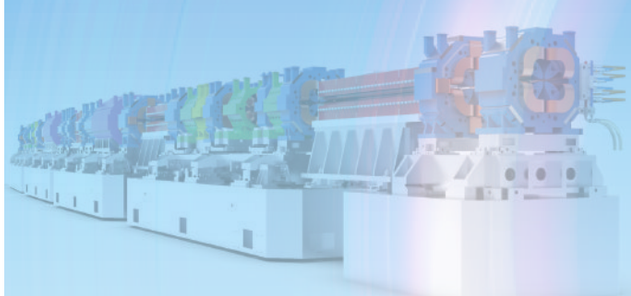
MEDSI 2023

Beijing · China

The 12th International Conference on Mechanical Engineering Design of Synchrotron Radiation Equipment and Instrumentation

Nov. 6 - 10, 2023 Beijing · China

CONFERENCE GUIDE



中國科學院高能物理研究所
Institute of High Energy Physics, Chinese Academy of Sciences

高能同步辐射光源
High Energy Photon Source | HEPS

The High Energy Photon Source (HEPS)

IHEP

The Institute of High Energy Physics (IHEP), a Chinese Academy of Sciences research institute, is China's biggest laboratory for the study of particle physics. We want to understand the universe better at the most fundamental level – from the smallest subatomic particles to the large-scale structure of the cosmos. We also want to use the knowledge and technology that comes from our research for the good of humanity. As well as theoretical and experimental research into particle and astroparticle physics, we have a broad range of research in related fields such as accelerator technologies and nuclear analysis techniques. The Institute also provides beam facilities for researchers in other fields of study.

Working at IHEP are over 1400 full-time staff, as well as over 500 postdocs and graduate students. Particle physics is a very collaborative and a very international field, and we have partnerships and experiment collaborations with dozens of universities and research institutions across China and worldwide.

IHEP's main campus is at Yuquan Road in the west part of Beijing. The Beijing campus hosts the Beijing Electron-Positron Collider, the BESIII experiment, the Beijing Synchrotron Radiation Facility, and most of IHEP's research and administrative staff.

The Dongguan campus, in Guangdong province in the south of China, is home to the China Spallation Neutron Source facility (currently under construction). In addition, IHEP runs experiment sites at Daya Bay and Jiangmen (both in Guangdong Province and Daocheng (Sichuan).

You can find more information about IHEP on the site (http://english.ihep.cas.cn/), or you can contact us at ihep@ihep.ac.cn.

HEPS

The High Energy Photon Source (HEPS), under construction since 2019, is located in the northern core area of Huairou Science City (HSC) and is one of HSC's large scientific facilities. When it is commissioned, HEPS will not only be the first high energy light source in China but also one of the brightest fourth-generation synchrotron radiation facilities in the world.

HEPS complex buildings resemble a magnifying glass, thus aptly symbolizing the role of HEPS as a powerful tool for characterizing the microstructure of matter. As one of the key projects listed in the 13th Five-year Plan for national major scientific and technological infrastructure construction, HEPS is an important platform for original and innovative research in the fields of basic science and engineering research. The HEPS project, undertaken by the Institute of High Energy Physics of the Chinese Academy of Sciences, comprises accelerators, beamlines and utility facilities. The estimated construction period is scheduled for six and a half years.

The storage ring of HEPS is 1360.4 m in circumference. Its electron energy is 6 GeV and its brightness is more than 1×10^{22} phs/s/mm^2/mrad^2/0.1%BW. By using a 7-Bending Achromatic (7BA) lattice, the horizontal emittance of the electron beam can surpass 60 pm·rad, which is the main feature of the fourth-generation diffraction limited light source.

HEPS can accommodate more than 90 high-performance beamlines and stations. Phase I involves construction of 14 user beamlines and stations for researchers in the fields of engineering materials, energy materials, environmental research, health studies and pharmaceutical development, and catalysts in the petrochemical industry, among others.

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The 12th International Conference on Mechanical Engineering Design of Synchrotron Radiation Equipment and Instrumentation

Welcome Message

Dear Colleagues and Friends,

It is our great pleasure to welcome you to the 12th International Conference on Mechanical Engineering Design of Synchrotron Radiation Equipment and Instrumentation (MEDSI2023) in Beijing, China, from 6 to 10 November 2023.
The conference aims to enable collaboration on cutting-edge instrumentation and technology, as well as novel research and development, that drives the rapid advancement in the field of synchrotron radiation and free-electron laser light sources worldwide.
The conference topics include insertion devices, magnets, storage rings, front ends, beamlines, optics, end station instrumentation, and core technology development in vacuum, cryogenic, optics, and precision mechanics.
The MEDSI2023 program includes 4 invited and 37 contributed talks, poster presentation sessions with 160+ posters, as well as 40+ industrial exhibitors. All properly presented contributions will be edited and published as JACoW Proceedings.
The MEDSI2023 has over 300+ delegates from worldwide, to have the opportunity to showcase and exchange cutting-edge developments in mechanical design and engineering of synchrotron-based instrumentation.
We warmly welcome you to attend this important event. We wish you enjoy MEDSI2023 and have a good time in Beijing.

Yours sincerely,

Yuhui Dong
MEDSI2023 Conference Chair

Ping He
MEDSI2023 SPC Chair

Source: HEPS Project Office

International Organizing Committee

Brad Mountford (ANSTO)
Deming Shu (APS)
Carles Colldelram (ALBA)
June Rong Chen (NSRRC)
Will Hutcheson (LBL)
Keihan Tavakoli (SOLEIL)
Sunao Takahashi (SPring-8)
Lixin Yin (SINAP)
Ping He (IHEP)
Martin Dommach (XFEL)
Ralph Doehrmann (DESY)
Yifei Jaski (APS)
Sarah Macdonell (DIAMOND)
Phillipe Marion (ESRF)
Lin Zhang (SLAC)
Sushil Sharma (BNL)

Scientific Program Committee

Chair: Ping He
Tiandou Hu
Weifan Sheng
Huamin Qu

Local Organizing Committee

Conference Chair: Yuhui Dong
Scientific Secretary: Lin Bian
Editor-in-Chief: Zhichu Chen Lu Li
Ye Tao
Ping He
Pei Zhang
Lijun Guo
Quanlin Li
Yin Li
Mengyao Yuan
Meijuan Yu
Xitong Sun
Shaozhen Liu

Date

November 6 - November 10, 2023

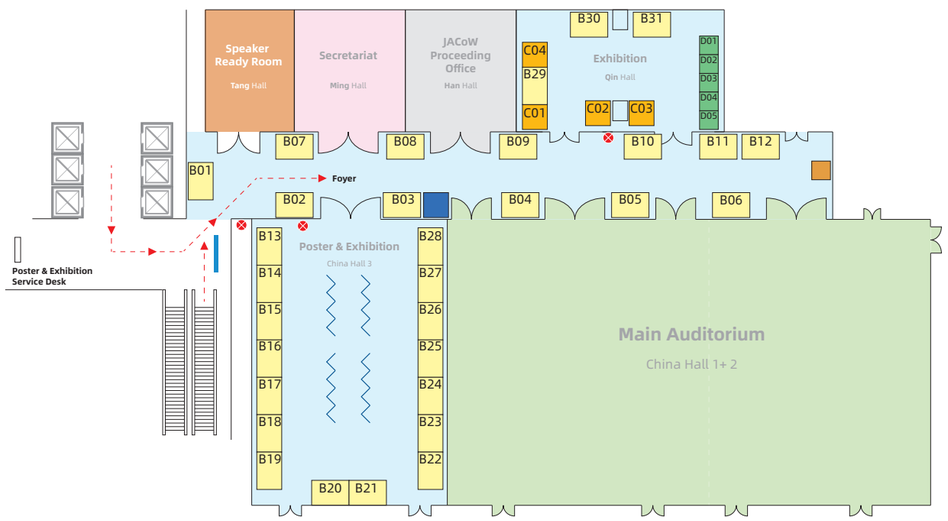
Topics

- MC1：Photon Delivery and Process
- MC2：Core Technology Developments
- MC3：New Facility Design and Upgrade
- MC4：Simulation
- MC5：Precision Mechanics
- MC6：Accelerators

Venue

Hotel: Wanda Realm Beijing 北京英协万达嘉华酒店
Add: No. Jia 18 Shijingshan Road, Shijingshan District, Beijing, P. R. China
地址：北京市石景山区石景山路甲 18 号 1 号楼

5F FLOOR PLAN



5F of the hotel

Main Auditorium at China Hall 1+2

Poster & Exhibition at China Hall 3

Exhibition at Foyer of China Hall & Qin Hall

JACoW Proceeding Office at Han Hall

Speaker Ready Room at Tang Hall

Secretariat at Ming Hall

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Smoking Policy

The venue is a non-smoking facility. Participants are requested to refrain from smoking in all areas.

WiFi

Free WiFi for participants.

5F Conference Area

Name: MEDSI2023

Password: ihepheps

Hotel

Name: WandaHotels

1. Access code will be sent to you by SMS after you fill in your mobile phone number (for mainland China +86 numbers only).

2. WeChat Authorized Login

If you cannot receive the code, please come to the front desk of the hotel. The staff there will help you.

Registration & Information Desk

Date	Opening Hours	Location
Monday, Nov. 6, 2023	13:30-20:00	1F Lobby
Tuesday, Nov. 7, 2023	08:00-17:30	
Wednesday, Nov. 8, 2023	08:00-17:30	5F Secretariat at Ming Hall
Thursday, Nov. 9, 2023	08:00-16:10	
Friday, Nov. 10, 2023	08:00-13:30	

JACoW Proceeding Office, Speaker Ready Room & Secretariat

Date	Opening Hours	Location
Monday, Nov. 6, 2023	13:30-20:00	5F JACoW Proceeding Office at Han Hall Speaker Ready Room at Tang Hall Secretariat at Ming Hall
Tuesday, Nov. 7, 2023	08:00-17:30	
Wednesday, Nov. 8, 2023	08:00-17:30	
Thursday, Nov. 9, 2023	08:00-16:10	
Friday, Nov. 10, 2023	08:00-13:30	

Poster & Exhibition Service Desk

The Poster & Exhibition Service Desk is on 5F, daily opens at 08:00 from Nov. 7 to Nov. 10, 2023.

The schedule for the poster session is as follows:

Date	Time	Schedule
Young Delegate Poster Session (including all the Classifications)		
Tuesday, Nov. 7, 2023	Before 10:00	Putting up your poster
	16:10-17:30	Poster Session
	17:30-18:30	Remove your poster
Photon Delivery and Process / Core Technology Developments / New Facility Design and Upgrade		
Wednesday, Nov. 8, 2023	Before 10:00	Putting up your poster
	16:10-17:30	Poster Session
	17:30-18:30	Remove your poster
Simulation / Precision Mechanics / Accelerator		
Thursday, Nov. 9, 2023	Before 10:00	Putting up your poster
	14:50-16:10	Poster Session
	After 16:10	Remove your poster

Lunch, Welcome Reception & Conference Dinner, and Coffee Break

Registration fee includes daily buffet lunch, welcome reception, conference dinner, and coffee breaks.

Lunch (Ticket Required)

Date and Time: 12:10-13:30, Nov. 7-10, 2023

Location: 2F Beijing Ballroom

Welcome Reception (Ticket Required)

Time: 16:00-18:00, Monday, Nov 6, 2023

Location: 1F Lobby Lounge

Conference Dinner (Ticket Required)

Time: 18:30-21:00, Thursday, Nov. 9, 2023 (after outing)

Location: Grand Mansion Restaurant (Zheng Yuan Da Zhai Men) 正院大宅门（西翠路店）
No. 11 Xicui Road, Haidian District, Beijing 北京市海淀区西翠路 11 号

The restaurant is built as Siheyuan, an ancient Chinese-style courtyard house. Grey bricks, wooden carving ornaments on the wall, ancient Chinese furniture, and red palace lanterns. These, at once, bring you to a scenario of a rich traditional Chinese family.

The food is a fusion of Beijing, Hangzhou, Sichuan, and Cantonese styles.

During the dinner, enjoy the Chinese Traditional Performances of Peking Opera, Face Changing Show, Acrobatics, and Chinese traditional music instruments – Erhu.

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Coffee Break

Coffee breaks are served at the exhibition area at the Foyer, China Hall 3 & Qin Hall.

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BESTEC

Outing (Shougang Park)

Departure Time: 16:10, Thursday, Nov. 9, 2023

Pick-up Point: 1F Hotel Lobby

About Shougang Park

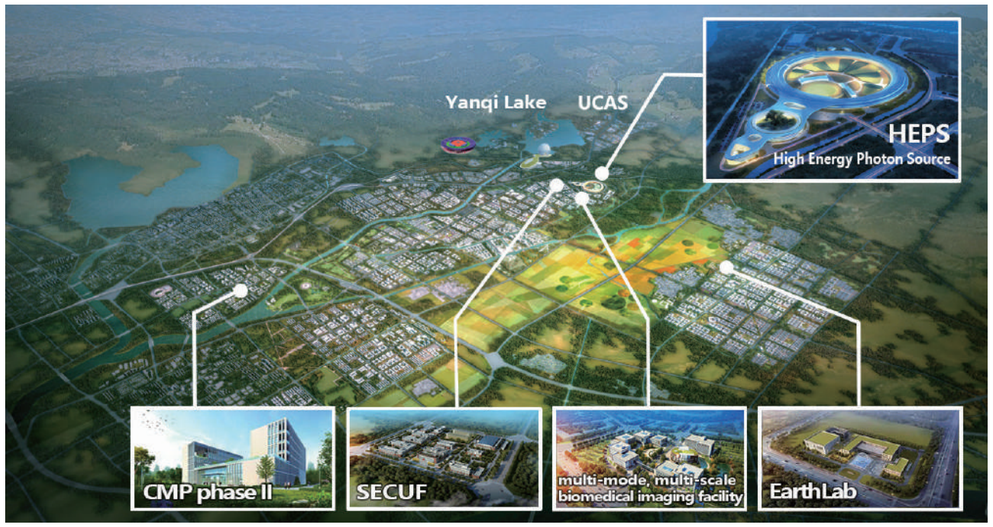
Since 2005, Shougang Group (Capital Iron and Steel Company, and Shougang for short) had started its steel business relocation and stopped all steel-related operations in the capital by the end of 2010. Today, Shougang Park has successfully transformed from a country-famous steel mill to a modern comprehensive zone housing technology, culture, commerce, and sports industries, setting an example of urban renewal for the rest of the world.

Facility Tour (HEPS)

Departure Time: 13:30, Friday, Nov. 10, 2023
Pick-up Point: 1F Hotel Lobby

HEPS-SECUF, two of five national major science facilities in Huairou Science City ("HSC").

Huairou Science City ("HSC"), an integral part of the "Three Cities and One Zone" in Beijing's vision for a globally influential science and technology innovation center, is a key area of Beijing Huairou National Comprehensive Science Center approved by the National Development and Reform Commission and the Ministry of Science and Technology of the People's Republic of China. It is an important pillar supporting the development of an innovation-oriented nation and a global technological powerhouse.
A cluster of scientific and technological facilities and platforms has taken shape in the area. Of these, 29 scientific and technological platforms are planned.



Emergency Numbers

Police (Calling)	110
Police (Text message)	12110
First-aid Ambulance	120
Fire	119
Traffic Accidents	122

110, 120, and 119 are free calls. 110 may be used for all emergencies. It is the first number to call. Whether 119 or 120 is called depends on the situation.

Local Contact Information:
Ms. Xiaolan Bao, +86 139 1151 0448
Ms. Qu Chen, +86 139 0108 5466

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The 12th International Conference on Mechanical Engineering Design of Synchrotron Radiation Equipment and Instrumentation

Program at a Glance

MEDSI 2023 PROGRAM

V2023.10.30

	MONDAY	TUESDAY		WEDNESDAY
	NOV 6	NOV 7		NOV 8
8:00	Main Classifications MC1: Photon Delivery and Process MC2: Core Technology Developments MC3: New Facility Design and Upgrade MC4: Simulation MC5: Precision Mechanics MC6: Accelerator	**Registration (8:00-17:30)**		
		TU Morning Session Chair: Yuhui Dong (IHEP)		**WE Morning Session Chair: Keihan Tavakoli (SOLEIL)**
9:00-9:10		**Conference Welcome -Yuhui Dong (Conference Chair)**		**Keynote Talk 2: The Progress of HEPS Project -Ping He (IHEP) (9:00-10:00)**
9:10-10:00		**Keynote Talk 1: Mechanics and Multi-physics Analyses to Serve X-ray Photon Science -Lin Zhang (SLAC) (9:10-10:10)**		
10:00-10:10				**Group Photo**
10:10-10:30		**Exhibitor Talk & Coffee Break (10:10-10:30)**		**Coffee Break (10:10-10:30)**
10:30-12:10		**TUOAM: Photon Delivery and Process A (10:30-12:10)**		**WEOAM: Core Technology Developments (10:30-12:10)**
		Upgrade of European XFEL Beam Shutters for Full Beam Operation -Martin Dommach (EXFEL)		High-Throughput Data Orchestration and Streaming System for High Energy Photon Source -Chenglong Zhang (IHEP)
		Update of the BM18 ESRF Beamline Development: Presentation of Selected Equipment and Their Commissioning -Pierre Van Vaerenbergh (ESRF)		A Vacuum Aspirated Cryo Cooling System (VACCS) -Bodvar Olafsson (DLS)
		Progress of Beamlines Design and Key Technologies of Hefei Advanced Light Facility -Xuewei Du (USTC)		Magnetic Levitation on a Budget -Jonathan Kelly (DLS)
		New Developments and Status of XAIRA, the New Microfocus MX Beamline at the ALBA Synchrotron -Nahikari Gonzalez (ALBA-CELLS)		Development of Low-Frequency Superconducting Cavities for High Energy Photon Source -Xinying Zhang (IHEP)
		Thermal-Deformation Based X-Ray Active Mirror Development: Modulation and Metrology -Fugui Yang (IHEP)		Zero-Length Conflat Flange Nonevaporable Getter (NEG) Pump Manufactured by Oxygen-Free Pd/Ti Deposition -Kazuhiko Mase (KEK)
12:10-13:30		**Lunch (12:10-13:30)**		**Lunch (12:10-13:30)**
13:30-15:50	**Registration (13:30-20:00)**	**TU Afternoon Session Chair: Brad Mountford (ANSTO)**		**WE Afternoon Session Chair: Martin Dommach (EXFEL)**
		TUOBM: Photon Delivery and Process B (13:30-15:50)		**WEOBM: MC2 & MC3 & MC4 & MC5 (13:30-15:50)**
		ForMAX: A Beamline for Multi-Scale and Multi-Modal Structural Characterisation of Hierarchical Materials -Joaquín Benchomo González Fernández (MAX IV)		Challenges and Solutions for the Mechanical Design of SOLEIL-II -Keihan Tavakoli (SOLEIL)
		SAPOTI - The New Cryogenic Nanoprobe for the CARNAUBA Beamline at Sirius/LNLS -Renan Ramalho Geraldes (LNLS)		Development of the Bent Focusing Mirror in HEPS From Design to Test -Minwei Chen (IHEP)
		SAXS Instrumentation at SAXSMAT beamline for Materials Research at PETRA III -Saskia Pfeffer (DESY)		The Design and Progress of the Network and Computing System for HEPS -Hao Hu (IHEP)
		Research and Application of Two-Dimensional Energy Spectrum Imaging of Synchrotron Radiation -Zhongliang Li (SSRF)		Advancing Simulation Capabilities at European XFEL: A Multidisciplinary Approach -Fan Yang (EXFEL)
		The Progress in Design, Preparation and Measurement of MLL for HEPS -Shuaipeng Yue (IHEP)		Thermal Calculation and Testing of SLS 2.0 Crotch Absorbers -Xinyu Wang (PSI)
		MINERVA, a New X-ray Facility for the Characterization of the ATHENA Mirror Modules at the ALBA Synchrotron -Antonio Carballedo (ALBA-CELLS)		Extension of the IXS High Resolution Monochromator for the RIXS experiment at the Petra III Beamline P01 -Frank-Uwe Dill (DESY)
		Newly Developed Wavefront Metrology Technique and Applying in Crystal Processing -Fang Liu (IHEP)		Design, Modeling and Analysis of a Novel Piezoactuated XY Nanopositioner Supporting Beamline Optical Scanning -Lingfei Wang (IHEP)
15:50-16:00		**Exhibitor Talk & Coffee Break(15:50-16:10)**		**Exhibitor Talk & Coffee Break (15:50-16:10)**
16:00-16:30	**Welcome Reception (16:00-18:00)**	**TUPYP: Young Delegate Poster Session (54pcs) (16:10-17:30)**		**WEPPP: Poster Session (MC1+MC2+MC3) 60pcs (16:10-17:30)**
16:30-17:00				
17:00-17:30				
17:30-18:00				
18:00-18:30				
18:30-20:30				**IOC Meeting (18:30-20:30)**

MEDSI 2023 PROGRAM

V2023.10.30

	THURSDAY		FRIDAY
	NOV 9		NOV 10
8:00			
	TH Morning Session Chair: Carles Colldelram (ALBA)		FR Morning Session Chair: Sarah Macdonell (DIAMOND)
9:00-9:10 9:10-10:00	**Keynote Talk 3: Nanopositioning at Sirius/LNLS Beamlines – a Review and Future Opportunities** **-Renan Ramalho Geraldes (LNLS)** (9:00-10:00)		**Keynote Talk 4: An Introduction to Accelerator Physics** **-Chuang Zhang (IHEP)** (9:00-10:00)
10:00-10:30	**Exhibitor Talk & Coffee Break** **(10:00-10:30)**		**Exhibitor Talk & Coffee Break** **(10:00-10:30)**
10:30-12:10	**THOAM: Precision Mechanics A** **(10:30-12:10)**		**FROAM: Accelerator** **(10:30-12:10)**
	Development and Qualification of Micrometric Resolution Motorized Actuators for the High Luminosity Large Hadron Collider Full Remote Alignment System -Michel Noir (CERN)		Design and Testing of HEPS Storage Ring Magnet Support System -Zihao Wang (IHEP)
	SmarGon MCS2: An Enhanced Multi-axis Goniometer With a New Control System -Wayne Glettig (PSI)		Vacuum System of SPS-II: Challenges of Conventional Technology in Thailand New Generation Synchrotron Light Source -Thanapong Phimsen (SLRI)
	Magnetically Levitated 6 DoF Controlled Sample Manipulator for Tomography -Theo Ruijl (MI-Partners)		New Kicker Chambers for the ESRF-EBS Storage Ring -Thierry Brochard, Laurent Eybert (ESRF)
	Overall Progress on Development of X-ray Mirror Mechanical Systems at High Energy Photon Source (HEPS) -Shanzhi Tang, Zhongrui Ren (IHEP)		Stability and Vibration Control for High Energy Photo Source in China -Fang Yan (IHEP)
	Modeling the Disturbances and the Dynamics of the New Micro CT Station for the Mogno Beamline at Sirius/LNLS -Gabriel Shen Baldon, Guilherme Sobral de Aubuquerque (LNLS)		**Closing Remarks & Best Poster Prize** **-Ping He (SPC Chair)**
12:10-13:30	**Lunch** **(12:10-13:30)**		**Lunch** **(12:10-13:30)**
13:30-15:50	**TH Afternoon Session Chair: Lin Zhang (SLAC)**		**Facility Tour (HEPS)** **13:30-19:00**
	THOBM: Precision Mechanics B **(13:30-14:50)**		
	Structural Dynamic Testing and Design Evaluation of the Formax Detector Gantry -Gabor Felcsuti (MAX IV)		
	First Results of a New Hydrostatic Leveling System on Test Procedures at Sirius -William Heinrich (SETUP)		
	Progress and Core Technologies Development of Monochromators for HEPS -Hao Liang (IHEP)		
	Development of a Mirror Chamber System for SHINE Project -Fang Liu (ShanghaiTech University)		
15:50-16:00 16:00-16:30	**THPPP: Poster session (MC4+MC5+MC6) 54pcs** **(14:50-16:10)**		
16:30-17:00 17:00-17:30 17:30-18:00 18:00-18:30	**Outing** **(16:10~18:30)**		
18:30-21:00	**Conference Dinner** **(18:30-21:00)**		

Information for Speakers

Please make sure that you finish your remarks within the time allocated for your presentation so that there is time for questions and discussion. Please upload your presentation following the instructions below. Use of individual laptops for displaying slides in the oral sessions cannot be accommodated.

Slide Size, Format, and Display

The projector's aspect ratio will be 16:9, but slides with a different aspect ratio such as 4:3 can be accommodated. Slides will be displayed via hardware running Microsoft Windows. There will be no provision for authors to use their personal computers under any circumstances.

Uploading your Presentation before the Conference

Please upload your electronic presentation via MEDSI2023 SPMS account as early as possible, but at the latest by 15:00 on the day before your presentation. Name the file with the paper code and «_talk» (for example, TUOAM01_talk.pptx, TUOAM01_talk.pdf) and then upload in the same way as for your paper. You can find the paper code assigned to your presentation when you log in to SPMS. Accepted formats are Microsoft PowerPoint and Adobe PDF.

At the Conference

Speakers who have not uploaded their files in advance, please upload them as described above or deliver them to Speaker Ready room at least one day in advance (Please note that we do not accept USB disc copies, you may try to download the file from your mailbox, etc.). We recommend all the speakers visiting Speaker Ready room to ensure that your presentation has been properly loaded and can be displayed correctly.

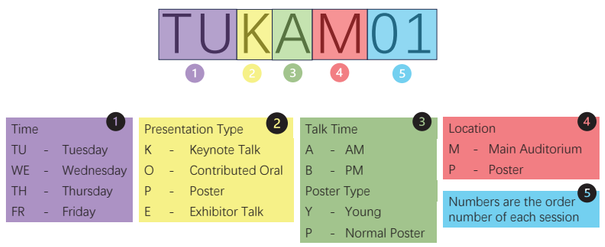
Slides that have been successfully uploaded will be made available on the conference website and published in the conference proceedings. If you have any special needs, please visit the Speaker Ready room.

During Your Presentation

The organizers will ensure that your slides are ready prior to your scheduled time slot. A pointer, slide controller, microphone, and timer will be provided.

The session chair assistant will help speakers with their presentations and any minor issues.

How do we code



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Poster Sessions Guidelines

There are three poster sessions from Tuesday (November 7) to Thursday (November 9) 2023 in the afternoon.

Date	Time	Schedule
Young Delegate Poster Session (including all the Classifications)		
Tuesday, Nov. 7, 2023	Before 10:00	Putting up your poster
	16:10-17:30	Poster Session
	17:30-18:30	Remove your poster
Photon Delivery and Process / Core Technology Developments / New Facility Design and Upgrade		
Wednesday, Nov. 8, 2023	Before 10:00	Putting up your poster
	16:10-17:30	Poster Session
	17:30-18:30	Remove your poster
Simulation / Precision Mechanics / Accelerator		
Thursday, Nov. 9, 2023	Before 10:00	Putting up your poster
	14:50-16:10	Poster Session
	After 16:10	Remove your poster

Poster sessions are at China Hall 3. The time slot is the time when the poster presenter must be attending the contribution. Each day is a different poster session. Therefore, poster presenters must be available for only one correlative session.

The poster must be placed at the assigned location early morning before the start of the morning coffee break.

Poster Session Managers will be available with the necessary material for display. The poster shall be removed after 17:30 of the corresponding session.

Authors are reminded that no contributions are accepted for publications only. Any poster accepted for presentation which is not presented at the conference will be excluded from the proceedings. The Scientific Committee reserves the right to refuse papers for publication if they have not been properly presented during the conference. Conference contributions are not accepted as publication and the corresponding contribution paper must be written and submitted before the conference starts.

Poster Preparation Guideline

The standard poster format is a DIN A0 (84.1 x 118.9 cm) in portrait orientation (vertical).
The conference organizers will provide necessary materials for poster mounting and Local Committee members will support delegates for mounting.
Each poster has an assigned location on a poster panel placed in the exhibition hall identified by the program code. A label on the panel indicates the poster code. A layout of the exhibition area is to be found in the conference booklet to be given at the beginning of the conference.

Best Poster Prize

Two Best Poster Prizes will be awarded at the close of the conference. Poster authors should pay attention to email notifications. Winners will be notified by email 1-2 days before the Award Ceremony at the Closing Ceremony on Nov. 10, and are required to attend.

Poster committee is the joint committee of the International Organizing Committee and the Scientific Program Committee. The awards will be decided based on the communication point of view, presentation, etc.

The Best Young Delegate Poster. The award aims to encourage graduate students and young scientists to take part in the MEDSI conference and will be awarded to the best poster by the first author* younger than 30 years old (born after Nov. 6, 1992). The winner will receive an award certificate and RMB3,000.

* The poster is supposed to be presented by the first author at conference. If not, the first author and the speaker should both be born after Nov. 6, 1992.

Sponsored by

lightsources.org

Lightsources.org is delighted to be sponsoring the best young delegate poster at MEDSI2023. Our collaboration of light source science communicators represents 30 facilities (23 synchrotrons and 7 Free Electron Lasers) and through our website, we provide one voice for the brightest science. Lightsources.org gathers up the latest news, jobs, student positions, events and proposal deadlines from our members. Our weekly e-newsletter provides highlights to subscribers every Friday.

The Best Poster. This prize will be awarded to the best poster of the conference. The winner will receive an award certificate and RMB3,000.

Sponsored by

Radiation Detection Technology and Methods

Radiation Detection Technology and Methods is delighted to sponsor MEDSI2023, and in particular, the best delegate poster at MEDSI2023. Radiation detection technology and methods is a peer-reviewed, international and interdisciplinary research journal that focuses on all aspects of radiation detection technology and methods. Columns include electronics and system design, computer and control techniques, detection technology and methods, data processing and imaging. It presents an attractive mix of authoritative and comprehensive reviews, original articles on cutting-edge research and brief communications. The journal offers rapid review and publication of articles.

Proceedings

The papers will be processed by the editorial team. Authors will be able to check the status of their paper(s) by logging into their MEDSI Author Account or at JACoW Proceeding office. Email notifications of the processing status will also be triggered to primary (submitting) authors as processing is completed. Please follow your email in proceeding and return promptly.
If you have any questions about your paper, please visit the JACoW Proceeding Office during the conference.

DETAILED PROGRAM AND ABSTRACTS

Source: HEPS Project Office

DETAILED PROGRAM AND ABSTRACTS

07-Nov-23 09:00 – 10:10 China Hall 1+2

TUKAM — TUKAM: Welcome and Keynote Talk 1

Chair: Y.H. Dong (IHEP)

TUKAM01 09:10

Mechanics and Multi-physics Analyses to Serve X-Ray Photon Science

L. Zhang *(SLAC)*

During more than 3 decades of my career, I have attested and contributed to the emergent and successful development of modern X-ray light sources such as 3rd generation and low emittance synchrotron, high rep-rate hard X-ray Free Electron Laser. Mechanics and multi-physics analyses can play an important role in the development of those light sources and instrumentation. Beyond the simple checking engineering design of instruments, we can use mechanics and multi-physics analyses to optimize the design, guide design and propose innovative design concept. Furthermore, we can also help interpretation of X-ray experiments. In this talk, we will cover from civil engineering foundation, slab, building, through high power photon beam management components, high performance X-ray optics, to micrometer scale Galfenol magnetostriction sample in EXAFS experiments: strain inversion due to mechanical constrain, and quantum nano structures: strain distribution. This talk will stay at high level of each topic to highlight what we can bring added value in terms of mechanics and multi-physics analyses. We intend to address to wide audiences including engineers, scientists.

07-Nov-23 10:30 – 12:10 China Hall 1+2

TUOAM — TUOAM: Photon Delivery and Process A

Chair: Y.H. Dong (IHEP)

TUOAM01 10:30 20

Upgrade of European XFEL Beam Shutters for Full Beam Operation

M. Dommach *(EuXFEL)*

The European XFEL, a Free-Electron-Laser facility in the Hamburg area (Germany), started user operation in September 2017. In full operation the novel facility will produce coherent femtosecond pulses with unprecedented brilliance in the energy range from 250 eV to 25 keV at MHz repetition rate. The facility consists of a linear accelerator and three photon beamlines, located in underground tunnels. Different sections of the beamlines can be closed with mechanical shutters, blocking the beam and allowing access to one of the tunnels or experimental hutches. Material damage tests have shown that the X-ray beam, in an extremely unlikely event, is capable of damaging the absorber in front of the shutters, if focusing elements like CRLs or bendable mirrors are not operated properly. To exclude such events, the power at different parts of the beam transport system is currently limited. In order to abolish this limitation an upgrade of all absorbers was carried out implementing new absorbing materials like CVD diamond and an active safety system. This presentation will give an overview of the new design, implementation and first commissioning results from an engineering point of view.

TUOAM02 10:50 20

Update of the BM18 ESRF Beamline Development: Presentation of Selected Equipment and Their Commissioning

F. Cianciosi*, A.-L. Buisson, P. Carceller, P. Tafforeau, P. Van Vaerenbergh (ESRF)*

The BM18 ESRF-EBS beamline has been tailored for hierarchical propagation phase-contrast tomography. The 220 m beamline benefits from the high-coherence at high-energy beam from a 1.56 T triple short wiggler of the new 4th generation storage ring. The beamline combines a resolution range from 80 µm down to 0.65 µm with the possibility to scan samples up to 2.5 m high for a diameter of 1 m. With a beam width up to 32 cm and energies ranging from 25 to 280 keV (polychromatic), the main applications are material sciences, cultural heritage, geology, biomedical imaging and industrial applications. This article highlights specific equipment that were not described in previous publications, like the in-vacuum cooled alternative fast shutter for high-energy, the 40 cm wide aluminium window and tailored high-precision slits (opening of 400x200 mm), as well as the 33 tons large sample stage which has been designed, tested and installed by the company LAB Motion System. 2022 and 2023 have seen the installation and commissioning of these new equipment. The beamline opened for user applications in September 2022 with limited capabilities and is increasing its possibilities since then.

TUOAM03 11:10 20

Progress of Beamlines Design and Key Technologies of Hefei Advanced Light Facility

X.W. Du*, J. Chen, Z.K. Liu, Q.P. Wang, Z. Wang, S. Wei (USTC/NSRL)*

A new synchrotron radiation light source, Hefei Advanced Light Facility (HALF), is under construction. This is the fourth-generation diffraction limited light source located in the low energy region. The storage ring energy is 2.2 GeV, the circumference is about 480 m, and the horizontal beam natural emittance is about 86.3 pm.rad. Ten beamlines, including three coherent beamlines, will be built in the first phase. Due to the high coherence, high brightness and high resolution characteristics of diffraction limited light source, the beamline faces new challenges. This talk will present the progress of beamlines design and some key technology R&D of HALF.

TUOAM04 11:30 20

New Developments and Status of XAIRA, the New Microfocus MX Beamline at the ALBA Synchrotron

NGonzález*, C. Colldelram, A. Crisol, D. Garriga, J. Juanhuix, J. Nicolás, M. Quispe, I. ics (ALBA-CELLS)*

The new BL06-XAIRA microfocus macromolecular crystallography beamline at ALBA synchrotron is currently under commissioning and foreseen to enter into user operation in 2024. The aim of XAIRA is to provide a 4-14 keV, stable, high flux beam, focused to $3\times1\,\mu m^2$ FWHM. The beamline includes a novel monochromator design combining a cryocooled Si(111) channel-cut and a double multilayer diffracting optics for high stability and high flux; and new mirror benders with dynamical thermal bump and figure error correctors. In order to reduce X-ray parasitic scattering with air and maximize the photon flux, the entire end station, including sample environment, cryostream and detector, is enclosed in a helium chamber. The sub-100 nm SoC diffractometer, based on a unique helium bearing goniometer also compatible with air, is designed to support fast oscillation experiments, raster scans and helical scans while allowing a tight sample to detector distance. The beamline is also equipped with a double on-axis visualization system for sample imaging at sub-micron resolutions. The general status of the beamline is presented here with particular detail on the in-house fully developed end station design.

TUOAM05 11:50 20

Thermal-Deformation Based X-Ray Active Mirror Development: Modulation and Metrology

F.G. Yang*, M. Li, W.F. Sheng, S.F. Wang, X.W. Zhang (IHEP)*

Advanced light source require small wavefront distortion to maintain the quality of the X-ray beam. Active optical wavefront correction technology is a very important solution to solve the service problems of ultra-precise devices under such conditions. In this paper, we will report our recent progress on this active optics system development including surface metrology and mirror modulation. Based on the research of laser-heating-based thermal deformation modulation technology, this project proposes to modify the mirror surface of X-ray mirrors based on semiconductor microfabrication process, and modulate the local deformation of the mirror surface by electric heating to realize the surface shape correction/modulation of X-ray mirrors. Since the modulation unit acts directly on the reflective region of the mirror surface, it has a better surface shape correction capability than the conventional body deformation modulation. The solution also has the advantage of high efficiency and low cost.

07-Nov-23 13:30 – 15:50 China Hall 1+2

TUOBM — TUOBM: Photon Delivery and Process B

Chair: B. Mountford (ANSTO)

TUOBM01 13:30 20
ForMAX: A Beamline for Multi-Scale and Multi-Modal Structural Characterisation of Hierarchical Materials
J.B. González Fernández*, V.H. Haghighat, S.A. McDonald, K. Nygard, L.K. Roslund (MAX IV Laboratory, Lund University)*
ForMAX is an advanced beamline at MAX IV Laboratory, enabling multi-scale structural characterization of hierarchical materials from nm to mm length scales with high temporal resolution. It combines full-field microtomography with small- and wide-angle x-ray scattering (SWAXS) techniques, operating at 8-25 keV and providing a variable beam size. The beamline supports SWAXS, scanning SWAXS imaging, absorption contrast tomography, propagation-based phase contrast tomography, and fast tomography. The experimental station is a versatile in-house design, tailored for various sample environments, allowing seamless integration of multiple techniques in the same experiment. The end station features a nine-meter-long evacuated flight tube with a motorized small-angle x-ray scattering (SAXS) detector trolley. Additionally, a granite gantry enables independent movement of the tomography microscope and custom-designed wide-angle x-ray (WAXS) detector. These features facilitate efficient switching and sequential combination of techniques. With commissioning completed in 2022, ForMAX End Station has demonstrated excellent performance and reliability in numerous high-quality experiments.

TUOBM02 13:50 20
SAPOTI - The New Cryogenic Nanoprobe for the CARNAUBA Beamline at Sirius/LNLS
R.R. Geraldes*, G.G. Basilio, J.L. Brito Neto, V.B. Falchetto, D. Galante, R.C. Gomes, A.Y. Horita, L.M. Kofukuda, F.R. Lena, M.B. Machado, Y.A. Marino, E.O. Pereira, P.P.R. Proença, C.A. Pérez, M.H. Siqueira da Silva, A.P.S. Sotero, R.A.A. Taniguchi, V.C. Teixeira, H.C.N. Tolentino (LNLS)*
SAPOTI will be the second nanoprobe to be installed at the CARNAUBA (Coherent X-Ray Nanoprobe Beamline) beamline at the 4th-generation light source Sirius at the Brazilian Synchrotron Light Laboratory (LNLS). Working in the energy range from 2.05 to 15 keV, it has been designed for simultaneous multi-analytical X-ray techniques, including absorption, diffraction, spectroscopy, fluorescence and luminescence, and imaging in 2D and 3D. Highly-stable fully-coherent beam sizes between 30 and 120 nm, with monochromatic flux up to 10^{11} ph/s/100 mA/0.01 %BW, are expected with an achromatic KB (Kirkpatrick-Baez) focusing optics, whereas a new in-vacuum high-dynamic cryogenic sample stage has been developed aiming at single-nanometer-resolution images via high-performance 2D mapping and tomography. This work reviews and updates the entire high-performance mechatronic design and architecture of the station, as well as the integration results of its several modules, including automation, thermal management, dynamic performance, and positioning and scanning capabilities. Commissioning at the beamline is expected in early 2024.

TUOBM03 14:10 20
SAXS Instrumentation at SAXSMAT Beamline for Materials Research at PETRA III
S.P. Pfeffer *(DESY)*
The SAXSMAT Beamline P62 at PETRA III (DESY) can perform small- and wide-angle X-ray scattering simultaneously. The SAXS instrument is based on a tube system with SAXS detector inside under high vacuum conditions (~10^{-5} mbar). The tube system is 13 m long with a diameter of 1 m. The tube system allows continuous movement of the detector along the beam direction and is made possible by means of a rack and pinion drive. The distance of the detector can be changed without breaking the vacuum, resulting in time savings during operation. The vacuum compatible detector can moved over a travel range of 12 m. The two motors are water-cooled with a simple pipe coil of copper. All cables and cooling pipes will be moved with the help of a counter rotating drag chain, made by stainless steal.

TUOBM04 14:30 20
Research and Application of Two-Dimensional Energy Spectrum Imaging of Synchrotron Radiation
Z.L. Li *(SSRF)*
In order to measure the operando synchrotron radiation crystal monochromator performance, an analysis crystal in the configuration perpendicular to the monochromator is used to carry out the dispersion modulation of the beam in the horizontal direction, so that the 2D spatial distribution of the diffraction spot could have the energy spectrum characteristics. Through analysis of photon numbers in different positions, the spatial distribution of photon flux and peak shift can be obtained to characterize the changes in the beam energy spectrum which can quantitatively reflect the characteristics of the monochromator. In this paper, a special detecting system consisting of an orthogonal analyzer and a 2D imaging camera was used to analyze the spectrum characteristics of beam variation, which could be used to quantitatively measure the energy bandwidth of monochromator, the thermal deformation of crystal and the stability of beam angle. The spectral resolution of the system is only determined by the pixel size of the imaging camera. The quantitative characterization of operando monochromator performance is realized, which provides data support for beamline performance optimization.

TUOBM05 14:50 20
The Progress in Design, Preparation and Measurement of MLL for HEPS
S.P. Yue*, G.C. Chang, Q. Hou, B.J. Ji, M. Li (IHEP)*
The multilayer Laue lens (MLL) is a promising optical element with large numerical aperture and aspect ratio in synchrotron radiation facility. Two multilayers with 63(v)×43(h) μm^2 aperture and focal spot size of 8.1(v)×8.1(h) nm^2 at 10 keV are fabricated by a 7-meter-long Laue lens deposition machine. Ultrafast laser etching, dicing and FIB are used to fabricate the multilayer into two-dimensional lenses meeting the requirement of diffraction dynamics. The multilayer grows flat without distortion and shows an amorphous structure characterized by TEM and SAED. The smallest accumulated layer position error is below ±5 nm in the whole area and the rms error is about 2.91 nm by SEM and image processing. The focusing performance of MLL with actual film thickness is calculated by a method based on the Takagi-Taupin description (TTD). The full width at half maximum(FWHM) of focus spot is 8.2×8.4 nm^2 which is close to the theoretical result.

TUOBM06 15:10 20
MINERVA, a New X-ray Facility for the Characterization of the ATHENA Mirror Modules at the ALBA Synchrotron
A. Carballedo*, J.J. Casas, C. Colldelram, A. Crisol, G. Cuní, D. Heinis, J. Marcos, O. Matilla, J. Nicolás, A. Sanchez, N. Valls Vidal (ALBA-CELLS) M. Bavdaz, I. Ferreira (ESA-ESTEC) L. Cibic, M. Krumrey (PTB) M.J. Collon, G. Vacanti (Cosine Measurement Systems)*
In this paper we present the newly built beamline MINERVA, an X-ray facility at the ALBA synchrotron. The beamline has been designed to support the development of the X ray observatory ATHENA (Advanced Telescope for High Energy Astrophysics). MINERVA will host the necessary metrology equipment to integrate the stacks produced by cosine in a mirror module (MM) and characterize their optical performances. The optical and mechanical design is based on the XPBF 2.0 from the Physikalisch-Technische Bundesanstalt (PTB), at BESSY II already in use to this effect and its construction is meant to significantly augment the capability to produce MM. The development of MINERVA has addressed the need for improved technical specifications, overcome existing limitations and achieve enhanced mechanical performances. We describe the design, construction process and implementation of Minerva that lasted three years. Even though the beamline is still under a commissioning phase, we expose tests and analysis that have been recently performed, remarking the improvements accomplished and the challenges to overcome, in order to reach the operational readiness for the mirror modules mass production.

TUOBM07 15:30 20
Newly Developed Wavefront Metrology Technique and Applying in Crystal Processing
F. Liu*, Q.S. Diao, Z.H. Hong, M. Li, H. Lian, J.L. Yang (IHEP)*
In this work, we firstly propose an innovative wavefront metrology method at Beijing Synchrotron Radiation Facility (BSRF), named the double edges scan (DES) wavefront metrology technique. As the method resolved several vital problems of the first-generation synchrotron radiation source, including inferior lateral coherence, poor stability, and distortion of incident wavefront, it realized diffraction limit level wavefront metrology and has been successfully applied to crystal processing, which regarded as an important feedback of the fourth-generation synchrotron radiation source crystal fabrication process. The DES can achieve the precision better than 22.5 nrad (rms) with a 50 microns lateral resolution on crystal surface. The crystal we measured was processed by magnetically controlled small tool, which is also a creative processing technic. The technique gets rid of the limitation of the power system and transmission system, and realized the free machining of channel-cut crystal with narrow space.

07-Nov-23 16:10 – 17:30 China Hall 3

TUPYP — Young Delegate Poster Session TUPYP
Chair: B. Mountford (ANSTO)

TUPYP001 **Shining Light on Precision: Unraveling X-ray Beam Positioning Monitors at the Australian Synchrotron**
***B. Lin**, J. McKinlay, S. Porsa, Y.E. Tan (AS - ANSTO)*
X-ray beam positioning monitoring technology plays an important role in synchrotron facilities, gaining increasing significance as light sources move towards smaller source sizes and nanoscale sample probing. At the Australian Synchrotron (AS), the need for non-destructive XBPMs in the beamline front ends led to the development and installation of an in-house prototype using the photoelectric effect in 2021. This prototype served as a proof of concept and an initial step towards creating a customised solution for real time X-ray position monitoring. Of the new beamlines being installed at the AS, the MX3 and Nanoprobe beamlines require XBPMs due to their small spot size and high stability requirements. However, a significant hurdle is the short distance from the source point to the XBPM location, resulting in an extremely restricted aperture to accurately monitor the beam position. Scaling down the photoelectric prototype to accommodate the available space has proven challenging, prompting us to explore alternative designs that utilize temperature-based methods to determine the beam position. This poster will detail insights made investigating these alternative methods and design.

TUPYP002 **Equipment Protection Shutter for the Sirius Beamlines Pre Front Ends**
***L.C. Arruda**, W.L. Andrade, G.T. Barreto, F.G.R. Carrera, D.R. Cavalcante, J.V.B. Franca, A.L. Malandrin, B.M. Ramos, T.M. Rocha, G.L.M.P. Rodrigues, D.R. Silva, G.H. Silva, U.R. Sposito, L.M. Volpe (LNLS) P.H.S. Martins, D. Passuelo (CNPEM)*
Due to equipment safety at Sirius, the Brazilian 4th generation synchrotron light source, there are conditions where the need to interrupt the beam being provided by the storage ring to the beamline is mandatory. To minimize the duration and quantity of storage ring beam interruptions as the number of beamlines increases, the installation of a new shutter was proposed between the storage ring and the beamline's front end. This work presents an overview of the project motivation, modes of failures and their effects, project validation, device operation, and preliminary results.

TUPYP004 **A Setup for the Evaluation of Thermal Contact Resistance at Cryogenic Temperatures Under Controlled Pressure Rates**
***B.A. Francisco**, M. Saveri Silva, W.H. Wilendorf, V.B. Zilli, G.S. de Albuquerque (LNLS)*
The design of optical elements compass different development areas, such as optics, structures and dynamics, thermal, and control. In particular, the thermal designs of mirrors aim to minimize deformations, whose usual requirements are around 5 nm RMS and slope errors in the order of 150 nrad RMS. One of the main sources of uncertainties in thermal designs is the inconsistency in values of thermal contact resistances (TCR) found in the literature. A device based on the ASTM D5470 standard was proposed and designed to measure the TCR among materials commonly used in mirror systems. Precision engineering design tools were used to deal with the challenges related to the operation at cryogenic temperatures (145 %) and under several pressures rates (1∼10 MPa) whilst ensuring the alignment between the specimens. We observed using indium as Thermal Interface Material reduced the TCR in 10–42.2 % for SS316/Cu contacts, and 31–81 % for Al/Cu. Upon analyzing the measurements, we identified some areas for improvements in the equipment, such as mitigating radiation and improving the heat flow in the cold part of the system that were implemented for the upgraded version.

TUPYP005 **On the Performance of Cryogenic Cooling Systems for Optical Elements at Sirius/LNLS**
***B.A. Francisco**, M.P. Calcanha, L.M. Kofukuda, M. Saveri Silva, L.M. Volpe (LNLS)*
Sirius' long beamlines are equipped with cryogenic cooled optics to take advantage of the Silicon thermal diffusivity and expansion at those temperatures, contributing to the preservation of the beam profile. A series of improvements was evaluated from the experience in the employment of such cooling systems during the early years of operation. The main topic refers to the prevention of instabilities in the temperature of the optics due to variations in the liquid nitrogen cylinder pressure, refill automation or progressive variations of the convective coefficient into the cryostat. This work discusses the performance of these systems after optimizing the pressure of the vessels and their control logics, the effectiveness of occasional purges, cool down techniques, and presents the monitoring interface and interlock architecture. Moreover, we present the reached solution for achieving higher beam stability, considering liquid nitrogen flow active control (commercial and in-house). Also propose the approach for the future 350 mA operation, including new braids and different cooling mechanisms.

TUPYP006 **Rhizomicrocosm Setup for in Vivo Soil-plant Interaction Studies at the TARUMA Station of the CARNAUBA Beamline**
***F.R. Lena**, G.G. Basilio, N.A. Ferreira, T.R. Ferreira, R.R. Geraldes, R.C. Gomes, L.R. Hesterberg, M.B. Machado, L.S. Perissinotto, C.A. Pérez, L.O. Romão, S.S. Susilaine, H.C.N. Tolentino, W.H. Wilendorf (LNLS) C. Celso, R.H. Tisdale (Rejected) T.R. Tiina (University of Southampton)*
TARUMA, at the Sirius facility in the Brazilian Synchrotron Light Laboratory (LNLS), is a versatile X-ray station supporting various nanoscale 2D and 3D X-ray techniques, including ptycho-CDI, XAS, XRD, XRF, and XEOL. The station design allows multiple sample setups for tailored studies, including in situ, operandum and now in vivo experiments. In this context, we introduce the Rhizomicrocosm, a sample setup developed for detailed plant root-soil interaction studies. The sample setup comprises multiple systems with high stiffness and eigenfrequencies, which are essential for nanometric resolution probing and minimal obstruction of the X-ray beam to enable broad-angle data collection with multiple detectors for 3D reconstruction. We also detail a modular subsystem facilitating the study of thin soil-filled capillary-grown roots and its integration with auxiliary instruments for soil characterization. An environmental control system allows temperature control of the air, humidity, CO_2 measurements, and illumination for the plant. These advancements enable novel, comprehensive plant root-soil interaction studies with unmatched spatial and chemical resolution.

TUPYP007 **Development of a Multi-Capillary Sample Holder With Peltier-Based Temperature Control for the CATERETÊ Beamline at Sirius**
***R.C. Moraes**, B.A. Francisco, F. Meneau, A.R. Passos, G.L.M.P. Rodrigues, L.M. Volpe, V.B. Zilli (LNLS)*
This work describes the development of a sample holder designed to accommodate multiple capillaries for use at the CATERETÊ beamline located at Sirius at the Brazilian Synchrotron Light Laboratory (LNLS). The sample holder was specifically designed to meet certain requirements, including the accommodation of five capillaries with a diameter of 1.5 mm, and incorporates a Peltier-based temperature control system, enabling cooling of the sample to 0 °C (273 K) and heating up to 100 °C. To ensure optimal performance, the system was subjected to thermal and fluid dynamics analyses within FEM. These analyses aimed to assess and optimize the thermal gradient in the sample holder, meeting the desired cooling and heating criteria. Overall, this work demonstrates the successful development of a sample holder that meets the specified requirements for capillary accommodation and precise temperature control.

TUPYP008 **Exactly Constrained, High Heat Absorbent Design for SABIA's First Mirror**
***V.B. Zilli**, G.G. Basilio, B.A. Francisco, A.C. Pinto, G.L.M.P. Rodrigues, M.S. Silva, L.M. Volpe (LNLS)*
The SABIA beamline (Soft x-ray ABsorption spectroscopy and ImAging) will operate on a range of 100 to 2000 eV, aiming to study magnetic materials. Thermal management on these soft x-ray beamlines is particularly challenging due to the high heat loads. SABIA's first mirror (M1) absorbs about 360 W, a power density of 0.52 W/mm^2, and to manage such heat load a water-cooled mirror was designed. With the intention of extending the mirror operation life-time, normally shortened on soft X-ray beamlines due to carbon deposition on the mirror optical surface, a procedure was adopted using high partial pressure of O_2 into the vacuum chamber during the commissioning phase. The internal mechanism was designed to be exactly constrained using folded leaf springs. I It presents one degree of freedom for control and alignment: a rotation around the vertical axis with a motion range of about 0.6 mrad, provided by a piezoelectric actuator and measured using vacuum compatible linear encoders. This work describes the SABIA's M1 exactly constrained, high heat absorbent design, its safety particularities compared to Sirius typical mirrors, and tests validation results.

TUPYP009 **The Design of an Exactly Constrained Bender Mechanism for JATOBÁ Beamline**
***V.B. Zilli**, B.C. Meyer, A.C. Pinto, M.S. Silva, L.M. Volpe, W.H. Wilendorf, G.S. de Albuquerque (LNLS)*
The new full X-ray scattering technique beamline at Sirius will operate on a range of 43 to 71 keV, the JATOBÁ beamline consisting of a large toroidal (2727 m x 86 mm) multilayer Si/W mirror (M1) which will focus and monochromatize the photon-beam extracted from a BC magnet, a set of slits, and a flat multiplayer Si/W mirror (M2). Due to the first mirror' large optical length of 600 mm and its figure being toroidal, this design deviates from the standard side bounce, fixed figure with an exactly constrained mechanism used so far at Sirius. We decided on using a novel exactly constrained bender mechanism to achieve the optical figure required with a deviation well below 0.5 % of its nominal radius and to ensure mechanical stability comparable to commonly found on Sirius mirror systems (above @100 Hz). By restricting the required degrees of freedom, combining the effects of gravity and a one-point force, and using an optimization method by parametrization on Ansys we were able to select a geometry with deformation below 25 nm Peak-to-Valley. A new concept of thermal coupling using Ga-In liquid metal is under evaluation, this would eliminate deformations by clamping.

TUPYP010 **A Novel Coating to Avoid Corrosion Effect and Vibration Coupling Between Eutectic Gallium-Indium Alloy and Heat Sink Metal for X-Ray Optics Cooling**
T. He, *M. Li, W.C. Liu, Z.N. Ou, Z.R. Ren, W.F. Sheng, S. Tang, J.L. Yang, H.H. Yu, X.M. Zhang (IHEP)* ***T. He***, *M. Li, W.C. Liu, W.F. Sheng, S. Tang, J.L. Yang, H.H. Yu, X.M. Zhang (University of Chinese Academy of Sciences)*
Although the vibration decoupling method based on eutectic gallium-indium (EGaIn) alloy performs excellent in suppressing parasitic vibration caused by the cooling medium and pipes of X-ray optics, the corrosion of EGaIn alloy to the heat sink metal still results in the solidification and the vibration decoupling failure. A novel anti-corrosion coating based on tungsten (W) is proposed. Through the analysis of the micromorphology and the chemical composition after heating for 36 hours at 250 °C, there is no obvious evidence that W is corroded which is more effective than the widely used coating of nickel (Ni). And the W coating by using magnetron sputtering has been implemented for feasibility validation. Its corrosion resistance mechanism has also been fully analyzed. Besides, finite element analysis on the differences of vibration decoupling after applying W coatings and Ni coatings are also carried out and discussed. Tungsten is proved to be a considerable coating for vibration decoupling to face up to the challenge of the ultra-high requirements of high stability (~10 nrad RMS), high surface shape accuracy (~50 nrad RMS) in diffraction-limited storage ring light source.

TUPYP011 **Design of New Crystal Attitude Adjustment Module**
D.S. Shen *(IHEP)*
Horizontal diffraction monochromator is a typical optical device in synchrotron radiation equipment, which is characterized by high angular accuracy and stability. The fourth generation light source has more strict requirements on spot stability and resolution. This paper introduces a new type of crystal attitude adjustment module, including the Angle adjustment mechanism and the roll Angle adjustment mechanism. In order to improve its stability, the flexible hinge with poor stiffness was optimized, and the auxiliary support hinge design was innovatively proposed to bear the axial load weight and increase the overall rigidity, and the stiffness of the mechanism was improved without increasing the driving force. Through the simulation calculation, the overall mode of the new crystal attitude adjustment module is 234 Hz, the maximum stroke of the casting Angle is ±0.5 °, and the maximum thrust required is only 40.0 N. As the distance between the motor and the rotating center is increased, the resolution is also improved when the same driving motor is used. The new crystal attitude control module offers significant improvements in both stability and resolution.

TUPYP012 **Mechanical Design of Water-cooled White Beam Collimating Bent Mirror System at HEPS**
J.Y. Wang, *M. Li, Z.R. Ren, W.F. Sheng, S. Tang, R.Z. Xu (IHEP)*
The main function of the Water-cooled White Beam Collimating Bent Mirror is to align the synchrotron radiation light to improve the resolution of its downstream monochromator; It also absorbs heat and reduces the heat load transmitted to the monochromator. Therefore, the accuracy of its posture directly affects the quality of the output beam. This article discusses the design of the device. It is mainly divided into 3 parts. The bending mechanism uses constant external force to elastically bend the optical elements to obtain the required surface shape. The cooling mechanism is used to reduce the thermal deformation of the mirror surface, thus reducing the surface error of the mirror. The overall mechanical system provides 5-DOF attitude adjustment. Based on this, this design adopts a combination scheme of a four-bar bender with independent bending moment, the copper blades inserted in the GaIn eutectic filled trough solution and 5-DOF attitude adjustment of multi-layer granite. Through a series of calculations, simulations and tests, it is demonstrated that the design indexes meet the requirements, thus verifying the feasibility of the scheme.

TUPYP013 **Highly Efficient Thermal Deformation Optimization Method for Smart-Cut Mirrors over the Entire Photon Energy Range**
S.F. Wang *(IHEP)*
For heat load generated by synchrotron radiation, it is a challenge to optimize the thermal deformation of the mirror over the entire photon energy range. A theoretical method is used to quantitatively evaluate the influence of the thermal load on the thermal deformation of the mirror. The result of theoretical calculations and finite element analysis (FEA) are consistent, which proves the feasibility of the method. The thermal deformation optimization theory proposed in this paper requires only one round optimization calculation and check computation in FEA. Significantly reduce the workload of mirror design. And the design work has taken care of all the photon energy points. Avoid optimizing mirrors at a certain energy point, resulting in large deformations at other energy points. In addition, designers can predict the thermal deformation of the mirror at a certain energy point without FEA simulation. This will provide guidance for the correction of the spherical item of the WBM's thermal deformation by downstream optics, such as focusing mirror, compound refractive lens (CRL) and so on.

TUPYP014 **Experimental Test of Flow and Heat Transfer Characteristics of the Absorber Cooling Structure in Front-Ends**
S.F. Wang *(IHEP)*
As a fourth-generation light source, the front-ends of HEPS (High Energy Photon Source) experiences extremely high thermal load, with a maximum peak power density of 766 kW/mrad^2 and a total power of 25 kW (@ ID07-Engineering Materials Beamline). The front-ends absorber employs enhanced convective heat transfer technology, which involves the introduction of copper springs into the cooling channels to generate vortex disturbance. This technique increases the relative flow velocity between the cooling water and the wall surface, enhances the disturbance, and strengthens the heat transfer between the cooling medium and the wall surface, thus achieving the effect of intensified convective heat transfer. This paper presents experimental tests on the flow and heat transfer characteristics of this flow disturbance element. The test results indicate that the pressure drop of this structure is proportional to its length, and the pressure drop of the structure without springs can be practically ignored. When the flow rate reaches 7.2 L/min, the pressure drop is 435 kPa/m, and the convective heat transfer coefficient is 28,000 W/m^2/K.

TUPYP015 **Investigation of Vibrations Attenuation with Different Frequency Along HEPS Ground**
Y. Yang, *F. Yan (IHEP) F. Fu, W. Wu, Y. Yan (CAU) L. Lei (Peking University)*
High Energy Photon Source (HEPS) has a strict restriction on vibration instabilities. To fulfill the stability specification, vibration levels on HEPS site must be controlled. The control standards are highly related with the vibration amplitude of the sources and the distance between sources and the critical positions. To establish reasonable regulations for new-built vibration sources, the decay patterns on ground are investigated on HEPS site for different frequency noises. A series of experiments were conducted using shaker to generate vibrations with frequency from 1 Hz up to 100 Hz. The vibration attenuation on ground and slab were measured using seismometers and the attenuation law were analyzed. Details will be presented in this paper.

TUPYP016 **Quick Scanning Verification of a Monochromator Spindle Based Servo Control at BSRF**
Z.K. Zekuan, *H. Liang (IHEP)*
A quick scanning monochromator built for Quick EXAFS experiments needs to perform 2 kinds of movements, one is fast movements in an oscillation way of the spindle, the other is step scan mode. Servo control has never been used on quick scanning monochromators. To verify the feasibility of the 2 modes on quick scanning monochromators by servo control, experiments are designed and carried out on a inhouse built air bearing spindle. An ACS controller is used to drive the motor, encoder provides the position feedback. A laser interferometer is used to measure the actual angular position of the spindle. Test method: The motor is controlled to move with a set trajectory of sinusoidal signals, and the feedback data from the interferometer and encoder are compared to verify the position and speed. The experiments show that with interferometer calibration, there is only 3 % systematic error in the encoder feedback value. Overall the stepping mode can achieve a resolution of 0.4 arcsecond per step, and the scanning mode can achieve a 50 Hz, 0.08° sine signal tracking. It is possible to get better results by using lighter loads and motors with better performance.

TUPYP017 **Precision Mechanical Design of a High Resolution Monochromator at the HEPS**
L. Zhang, *H. Liang, W.X. Xu (IHEP)*
The Nuclear Resonant Scattering (NRS) spectroscopy demands extremely high energy-resolving power better than 10^{-7}. Along with double crystal monochromators, the high Energy resolution monochromators are indispensable optical component for NRS and inelastic X-ray scattering spectroscopies. As an optical element upstream of focusing mirror, the HRM shall maintain a high stability in terms of positioning, which could influence the energy precision as well as the beam motion at sample position. By referring to the designs from APS and PETRAIII, we have designed a new compact structure with in-situ metrology framework. This newly designed flexure mechanism is promising in reducing the size of the crystals and increasing the stroke while minimizing measurement system errors through highly rigid metrology devices. The developed mechanism successfully balances requirements for simultaneously large travel range and high stability. In this talk, we will present the concept, fabrication, assembly and off-line measurements of the new High Energy Resolution Monochromator, before it can be installed on the beamline in 2024.

TUPYP018 **Design and Improvements of a Cryo-Cooled Horizontal Diffracting Double Crystal Monochromator at HEPS**
Y.S. Zhang *(IHEP)*
Horizontal diffracting double crystal monochromator(HDCM) are usually used in a 4th generation light source beamline due to the larger source size in the horizontal direction. This paper introduces the mechanical design and optimization of a HDCM for Low-dimension Structure Probe Beamline of HEPS. In order to achieve the high stability requirement of 50 nrad RMS, the structural design is optimized and modal improved through FEA. In order to meet the requirement of a total crystal slope error below 0.3 µrad, FEA optimizations of the clamping for first and second crystal are carried out. To get good long term stability, thermal leakage is calculated by FEA and compensated by heaters. The vacuum chamber is optimized to become more compact, improving the maintainability. Fabrication of the HDCM is under way. The results show that the design is capable of guarantee the required surface slope error, stability, and adjustment requirements.

TUPYP019 **Optical Metrology of High Energy Photon Source**
C.R. Zhang*, R.L. Cui, M. Li, D.N. Zhang (IHEP)*
The fourth-generation synchrotron light sources-High Energy Photon Source(HEPS) requires the accuracy of X-ray mirror surface slope and height error to be as high as 50 nrad(rms) and 0.4 nm (rms), respectively. Its a huge challenge to detect the X-ray mirrors with such high-precision specification. A new type long trace profiler named FSP (Flag-type Surface Profiler), which is independently developed by Institute of High Energy Physics, Chinese Academy of Sciences, providing high-precision surface shape Metrology services for the X-mirrors of HEPS. So far, we have completed the surface shape Metrology of 25 HEPS high-precision X-ray mirrors, and the surface shape Metrology of FSP were also recognize approved by JTEC. Among them, the Wolter diffraction limit focusing mirror processed by JTEC Company in Japan, the height error is 0.1 nm RMS at 1 mm high spatial resolution (0.11 nm RMS for Wolter KB elliptic area and 0.12 nm RMS for hyperbolic area). So far this is the most accurate X-ray mirror for HEPS. At the same time, we also developed the Spatial Frequency decomposition stitching Interferometer (FSI), the standard deviation of surface shape Metrology of FSP and FSI reached 0.33 nm.

TUPYP020 **Optimization of Rotating Coil System for Magnetic Center Measurement and Its Application in High Energy Photon Source**
L.Y. Zhang *(IHEP)*
To satisfy the rigorous requirements of precise alignment of large quantities of magnets in the High Energy Photon Source (HEPS), a simplified single-turn rotating coil system was designed to expedite the measurement process while maintaining high accuracy. Optimizing the system structure allowed for significant shortening of the measurement time. Furthermore, precision could be further raised by adding a three-coordinate measuring machine (CMM). In this paper, the system's general design, upgrade, mathematical theory, and measurement results on magnets in the Booster of HEPS are introduced. Tests on an ultra-high quadrupole magnet revealed that the system met both precision and efficiency design requirements. It was confirmed that the entire procedure of installing and aligning the magnet, measuring the magnetic axis, and extracting the magnetic center to fiducials on the magnet, was reduced to just a few hours through the optimized design of the rotating coil system. The system has, subsequently, successfully accomplished the magnet fiducilization of the Booster of HEPS. Concluding remarks are made at the end.

TUPYP021 **Development and improvement of HEPS Mover**
S. Yang*, S.Y. Chen, C.H. Li, Z.H. Wang, L. Wu, Y.D. Xu (IHEP)*
High Energy Photon Source (HEPS) has been constructed after decade of research. As the first diffraction-limited storage ring light source, many advanced devices are applied in this project, including the Beam Based Alignment Mover (Mover), which support and adjust the position of the Sextupole Magnet. It undertakes to remotely online adjust the position of Sextupole to meet the Physical requirement to correct the optics coefficient of Electron beam current. The positioning accuracy, attitude angle, and coupled error of Mover with 450kg load strictly proposed and tested during the development of Mover. There are three main types of Mover, including Four-layer with sliding guide, Three-layer with rolling guide, and Three-layer with sliding guide. This paper introduces the development and improvement of Mover.

TUPYP022 **The Development and Application of Motion Control System for Heps Beamline**
Z.Y. Yue*, X.B. Deng, G. Gao, G. Li, L.Y. Liu, C.X. Yin, D.S. Zhang, Q. Zhang, A.Y. Zhou (IHEP)*
In synchrotron radiation facilities such as the High Energy Photon Source (HEPS) beamline, thousands of motorized actuators are equipped on different optical devices, such as K-B mirrors, monochromator and transfocators, in order to acquire the specified properties of X-ray. The motion control system, as a part of the ultra-precision mechatronics devices, is used to precison positioning control, which not only has ability to realize basic motion functions but also can handle complex motion control requirements. HEPS has developed a standardized motion control system(MCS) for synchrotron radiation applications. In this paper, The structure of hardware and software of MCS will be presented, and some applications are demonstrated in detail.

TUPYP023 **Design of a Long Versatile Detector Tube System for Pink Beam Small-Angle X-Ray Scattering (SAXS) Beamline at HEPS**
Z.Q. Cui*, G. Mo, Z.N. Ou, S. Tang, X. Xing, J.C. Zhang (IHEP)*
The long versatile detector tube system for small-angle X-ray scattering meets the experimental conditions of 5–50° wide-angle X-ray scattering (WAXS), 0.02–6° small-angle X-ray scattering (SAXS) and 0.001–0.2° ultra-small-angle X-ray scattering (USAXS), record the same change process of the same sample, and obtain comprehensive structural information of atomic size, nanometer size and micron size, which can be applied to nanomaterials, mesoporous materials, biological macromolecules, polymers and other fields. The size of the tube system is 26760×1945×2565 mm, and consists of four parts: WAXS device, SAXS device, USAXS device and vacuum chamber. The vacuum chamber is assembled by connecting and assembling parts such as thick and fine pipes, bellows, heads, and vacuum valves, with a length of 13775 mm and an inner diameter of 1500 mm. The thin pipe is 7740 mm long and has an inner diameter of 300 mm. The design scheme of the tube system is committed to ensuring that the distance between the SAXS detector and the sample is continuously adjustable within the range of 1–13.5 m in vacuum environment, and the straightness of the 13840 mm long track of the SAXS device is better than 1 mm.

TUPYP024 **Study of the TiZrV Getter Film Deposited on the Inner Surface of HEPS Undulator Vacuum Tube**
B.L. Zhu *(IHEP CSNS)*
The clean and stable ultra-high vacuum environment of the particle accelerator storage ring can reduce the beam loss caused by gas scattering, which is the basis for the long-term stable operation of the beam. The HEPS undulator vacuum system is a very small aperture elliptical pipe with an inner diameter of 22×7 mm. In order to meet the requirements of ultra-high vacuum of the narrow-gap insertion devices vacuum system, a non-evaporable getter (NEG) film is deposited on the inner wall of the tube. In this study, a magnetron sputtering coating system suitable for depositing NEG films on the inner wall of a narrow-gap elliptical pipe was designed and built, and TiZrV films were successfully obtained on the inner wall of an elliptical pipe. The microstructure, deposition rate, crystal structure and chemical composition of TiZrV thin films were studied by scanning electron microscopy, X-ray diffraction and X-ray photoelectron spectroscopy, respectively. The results show that the TiZrV film has a columnar structure and its crystal structure is amorphous. The atomic ratio of the three chemical elements in the TiZrV film is located in the low temperature activation region.

TUPYP025 **Thermal Analysis of Crotch Absorbers Designed for Hefei Advanced Light Facility**
B. Bian *(USTC/NSRL)*
The Hefei Advanced Light Facility (HALF) is a vacuum ultraviolet (VUV) and soft X-ray Diffraction-Limited Storage Ring (DLSR) light source, operating at 2.2 GeV with a beam current of 350 mA.The synchrotron radiation (SR) emitted from bend magnets (BM) and insertion devices (ID) has a pretty high power density, which can easily damage the vacuum components and cause the breakdown of the vacuum system. Typically, the crotch absorbers, installed at pump stations, block most of the heat load and allow parts of SR to be sent to the beamline for scientific research and applications.

TUPYP026 **Influence of the Groove Curvature on the Spectral Resolution in a Varied-line-spacing Plane Grating Monochromator (VLS-PGM)**
J. Du*, X.W. Du, Q.P. Wang, Z. Wang (USTC/NSRL)*
Diffraction-limited synchrotron radiation (DLSR) light source with smaller source size and emittance makes ultra-high spectral resolution beamline possible. Here, we report an undulator-based beamline optical design with ultra-high spectral resolution using a varied-line-spacing plane grating monochromator (VLS-PGM), which is a well-proven design for achieving ultra-high resolution in the soft X-ray band. A VLS plane grating with a central groove density of 2400 l/mm is utilized to cover the photon energy region of 250 2000eV. VLS gratings are generally fabricated using the holographic method, but the resulting grating grooves are two-dimensionally curved curves, which can affect the resolution of the monochromator. To analyze this effect, we first use a spherical wavefront and an aspherical wavefront to generate the fringes and optimized the recording parameters. We also present a method for calculating the groove curvature of holographic plane VLS grating grooves. Furthermore, the influence of grating groove curvature on beamline resolution is theoretically analyzed based on the aberration theory of concave grating.

TUPYP027 **A Subnanometer Linear Displacement Actuator**
***S.K. Jiang**, X.W. Du, Q.P. Wang (USTC/NSRL)*
With the development of synchrotron radiation technology, an actuator with sub-nanometer resolution, 100N driving force, and compatible with ultra-high vacuum environment is required. To achieve synchrotron radiation micro-nano focusing with adjustment resolution of sub-nanometer and high-precision rotation at the nano-arc level, most of the commercial piezoelectric actuators are difficult to meet the requirements of resolution and driving force at the same time. The flexure-based compound bridge-type hinge has the characteristic of amplifying or reducing the input displacement by a certain multiple, and can be used in an ultra-high vacuum environment. According to this characteristic, the bridge-type composite flexible hinge can be combined with commercial piezoelectric actuators, to design a new actuator with sub-nanometer resolution and a driving force of 100N. This paper mainly presents the principle of the new actuator, the design of the prototype and the preliminary test results of its resolution, stroke and driving force.

TUPYP028 **Deformation**
***Lin. M. Lin**, J. Chen, S.K. Jiang, Q.P. Wang (USTC/NSRL)*
Thermal deformation is a key influencing factor in the surface shape of optical components for beamline optics. In the process of beamline design, it is necessary not only to select different cooling schemes based on thermal loading conditions but also to extensively optimize the parameters of these cooling schemes. The traditional approach for optimizing cooling scheme design often requires significant manual effort. By integrating existing experience in optimizing cooling scheme designs, this study transforms the parameterized design tasks that were originally performed manually into automated processes using software. This paper presents the latest advancements in the automated design software for cooling schemes of beamline optical components, and the results indicate that the optimization outcomes of the existing automated design software are close to those achieved through manual optimization.

TUPYP029 **The Study on NEG Thin Film Coated by DC Magnetron Sputtering Based on COMSOL**
***W.J. Ma** (USTC/NSRL)*
The NEG coated vacuum chambers provide an efficient solution to the obtaining of ultra-high vacuum in the diffraction limited storage ring (DSRL). During the DC magnetron sputtering process, the position of the cathode target will affect the quality of the NEG film. In this work, the simulation of the state of the glow discharge plasma was performed by COMSOL Multiphysics. The distribution of electric potential, argon ion number density and electron density during the discharge of the orthocentric and eccentric targets were simulated.

TUPYP030 **The Design of High Stability Double Crystal Monochromator for HALF**
***Z.L. Xu** (USTC/NSRL)*
HALF is a fourth-generation synchrotron light source with a number of state-of-the-art beamlines. Naturally, the new 4th generation machines, with their small emittances, start to bring higher stability performance requirements. In response to these problems, an concept of a high stability DCM (Double Crystal Monochromator) with angular range between 14 and 81 degrees (equivalent to 2 to 8 keV with Si(111)) has been developed at the National Synchrotron Radiation Laboratory. This poster gives an overview of the DCM prototype project including specifications, Mechanical design, heat load management and stability consideration.

TUPYP031 **Vibrational Stability of a High-Resolution Grating Monochromator at HALF**
***Z.L. Xu** (USTC/NSRL)*
The requirement for vibrational stability of monochromator continues to evolve rapidly to comply with the demands created by the improved brilliance of the fourth-generation low-emittance storage rings around the world. During the commissioning, quantify the performance of the plane-mirror monochromator (PGM) before it is installed at the beamline is crucial. The stability of PGM is measured at ambient temperature (25 °C) and under water cooling condition. Furthermore, we use Fast Transform(FFT)to analyse the composition and origin of the vibration source. This paper aims to present the static and dynamic stability of PGM.

TUPYP032 **An Argon-Oxygen or Argon-Hydrogen Radio-Frequency Plasma Cleaning Device for Removing Carbon Contamination from Optical Surfaces**
***H.J. Yuan**, X.W. Du, Q.P. Wang (USTC/NSRL)*
Due to synchrotron radiation, carbon contamination on the surfaces of optical elements inside the beamlines, such as mirrors and gratings, remains an issue. Future beamline designs will select more optical element surface coating materials according to the specific needs, including gold, platinum, chromium, nickel, and aluminum, and a single cleaning method will not be able to adequately address the demands. We have studied the RF plasma cleaning of optical elements. After the argon/oxygen or argon/hydrogen gas mixture was injected into the chamber, glow discharge was carried out, and the carbon on the surface of the inert metal-coated optical element and oxidation-prone metal-coated optical element was removed by the oxidation or reduction reaction of radicals. In order to optimize the discharge parameters, it utilizes a differential mass spectrometry system and an optical emission spectrometer to monitor the cleaning process. This paper introduces the principles of the two cleaning methods as well as our existing cleaning device.

TUPYP033 **Influence of Atmospheric Storage on Secondary Electron Emission of Laser-etched Copper**
***W.L. Zhang**, X.Q. Ge, W.J. Ma, S. Wang, Y. Wang (USTC/NSRL)*
The performance of operating particle accelerators has been seriously affected by the electron cloud effect (e-cloud). The secondary electron yield (SEY) is one of the main factors for judging the e-cloud. The secondary electron emission (SEE) and the e-cloud can be effectively suppressed through laser-etching the inner surface of the vacuum chamber. Oxygen-free copper (OFC) has become the first choice for the vacuum chambers of modern accelerators due to its high electric, high thermal conductivity, and effective radiation shielding property. Due to the long construction period of the vacuum chambers in the particle accelerators, the laser-etched components will inevitably face the problem of long-term storage during their manufacturing, installation and commissioning.

TUPYP034 **A New Design of X-ray White Beam Profile Monitor for HEPS Beamlines**
***Q.H. Duan**, Q. Han, Z. Li, S. Liu, Z.Y. Yue, Q. Zhang (IHEP)*
The development of x-ray white beam profile monitor is to realize the visual detection of beam contour and position under the condition of high energy and high heat load of HEPS fourth-generation light source. The device includes a electric drive system, an imaging system, and a copper-cooled CVD diamond monitor. SPECTRA and ANSYS were used to verify the mechanism temperature reliability when monitor being used in different HEPS beamlines at current of 200 mA. At the same time, the functional verification of the experimental prototype was carried out on the 3W1 high energy test beamline of BSRF, white beam fluorescence images were successfully obtained. During the test of Multilayer Monochromator for Structural Dynamics Beamline(HEPS), the change images of white and monochromatic beam profiles and curve of intensity distribution during crystal adjustment are successfully obtained, which verificates the processing function of the monitor for beam profile and intensity distribution.

TUPYP035 **Mechanical Design of Compensation Device Using 1D CRL for Wavefront Deformation at HEPS**
***X.H. Kuang**, Z.R. Ren, W.F. Sheng, S. Tang (IHEP)*
Compensating devices using 1D CRL have been used in many beamlines at HEPS. Due to the deformations caused by the thermal and clamping of the monochromator, the beamline optical focus will be shifted in the horizontal or vertical direction. Then compensation device needs to be added to make the focus align with the sample position. The correction tablet uses 1D compound refractive lens (CRL), which is fixed on a customized five-dimensional manipulator. According to different errors corresponding to different energies, the correction tablet needs to rotate at different angles. If only the rotation angle cannot meet the requirements, a more appropriate CRL should be chose by switching, Generally in the horizontal direction through a large stroke to achieve. When cooling is required, the clamping block of the 1D CRL is made of Cu material with good heat transfer effect, and the displacement compensation of rotation is carried out by copper foil.

TUPYP036 **Mechanical Design of Water-cooled Slits System at HEPS**
***Z. Li**, Q.H. Duan, L. Gao, Q. Han, Y.X. Ma, W.F. Sheng, Z.Y. Yue (IHEP)*
The fourth generation synchrotron radiation light source currently under construction in China has the characteristics of high energy and high brightness. High Energy Photon Source(HEPS) can be used in many basic and engineering research fields, so different spot sizes are modulated for different research needs. This design is a rotary water-cooled white beam slit system, which mainly includes absorber parts and driving mechanism. On the premise of ensuring the integrity of the absorber, the aperture is processed inside the absorber, and the absorber is rotated by the driving mechanism, so as to realize the adjustment of the aperture of the slit. The system has the characteristics of compact structure, high yield and simple processing, and can achieve the same performance index while saving time and space costs. At present, the function of the experimental prototype has been verified on the 3W1 high energy test beam line of BSRF, and the spot size can be adjusted.

TUPYP037 **Mechanical Design of Multilayer Kirkpatrick-Baez (KB) Mirror System for Structural Dynamics Beamline (SDB) at High Energy Photon Source (HEPS)**
***R.Y. Liao**, L. Gao, Z.N. Ou, S. Tang, H.H. Yu (IHEP)*
SDB aims in-situ real-time diagnosis in dynamic compression science and additive manufacturing. Nano-experimental environment requires highly multilayer KB mirror system in thermal deformation and stability of mechanism. This paper illustrates the KB cooling scheme and mechanical design. Only using variable-length water cooling to control the temperature and thermal deformation of mirror has limitations here. First, the installation of cooling system should be non-contact so that the surface shape can be sophisticatedly controlled without deformation of chucking power. Second, the distance between the HKB and the sample stage is too small to arrange the cooling pipe. Third, the KB mirror has multi-dimensional attitude adjustment. Cu water cooling pipe would be dragged with adjustment thus it has to be bent for motion decoupling, which occupies considerable space. Thus, the Cu cooling block and water cooling pipe are connected by copper foil. Eutectic Gallium-Indium fills a 100 µm gap between the cooling block and KB mirror to avoid chunking power deformation. Finally, the structural stability and chamber sealability is analyzed.

TUPYP038 **A Design of an X-ray Pink Beam Integrated shutter for HEPS**
***S. Liu**, Q. Han, Mo,G. Mo, A.Y. Zhou (IHEP)*
The main function of the shutter is to accurately control the exposure time of the sample so that the sample as well as the detector can be protected. In order to cover the high thermal load and high energy working environment, we designed an integrated shutter device. The device includes a thermal absorber shutter, a piezoelectric ceramic fast shutter, a vacuum chamber and an adjustable height base. Firstly SPECTRA and ANSYS were used to verify the device's institutional temperature reliability at a thermal power density of 64 W/mm^2. In addition, the device is suitable for both monochromatic and pink light operation with a horizontal pitch of 15 mm. The device is also compatible with both vacuum and atmospheric working environments, and the recollimation of the device is not necessary when switching modes. Finally, the thermal absorber shutter is also able to function as a beam profile monitor, and the position of the spot can be monitored through a viewing window on the cavity.

TUPYP039 **A Design of an X-ray Monochromatic Adjustable Slit for HEPS Beamlines**
***S. Liu**, Q.H. Duan, Q. Han, Z. Li, Z.Y. Yue, Q. Zhang, Z.B. Zhang (IHEP)*
The monochromatic slit is a commonly used device in HEPS beamlines. It can limit the synchrotron beam-spot within a desired size required by the downstream optical equipment. In addition, the four-blade structure is the most widely used form of slit. The slit with this form usually consists of a pair or two parallel tungsten carbide blades. With their edges close to each other, a slit can be formed, and the size of which can be controlled by micromechanical guides. This structure is very suitable for the case of large beamsize. In this work, we have designed a monochromatic slit based on the four-blade form for BF-beamline in HEPS. It can be used in ultra-high vacuum, high luminous flux working environment. The maximum opening range is up to 30 mm × 10 mm (H×V), while it can allow a white beam of 136 mm × 24 mm (H×V) to pass through. Furthermore, we adopted a double spherical-ball-joint connection design, which enables repeatable positioning accuracy up to ±1 µm.

TUPYP040 **Experimental Setup Design of Hard X-ray Coherent Scattering (HXCS) Beamline at HEPS**
***Z.N. Ou**, R.Y. Liao, S. Tang, X. Wang, H.H. Yu, L. Zhou (IHEP)*
The HXCS is a dedicated coherent beamline of the High Energy Photon Source (HEPS). The experimental setup of the endstation mainly includes two devices: CDI/WAXS XPCS and SAXS XPCS. To achieve high stability requirements, the CDI/WAXS XPCS device use a nano-focusing AKB mirrors system, which will focus hard x-rays to a focal spot as small as 100 nm with a small working distance of 64 mm. In the narrow working distance, AKB mirror chamber and sample chamber are designed as a unit but separated from the middle. And the device is designed with two sets of switchable sample table, in order to flexibly carry out four coherent techniques. Due to high stability, the CDI/WAXS XPCS device is stringent designed for high stiffness, high temperature stability and metrology. Besides, the other important equipments of the beamline include a 1.5 m WAXS tube and a 14 m SAXS tube. For high-resolution applications, the WAXS tube can be rotated around the sample in the horizontal and vertical plane by 45° and the SAXS tube can adjust distance and angulation. At present, the whole experimental setup is designed according to the fine mechanical design which can meet the experimental requirements.

TUPYP041 **Design for Harmonic Suppression Mirrors Mechanical System with X-Ray Height Compensation Function at HEPS**
***Z.R. Ren**, M. Li, W.F. Sheng, S. Tang, L.R. Zheng (IHEP)*
In view of the fact that the Harmonic Suppression Mirrors (HSMs) mechanical system under the fast scanning mode of the X-ray Absorption Spectroscopy Beamline (XAS Beamline) of High Energy Photon Source (HEPS) needs to have a X-ray height compensation function in addition to suppressing high harmonics. This paper introduces a high stability 9-axis HSMs mechanical system, which has a basic 5-DOF adjustment, and the relative position relationship between the two mirrors is adjustable. By changing the center distance between the two mirrors, the gap between the two mirrors, and adjusting the parallelism of the two mirrors, the goal of compensating the output X-ray height difference of the upstream Channel Cut Monochromator is achieved. The vacuum machinery volume of the entire HSMs mechanical system is relatively large, which reaches 1766 mm. Movement travel of the second mirrors reaches 620 mm. Currently, the vacuum machinery has been processed and further testing is being carried out.

TUPYP042 **Vacuum System Design of HEPS Beamlines**
***Y. Tian**, Q. Han, H. Shi (IHEP)*
Vacuum system is the basic component in High Energy Photon Source(HEPS) beamlines. Only when the optical devices in beamlines are operated in a high vacuum or even ultra-high vacuum environment, can avoid the carbon deposition of the optical mirror which might result in the optical reflectivity reduction, and reduce the absorption of synchrotron radiation light by residual gas. The purpose of vacuum system design is to obtain and maintain a reasonable vacuum degree to ensure the stable operation of the beamline. This article introduces the vacuum system design in HEPS beamlines from the aspects of pressure distribution calculation, vacuum material selection, vacuum acquisition, measurement equipment selection, vacuum system gas desorption analysis and vacuum equipment layout. The key point lies in using Mlflow software based on test particle Monte Carlo method to analyze and simulate the static pressure distribution which is without beam throughout the vacuum system and the dynamic pressure distribution after beam cleaning.

TUPYP043 **The Design of Test Beamline at HEPS**
***J.L. Yang**, Q.J. Jia, M. Li, P. Liu, Y. Tao (IHEP)*
This paper describes the design of a test beamline for a new generation of high-energy, high-flux, and high-coherence SR beamlines. The beamline will be built at ID42 of HEPS. The beamline includes two sources, a wiggler and an undulator, to provide high-energy, high thermal power, large size, and high-coherence, high-brightness X-ray beams, respectively. In the current design, the beamline mainly has optical components such as monochromators, CRLs, and filters. With different combinations of sources and optical components, the beamline can provide various modes, including white, monochromatic, and focused beam. Using a Si111 DCM, the beamline covers a wide photon energy range from 5 to 45 keV. In the future, the beamline will be capable of providing monochromatic beam with photon energy over 300 keV. The wiggler's white beam can provide high thermal load test conditions over 1 kW. The beamline offers high flexibility and versatility in terms of available beam size (from micrometers to over 100 mm), energy resolution, and photon flux range. Various experimental techniques including diffraction, spectroscopy, imaging, and at-wavelength measurement can be performed on this beamline.

TUPYP044 **Development of Typical Nano-KB/AKB Mirrors Mechanical System at HEPS**
***H.H. Yu**, M. Li, R.Y. Liao, W.F. Sheng, S. Tang, R.Z. Xu (IHEP) Y. Li (BUAA) Y. Li (Rejected) S. Tang, **H.H. Yu** (UCAS)*
Nano-KB/AKB mirrors are used to focus spot size to the nanometer level in main performance beamlines at HEPS, including the Hard X-ray Nanoprobe Multimodal Imaging Beamline(NAMI Beamline), the Hard X-ray Coherent Scattering Beamline(HXCS Beamline), and X-ray Absorption Spectroscopy Beamline(XAS Beamline), etc. For the typical Nano-KB/AKB mirrors mechanical system, a common design of the mounting and clamping mechanisms and the adjustment mechanisms is presented. There are also the key components of the Nano-KB/AKB mirrors mechanical system. Currently, through the design and optimisation of the mechanical structure and the corresponding finite element analysis(FEA), the first Nano-KB mirrors mechanical system at HEPS has been fabricated, and the large travel range, high resolution and high stability adjustments mechanisms are achieved, the slope error of the Nano-KB mirrors is well ensured simultaneously, and the test results are consistent with the design.

TUPYP045 **Usability Study to Qualify a Maintenance Robotic System for Large Scale Experimental Facility**
J.Y. Zhang, *L. Kang (IHEP) J.X. Chen (USTC/NSRL) J.X. Chen (IHEP CSNS)* ***J.Y. Zhang*** *(Institute of High Energy Physics, CAS)*
The primary stripper foil device is one of the most critical devices of China Spallation Neutron Source (CSNS), which requires regular foil replacement maintenance to ensure its stable running. To avoid the potential hazard to workers caused by prolonged exposure to high levels of radiation, a maintenance robotic system is developed to perform repetitive and precise foil changing task. The robotic system acquires RGB and depth image synchronously through depth camera, matching foil component information which contains positioning and grasping features through using Yolo v5 algorithm. Then, based on the bidirectional improved RRT based obstacle avoidance path planning algorithm, the robotic arm, controlled by upper computer, grabs the foli component and place it into a special shielding container automatically. The proposed framework covers all aspects of the robot system, from hardware structure, target detection, manipulator kinematics design, and system construction based on ROS Moveit. The simulation is carried out using GAZEBO, which demonstrates the efficiency of the system.

TUPYP046 **Design and Test of Valve Box for HFRS Cryogenic Distribution System**
Y. Cheng, *X.X. Ding (Lanzhou University of Technology) D.S. Ni, X.D. Wang, B.M. Wu, W. Wu, Q.G. Yao, L. Zhu (IMP/CAS)*
High Intensity heavy ion Accelerator Facility (HIAF) is a major scientific research facility proposed by the Institute of Modern Physics, Chinese Academy of Sciences. Among them, HIAF Fragmentation Separator (HFRS) is an important radioactive beamline on this device. In order to cooperate with the superconducting magnet to operate stably in the 4.5K environment, there are 24 cryostats on the entire beamline, and each cryostat is equipped with a distribution valve box, which is installed in the cryogenic composite pipeline and the superconductor. It is used to modulate and deliver cryogenic fluid into the cryostat to cool the superconducting magnets. In addition, there are one main valve box and two end valve boxes in cryogenic distribution system. The finite element analysis software ANSYS is used to simulate the deformation and stress distribution of the valve box in a vacuum environment. Using the bending structure to compensate for cold deformation, omitting the bellows, reducing the difficulty of the process, and improving reliability. A new type of support structure has been designed to reduce heat leakage. At the same time, the temperature distribution is simulated

TUPYP047 **Design of Liquid Injection Device for Ultrafast Spectroscopy Experimental Station**
L.H. Li, *B. Li, X. Liu, T.C. Weng (ShanghaiTech University)*
The ultrafast spectroscopy experimental station (HXS) located at the Shanghai hard X-ray free-electron laser (SHINE) requires the construction of a specialized liquid sample injection device for research in the liquid phase state of matter. Due to the damage caused by high-repetition-rate XFEL pulses on the sample, it is necessary to ensure that the liquid sample is updated before the arrival of the next pulse. In order to reduce the impact of liquid film thickness on pump-probe ultrafast spectroscopy experiments, it is re-quired that the liquid film thickness be less than 20 µm. In this article, the method of liquid flow collision is utilized, from simulation calculations to the construction of experimental devices, and the principle of absorption spectroscopy is utilized to construct a thickness characterization system, resulting in stable ultrathin liquid films with a thickness range of 3-20 µm. Finally, views on the limitations and future improvements of the device are presented.

TUPYP048 **A High Repetition Rate Free-electron Laser Shutter System**
J.C. Gu, *H. Jiang, Y. Tong (ShanghaiTech University)*
The Shanghai High repetition rate XFEL and Extreme light facility (SHINE) is the first high repetition rate XFEL in China. It is a powerful tool for scientific research. However, the high repetition rate XFEL has a high peak power and average power. The high peak power can damage optics and devices in the optical path in femtosecond. And the high average power will cause the distortion of optics. Consequently, it becomes crucial to protect optics and devices in the optical path. This shutter system is designed to protect the diagnostics and avoid thermal distortion and thermal damage. It can control the number of pulses and average power on the diagnostics. The time window of shutter can be as small as 10 ms. It has can absorb most of FEL power.

TUPYP049 **The SILF Accelerator Controls Plan**
Z.Z. Zhou *(IASF)*
The Shenzhen Innovation Light-source Facility or SILF is a 3 GeV diffraction-limited light source. It is planned to be built in Shenzhen, China with the target of "industrial light source". This paper will introduce the controls design and some tests progress. Generally, the whole project including controls has reached the stage of conceptual design, though it hasn't been approved by the department yet. The SILF accelerator consists of a 200MeV linac, a 240 m booster, a 700 m storage ring, and two beam transport lines. Among the whole facility, the scope of the control system covers four parts: state transition and retention, monitor from different levels, collection and management of data, response to status update. It will include hardware and software of the above aspects: front-end controllers and hardware interface, network, server, global systems like timing, and high-level applications and services. As an "industrial light source" matured solutions and commercial products will be primarily adopted.

TUPYP050 **Overall Design and Feasibility Study of Wals Storage Ring Vacuum System**
C.Y. Liu, *Y. Chen, X.R. Hao, J.H. He, H.H. Li, H. Li, J. Li, Y. Nie, Y. Wang, G. Wei, P. Xiang, J.M. Zhang, Y.X. Zhang, Y. Zou (IAS)*
In the pre-research stage, the eighth storage ring of Wuhan Advanced Light Source was 22.5 m length, including the insertion length of 6.8 m. The inner diameter of the beam channel of the vacuum box was 32 mm, with NEG coating film. Each CELL contained 12 BPMS, of which 7 BPMS had independent bellows design and 5 BPMS were welded directly to the vacuum box. The first and last two BPMS of the standard unit segment were fixed directly to the foundation, and others were fixed to the magnet brackets. At least one bellows were connected between the two fixed brackets to keep the BPM stable, taking into account the effects of baking and synchrotron radiation heat. After the design of the whole vacuum system was completed, it was necessary to research feasibility by simulation. The simulation was performed in ideal state. The parameters were set as energy 1.5 GeV, beam 500 mA. The optical potential and power density of synchrotron radiation were calculated by SYNRAD, and then coupled with MOLFLOW to calculate the vacuum degree after beam cleaning. The average pressure of the beam chamber was 1×10^{-7} Pa, and the maximum temperature of the tower was 197 °C, which met the design requirements.

TUPYP051 **Progress of WALS NEG Coating Equipment and Technology**
G. Wei, *Y. Chen, X.R. Hao, J.H. He, H.H. Li, J. Li, C.Y. Liu, J. Wang, P. Xiang, J.M. Zhang, Y.X. Zhang (IAS)*
The goal of WALS (Wuhan Advanced Light Source) is to build a world -class radiating light source. Chromium-zirconium-copper was chosen as the main material for the entire storage ring vacuum vessels. And magnetron sputtering (PVD) process was used to deposit NEG coating on the inner surface of copper vacuum chamber, which can further improve the performance of the vacuum. At present, the coating laboratory has taken shape as a whole, and has built a standard cleaning platform, coating platform, ultimate vacuum test platform, extraction rate test platform, coating microstructure test process. As for the coating equipment, bias power supply and custom ceramic parts are added to achieve more functions. Different target materials were controlled by multi-electrode control, while experiments were performed on deposited compositions of different ratios of multilayers; Sample tube bias control access during the coating process; Multiple combinations of target materials and bias parameters for the technique have been studied. Coating is currently underway, and specific test results are in progress.

TUPYP052 **An Application of Plant Ramification Structures to the Biomimetic Design of Girders for the Synchrotron Radiation Accelerator Storage Ring**
X. Cao, *L. Lu, W. Ma, S. Tang, C.Y.B. Xing, Z. Yang, L.P. Zou (Sun Yat-sen University) Z. Yang (Institute of Advanced Science Facilities)*
In order to ensure the high stability and avoid the ground vibration amplification, it is necessary to improve the 1st eigenfrequency of the Magnet-Girder Assembly in the 4th Generation Light Source storage ring. At present, it is mainly parameters such as thickness, spacing, and height of girders are adjusted. In the natural world, plants have evolved highly ingenious support structures after billions of years of experimentation with load-bearing topological structures. By observing the growth process of plant ramifications, a simple and direct topology method is proposed. An algorithm based on MATLAB and APDL is used to iteratively optimize the mass configuration of the stiffeners, resulting in a novel bio-inspired girder. It introduces a growth and branching model, where growth and branching are vigorous in high-stress areas and slow down or even atrophy in low-stress areas. In this paper, we will investigate the effect of volume increase rates, branching thresholds, and other parameters, including the position and quantity of stiffener sprouting points, the growing process, support conditions, and the shape of the girder, on stiffener growth and the 1st eigenfrequency.

TUPYP053 **Current Status of Vibration Monitoring System at SOLARIS**
M. Piszak *(NSRC SOLARIS)*
Solaris synchrotron radiation centre, despite being relatively new facility, began expansion of its experimental hall in 2022 in order to accommodate new beamlines. The construction works were carried out along with regular accelerators and beamlines operation and generated high levels of vibration. To better understand the influence of vibrations on electron and x-ray beams' stability, an accelerometer-based monitoring system was designed and implemented. The system consists of a triaxial measurement point equipped with seismic accelerometers located on bending magnet inside storage ring and a central signal conditioning and acquisition point. The results of long-term vibration data collection and analysis will be presented along with plans for the future system expansion.

TUPYP054 **Mechanical Design of the Beam Gas Ionisation for CERN Super Proton Synchrotron**
M.T. Ramos Garcia, *W. Andreazza, P. Bestmann, H. Bursali, N.S. Chritin, W. Devauchelle, A. Harrison, G. Khatri, M. McLean, C. Pasquino, F. Sanda, P. Schwarz, J.W. Storey, R. Veness, W. Vollenberg, C. Vollinger (CERN)*
The Beam Gas Ionisation (BGI) instrument of the Proton Synchrotron (PS), presently installed and operational, has been re-designed for the Super Proton Synchrotron (SPS), the following machine along the Large Hadron Collider (LHC) injector chain at CERN accelerator complex. Using the same detection technology, Timepix3, the SPS-BGI infers the beam profile from the electrons created by the ionisation of rest gas molecules and accelerated onto the imaging detector. This measurement method will allow for continuous, non-destructive beam size measurement in SPS. In view of the upgrade, the design has been simplified and validated for integration, radio-frequency impedance, high-voltage and vacuum compatibility.

08-Nov-23 09:00 – 10:00 China Hall 1+2

WEKAM — WEKAM: Keynote Talk 2

Chair: K. Tavakoli (SOLEIL)

WEKAM01 09:00 **The Progress of HEPS Project**
P. He *(IHEP)*
HEPS(High Energy Photon Source) is 1st high energy synchrotron radiation facility in China, it will be located at Huairou Science City (80 km away from Beijing). This 7BA, 6 GeV, 200 mA machine which has horizontal emittance ϵ_h around 60 pm·rad to gain the high brilliance photon beam, this compact lattice design bring so many engineering challenges for accelerator systems. Here we will present the novel lattice and sub-system design, and show you the project main progresses since Jan. 2020.

08-Nov-23 10:30 – 12:10 China Hall 1+2

WEOAM — WEOAM: Core Technology Developments

Chair: K. Tavakoli (SOLEIL)

WEOAM01 10:30 20
High-Throughput Data Orchestration and Streaming System for High Energy Photon Source
C.L. Zhang *(IHEP)*
The forthcoming fourth-generation light source, the High Energy Photon Source (HEPS), is expected to generate a massive amount of data with a throughput estimated at hundreds of terabytes per day. With the advancement of synchrotron radiation technology and experimental methodologies, the data transmission pipeline has become increasingly complex, evolving from a simple detector-to-storage single-channel in the past to a complex network with multiple data generators and applications. In order to ensure a favorable experimental experience, effective data management and distribution are essential. In response to these challenges, Mamba Data Worker (MDW) has been developed, which serves the primary functions of real-time detector data acquisition, interaction with multi-terminal dataflow, metadata extraction, online assembly and writing, and light weight online data processing. This work presents the design and development plan of MDW, outlines the essential technologies involved, and illustrates its current application at the Beijing Synchrotron Radiation Facility (BSRF).

WEOAM02 10:50 20
A Vacuum Aspirated Cryo Cooling System (VACCS)
G.M.A. Duller*, B. Olafsson (DLS)*
The use of liquid nitrogen for cooling of synchrotron equipment is widespread. The cryogenic sub-coolers commonly employed come with some significant drawbacks such as cost, complexity, stiffness of distribution lines, and vibration induced by pressure variations. The typical sub-cooler is capable of handling 2-3 kW of absorbed power whilst many optics require no more than 50-150 W of cooling. We present a Vacuum Aspirated Cryo-cooling System (VACCS) which overcomes many of these disadvantages and which allows cryo-cooling to be implemented more widely. The VACCS system uses a vacuum, generated with no moving parts, to draw LN2 through a heat exchanger. Thus the system does not have to be pressure rated. We describe our designs for highly flexible distribution lines. A simple control system offers variable temperature at the heat exchanger by varying the flowrate of LN2. A system is installed at Diamond which allows the independent control of three zones. A test rig has demonstrated cooling capacity in excess of 100 W for a monochromator crystal assembly and controlled temperatures −194 °C–120 °C.

WEOAM03 11:10 20
Magnetic Levitation on a Budget
J.H. Kelly*, D. Crivelli, S. Farrelly, M.L. Hurlstone (DLS)*
The successful mechatronics development i.e. modelling, simulation, design, build and test of a magnetic levitation stage at the Diamond Light Source is presented. The concept was to use a low control Bandwidth across the 6 degree of freedom MIMO system, to provide both an alignment stage and vibration isolation. The project simultaneously upskilled staff and developed a proof-of-concept system demonstrator at a low cost. The final motion stage was constructed for a component cost of less than £15,000.

WEOAM04 11:30 20
Development of Low-Frequency Superconducting Cavities for High Energy Photon Source
X.Y. Zhang*, J. Dai, L. Guo, Q. Ma, F. Meng, P. Zhang, H.J. Zheng (IHEP)*
A low-frequency superconducting cavity is one of the most critical devices in the High Energy Photon Source (HEPS), a 6 GeV diffraction-limited synchrotron light source under construction in Beijing. A higher-order-mode (HOM) damped 166.6 MHz SS=1 quarter-wave superconducting cavity, first of its kind in the world, has been designed by the Institute of High Energy Physics. Compact structure, excellent electromagnetic and mechanical properties and manufacturability were realized. Mounted with a forward power coupler, a tuner, two thermal break beam tubes, a collimating taper transition, two gate valves and some shielded bellows, the dressed cavity was then assembled into a cryomodule. Two cryomodules were later required to fit into HEPS straight sections with a length limitation of 6 meters, which posed a significant challenge for the design of the cavity string. The success of the horizontal test also verifies the design of the cavity string. This article presents the design, fabrication, post-processing, system integration, and cryogenic tests of the first HOM-damped compact 166.6 MHz superconducting cavity module.

WEOAM05 11:50 20
Zero-Length Conflat Flange Nonevaporable Getter (NEG) Pump Manufactured by Oxygen-Free Pd/Ti Deposition
K. Mase*, T. Kikuchi (KEK) S. Ohno (Yokohama National University) M. Ono, I. Yoshikawa, K. Yoshioka (University of Tokyo) Y. Sato (Yokohama National University, Graduate School of Engineering Science)*
Nonevaporable getter (NEG) pumps are widely used to maintain ultrahigh vacuum (UHV). Commercial NEG pumps using ZrVFe alloy can be activated by heating at 400–500 °C, and pump active residual gases such as H_2, H_2O, CO_2, CO, N_2, and so on at room temperature (RT). Recently T. Miyazawa, T. Kikuchi, K. Mase et al. have developed a new NEG, Pd overcoated on Ti thin film with a purity higher than 99.95 % (oxygen-free Pd/Ti hereafter), which pumps H_2 and CO at RT after baking at 133 °C for 12 hours. Then we developed a zero-length conflat flange NEG pump deposited with oxygen-free Pd/Ti. The NEG pump can be fully activated by baking at 150 °C for 12 h and exhibits initial pumping speeds of 2340 $L{\cdot}s^{-1}$ for H_2, and 1440 $L{\cdot}s^{-1}$ for CO. The initial pumping speeds of the oxygen-free Pd/Ti thin film after baking at 150 °C were estimated to be 3.2 $L{\cdot}s^{-1}{\cdot}cm^2$ for H_2 and 7.6 $L{\cdot}s^{-1}{\cdot}cm^2$ for CO. The present NEG pump is ideal for maintaining UHV below 10^{-8} Pa, because its pumping speeds for H_2 and CO are quite large, and because it can be fully activated by baking at 150 °C for 12 h.

08-Nov-23 13:30 – 15:50 China Hall 1+2

WEOBM — WEOBM: MC2 & MC3 & MC4 & MC5

Chair: M. Dommach (EuXFEL)

WEOBM01 13:30 20

Challenges and Solutions for the Mechanical Design of SOLEIL-II

K. Tavakoli*, F. Alves, G. Baranton, Y. Benyakhlef, A. Berlioux, A.C. Carcy, M.-E. Couprie, J. Da Silva Castro, S. Ducourtieux, Z. Fan, C. Herbeaux, C.A. Kitégi, A. Le Jollec, F. Lepage, V. Leroux, A. Loulergue, F. Marteau, A. Mary, A. Nadji, S. Pautard, V. Pinty, M. Ribbens, T.S. Thoraud (SOLEIL)*

The Synchrotron SOLEIL is a large-scale research facility in France that provides synchrotron radiation from terahertz to hard X-rays for various scientific applications. To meet the evolving needs of the scientific community and to remain competitive with other European facilities, SOLEIL has planned an upgrade project called SOLEIL-II. The project aims to reconstruct the storage ring as a Diffraction Limited Storage Ring (DLSR) with a record low emittance which will enable nanometric resolution. The mechanical design of the upgrade project involves several challenges such as the integration of new magnets, vacuum chambers, insertion devices and beamlines in the existing infrastructure, the optimization of the alignment and stability of the components, and the minimization of the downtime during the transition from SOLEIL to SOLEIL-II. The mechanical design is mainly based on extensive simulations, prototyping and testing to ensure the feasibility, reliability, and performance of several key elements. This abstract presents an overview of the mechanical design concepts and solutions adopted for the SOLEIL-II project.

WEOBM02 13:50 20

Development of the Bent Focusing Mirror in HEPS From Design to Test

M.W. Chen*, M. Li, S. Tang, F.G. Yang (IHEP)*

The focusing mirrors are important for each beamline in the 4th generation photon source. One bent focusing face-down mirror in HEPS is taken for an example to be introduced from the design to the test. The effect of the gravity of the mirror is considered in the design. Moreover, for the sake of the compromise between the processing and the precision, the polygonal structure is adopted. Also, the iteration of the solution is improved to increase the design efficiency. The results reveal that the theoretical precision of the mirror after bending can reach less than 100 nrad RMS. In the aspect of the mechanics, the scheme of four roller bender comes out to avoid the parasitic moment, and the movable component in the bender are all coated with the MoS_2. As the type of the measurement is facing side which is different from the type of the actual condition, the effect of the gravity must be included in the metrology results. In the meantime, the stability and the repeatability are also measured. The result can be converged to around 200 nrad RMS, which is less than the required error. The stability, $\Delta R/R$, can be constrained under the 0.3 %, showing the outstanding performance.

WEOBM03 14:10 20

The Design and Progress of the Network and Computing System for HEPS

Hu.H. Hu *(IHEP)*

The 14 beamlines for the phase I of High Energy Photon Source(HEPS) will produces more than 300PB/year raw data. Efficiently storing, analyzing, and sharing this huge amount of data presents a significant challenge for HEPS. HEPS Computing and Communication System (HEPSCC), also called HEPS Computing Center, is an essential work group responsible for the IT R&D and services for the facility, including IT infrastructure, network, computing, analysis software, data preservation and management, public services etc. Aimed at addressing the significant challenge of large data volume, HEPSCC has designed and established a network and computing system, making great progress over the past two years.

WEOBM04 14:30 20

Advancing Simulation Capabilities at European XFEL: A Multidisciplinary Approach

F. Yang*, S. Göde, D. La Civita, D. Loureiro, H. Sinn (EuXFEL) M. Rehwald (HZDR) T. Stoye (DESY)*

At European XFEL, computational techniques such as FEA and CFD are widely applied in various scientific and engineering fields. In this contribution, a selection of multi-physics and multi-scaled models using FEA tools are presented, which virtually replicate the interaction process of XFEL beam with different materials, taking into consideration heat transfer, structural deformation and phase transition. To gain comprehensive insights into the fluid behaviors and performance of the detector cooling system and liquid sample delivery system, parametric studies are conducted using CFD simulation code FLUENT. Furthermore, a realistic simulation requires a secured process of Verification and Validation of the computational model. Specific guides and standards need to be followed to ensure the credibility and accuracy of the simulation results. Additionally, the FAIR principle for simulation data analysis is introduced at European XFEL. Based on reliable simulation data and real-time sensing data, the concept of digital twin will be integrated into the simulation framework, serving as a new safety constraint for monitoring and optimizing of the facility operation.

WEOBM05 14:50 20

Thermal Calculation and Testing of SLS 2.0 Crotch Absorbers

X. Wang*, B.S. Bugmann, R. Ganter, M. Maeher, C. Rosenberg, A. Weber (PSI)*

The storage ring of SLS2.0 based on a multibend achromat lattice will have the maximum electron energy of 2.7 GeV. The synchrotron radiation emitted by bending magnets, except for a small portion designated to beamlines, will be dissipated by crotch absorbers to protect downstream vacuum elements. SLS2.0 crotch absorbers are designed to have two water-cooled, toothed jaws made of Glidcop to dissipate a maximum heat power of 6 kW. Finite element analysis has been conducted to validate the thermal and mechanical strength of the absorbers' mechanical design. A conjugate heat transfer (CHT) simulation, utilizing direct coupled solid and fluid zones with Computational Fluid Dynamics (CFD) software ANSYS Fluent, was performed to verify the water cooling concept. Furthermore, a prototype absorber underwent testing in an e-beam welding chamber, where the temperatures of the absorber and cooling water were measured and compared against calculated values. The test results not only confirmed the absorber's ability to dissipate the specified heat load but also validated the thermal modelling methods. This presentation will focus on aspects of numerical simulation and thermal testing.

WEOBM06 15:10 20

Extension of the IXS High Resolution Monochromator for the RIXS experiment at the Petra III Beamline P01

F.U. Dill *(DESY)*

The IXS High Resolution Monochromator at P01 is used for the intermediate X-Ray regime from 2.5 keV to 3.5 keV. The core component is a disk that carries the crystals. At the circumfence an encoder ring is mounted. A radial and axial runout of less than 1 µm during the rotation is guaranteed by a high precision spindle bearing. The rotation is done by a PiezoLEG with a 110 mm long ceramic bar that is coupled to the disk via a wire and provides an angular resolution better than 100 nrad. The setup is in operation since mid 2017 with four crystals. In spring 2021 two additonal moving units where installed to position eight crystals in total. An enlargement of the angular range for the in-line setup is planned for spring 2024.

WEOBM07 15:30 20

Design, Modeling and Analysis of a Novel Piezoactuated XY Nanopositioner Supporting Beamline Optical Scanning

L.F. Wang*, G.C. Chang, Z.Y. Yue, L. Zhang (IHEP)*

In recent years, advances in X-ray optics have reduced the spot size of synchrotron radiation nano beamline to 10 nm or even lower. These decreased spot sizes, coupled with the emergence of ultra-brilliant synchrotron sources, are pushing instrumentation requirements for greater stability, resolution, and scanning speeds. In this report we consider the design, analysis and simulation of an XY PZT driven nano-positioning stage to support high precision optical scanning systems. To achieve fast and high precision motions with loads from the optical systems, a novel hollow structural design based on flexible amplifying and guiding mechanism is proposed which can increase the displacement output while reducing the coupling displacement and ensuring a relatively high natural frequency. In this work, the rationality of the stage design is verified by modeling and finite element simulation.

08-Nov-23 16:10 – 17:30 China Hall 3

WEPPP — Poster Session WEPPP

Chair: M. Dommach (EuXFEL)

WEPPP001 **Development of the Sample Environment Gas Delivery System for TARUMA Station**

W.H. Wilendorf, *C.S.N.C. Bueno, R.R. Geraldes, R.C. Gomes, L.M. Kofukuda, F.R. Lena, I.T. Neckel, L.S. Perissinotto, H.C.N. Tolentino (LNLS)*

TARUMA is the first experimental station of SIRIUS' CARNAUBA (Coherent X-Ray Nanoprobe Beamline). Operating in a tender energy range of 2.05 to 15 keV, with an optical KB system capable of focusing down to 120 nm (>8 keV), the station enables several high spatial resolution characterization techniques, including ptycho-CDI, nano-diffraction (XRD), and X-ray fluorescence (XRF) mapping. The station's unique design accommodates various sample environments for specific studies, many of which utilize a gas delivery system for in-situ reactions and sample conditioning. This paper introduces the overall system design and solutions for gas mixture, flow control, and sample environment delivery. This encompasses an in-house developed metal 3D-printed mixture manifold with microsolenoid actuators, flow meters and control integration, along with the design and manufacture of an X-ray transparent sample dome, all designed to comply with safety standards and station constraints.

WEPPP002 **The Status of the High-Dynamic DCM-Lite for LNLS/Sirius**

M. Saveri Silva, *J.P.S. Furtado, N.P. Hara, T.R. Silva Soares, G.S. de Albuquerque (LNLS)*

Two new High-Dynamics Double Crystal Monochromators (HD-DCM-Lite) are under installation for QUATI (super-bend) and SAPUCAIA (undulator) beamlines at Sirius. The HD-DCM-Lite portrays an updated version of Sirius LNLS HD-DCMs not only in terms of being a lighter equipment for sinusoidal scans speeds with even higher stability goals, but also bringing forward greater robustness for Sirius monochromators projects. It takes advantage of the experience gained from assembly and operation of the previous versions during the last years considering several work fronts, from the mechanics of the bench and cooling systems to FMEA, alignment procedures and control upgrades. In this work those challenges are depicted, and first offline results regarding thermal and dynamical aspects are presented.

WEPPP004 **High Heat Load Transfocator for New ID14 ESRF Beamline**

L. Eybert *(ESRF)*

X ray refractive lenses (CRL) are powerful in-line optics for focusing x-rays. They offer many advantages such as compactness, a comfortable working distance, robustness, and are suitable for use in a wide range of energy. In the scope of the new nuclear resonance ID14 beamline at ESRF, a new transfocator was developed. This transfocator benefits from the previous experience of ESRF's transfocators to better cope with the high power densities (645 W/mm^2) and total power (405 W) generated by the future CPMU18 and the high positioning tolerance required ≤ ±20 µm within the same LCR assembly and between different assemblies. A thermal load analysis was carried out to optimize the cooling design for both 1D and 2D Beryllium lenses unit assembly. The tight alignment specifications was achieved thanks a good machining of both lenses unit mechanical assembly and reference V shaped rail. High positioning repeatability of CRLs actuator is assured by an optimized flexor and a good alignment procedure. The transfocator vessel is installed on a granite and a 4-DOF alignment table.

WEPPP005 **Design and Performance Enhancement of a Compact Monochromator as an SX-700 Successor with Retained Optics and Enhanced Drives**

F. Eggenstein, *M. Brendike, M. Neu, L. Schwarz, J. Viefhaus, C. Weniger, T. Zeschke (HZB)*

The replacement of the long-serving SX-700 monochromators is currently underway. In the new monochromator design, the existing optics comprising two gratings and a 650 mm long plane mirror are retained to maintain compatibility with the previous setup. A significant improvement is achieved through the incorporation of a specially arranged UHV monochromator chamber and internal UHV mechanics, enabling a more compact successor. The upgraded monochromator now features a stepper motor integrated into a revolver system for efficient grating selection. It allows for adjustable deflection angles ranging from 0 to 27 deg on both the gratings and the plane mirror. This expanded flexibility in deflection angles significantly broadens the spectral range for a 600 L/mm grating from 1 eV to 2000 eV. To enhance the rotation of the optics, new drives employing a combination of torque motor and planetary lead screw spindle have been developed. These advanced drives enable a high angular velocity of 1 deg/sec for swift optical adjustments. Additionally, absolute angular encoders mounted on the rotation axes provide precise positioning accuracy of 0.02 arcsec.

WEPPP006 **Setup for a Combined XEOL and XAFS Spectroscopy Measurement at the X-Ray Absorption Spectroscopy Beamline P65 of Petra III**

R. Biller, *E. Welter (DESY) S. Levcenco, C.S. Schnohr (Leipzig University, Felix Bloch Institute for Solid State Physics)*

A recently designed setup to perform steady-state X-ray excited optical luminescence (XEOL) spectroscopy and simultaneous X-ray absorption fine structure (XAFS) characterization at the beamline P65 of PETRA III is described. The so-named XEOL setup is equipped with a customized Helium-flow cryostat and a state of-the-art optical detection system, which covers a wide wavelength range from near-infrared (NIR), visible (VIS) and ultraviolet (UV) wavelength ranges. The cryostats' and vacuum chambers' design required special layouts and design due to certain geometrical constraints which was challenging to realize. The result of the now implemented assembly make two measuring methods simultaneously possible. First case studies show the experiments' success. The main advantage of the elaborated setup is that it does not require modification of either the sample alignment or the basic instruments at the beamline P65. The XAFS-XEOL setup, covering wide spectral and temperature ranges, is available for the user experiments and we expect that future studies will provide valuable information about fine structures of a broad range of materials.

WEPPP008 **Flexible X-Ray Focusing Using CRL Transfocators for GI-SAXS/WAXS Experiments**

J.R. Rubeck, *A. Chumakov, M. Schwartzkopf (DESY)*

P03 operates a micro- and a nanofocus endstation both capable of transmission as well as grazing-incidence X-ray scattering experiments. The beam sizes range from typically 22 x 13 µm^2 to 350 x 250 nm^2. Common, unique features of the different focusing schemes are the exceptional long focal distance, allowing for a variety of advanced in situ and operando sample environments. The newly commissioned CRL3-system consists of two binary stacks of one-dimensional (1D) BeCRL mounted on an in-vacuum lens-exchanger with two train units, piezo-driven motors and a hexapod for generating a round-shaped microfocus beam with increased flux at 600 mm focal distance. An additional condenser system CRL4 for beam parallelization prior to focusing systems will increase the flux at both endstations. CRL4 consist of two Smarpods in-vacuum stages, both equipped with a stepped cascade of 1D lenses each for decoupled horizontal and vertical focusing. We will present the different focusing schemes incl. projected performances as well asthe current status of both new CRL-stations and technical challenges, e.g. space constraints, precise positioning, stability

WEPPP009 **POLAR Synchrotron Diffractometer**

G. Olea, *N. Huber, J. Zeeb (HUBER Diffraktiontechnik GmbH & Co.KG)*

A new product for research purposes aiming to work in a synchrotron facility after its upgradation (APS-U) has been recently developed. Based on specific beam characteristics (emittance, coherence, variable polarization) and several X-ray diffraction (XRD) techniques applied (resonant, reflectivity) on single crystal and thin films under extreme conditions (temperature, pressure), the product is expected to fast progress the investigations of magnetic materials at nanoscale level. The dedicated machine (diffractometer) will be in one of the newly constructed experimental enclosure (G) of a main beamline (POLAR) in the 4th (ID-4) sector, serving a large spectrum of investigations for Magnetic Material (MM) group. POLAR-Dm was conceived on a traditional 6C (C-circles) geometry, maintaining the common kinematic structural principle of its family. With the addition of several interchangeable positioning devices (e.g., Euler cradle, air bearings stages, etc) the system is expanding the spectrum of possible investigations, maintaining the precision of new setups. The kinematic, design and precision concepts applied, together with the obtained test results are all in detail presented.

WEPPP010 **The MID Instrument of European XFEL: Upgrades and Experimental Setups**

G. Ansaldi, *U. Boesenberg, J. Hallmann, A. Madsen, J. Möller, J.-E. Pudell, A. Rodriguez-Fernandez, A. Schmidt, R.A. Shayduk, K. Sukharnikov, A. Zozulya (EuXFEL)*

It is given an insight on examples of Upgrades currently under development at the Material Imaging and Dynamics (MID) Instrument of the European XFEL GmbH in the X-ray Scattering System (XSIS): - The Multi-Environment Setups for a Multi-Detector System (MDS_2) are the Setups designed around an additional detector chamber (MDS) to be used at the same time of the AGIPD detector, allowing it to cover simultaneously WAXS, SAXS and large field of view regions by using two area detectors, one close to the sample and a second one further away. - The Multi-Purpose Chamber 2 (MPC-2) represents the evolution of the current version and includes the upgraded design of both the exterior vessel and of some local optics assemblies in interior. Both these Upgrades will allow to improve the current MID Beamline performance capabilities and make entirely new experiments possible. - Reported are also Examples of some relevant Experimental Setups successfully designed and implemented going as well in the simultaneous multi-detector-use direction.

WEPPP011 **Design and CNC Manufacturing of the Sample Holder for the Forward Scattering Fixed - Target (FFT) Chamber**
***A.R. Reich**, R. Carley, C. Deiter, J.T. Delitz, G. Mercurio, A. Scherz, M. Teichmann (EuXFEL)*
The Forward- scattering Fixed-Target chamber (FFT) hosts the coherent diffraction imaging experiments, which are the baseline experimental studies to be performed at the Spectrosopy and Coherent Scattering (SCS) instrument of the European XFEL. The sample environment allows for changing samples without breaking the vacuum. This is realized by a fast sample changer system connected to a load lock. With different and customized sample holders it is possible to achieve user specific requirements. This poster describes the process of converting a Computer Aided Design (CAD) file into a Computer Aided Manufacturing (CAM) file, which in turn is converted into Numerical Control (NC) code. The sample holder is manufactured on an adapted CNC machine, with a vacuum table and specially selected tools. In addition, all important mechanical and vacuum boundary conditions are explained. Due to the adapted processes it is possible to react immediately to changes during an experimental campaign.

WEPPP012 **Multiple Detector Stage (MDS) at the Eu.XFEL$_M$ID Instrument**
***A. Schmidt**, G. Ansaldi, U. Boesenberg, J. Hallmann, A. Madsen, J. Möller, K. Sukharnikov (EuXFEL)*
The Multiple Detector Stage (MDS) is an ancillary detector setup for the Materials Imaging and Dynamics (MID) instrument at the European X-Ray Free-Electron Laser Facility (EuXFEL). It is developed to improve the current capabilities concerning X-ray detection and make entirely new experiments possible. A unique feature of the MID instrument is the large flexibility in positioning of the AGIPD detector relative to the sample. This enables a large variety of instrument configurations ranging from small-angle (SAXS) to wide-angle (WAXS) X-ray scattering setups. A recurrent request from the users, which is currently not enabled, is the option of simultaneously recording both wide- and the small angle scattering by using two area detectors. The aim of developing MDS is to provide this missing capability at MID so that SAXS and WAXS experiments can be performed in parallel. The MDS will not be installed permanently at the instrument but only on request to provide as much flexibility as possible. In this article, the background and status of the MDS project is described in detail.

WEPPP013 **Mechanical Design and Integration of SXP Scientific Instrument at the European XFEL**
***V.V. Vardanyan**, D.G. Doblas-Jimenez, M. Dommach, P.G. Grychtol, M. Izquierdo, N. Kohlstrunk, D. La Civita, S. Molodtsov, O.J. Ohnesorge, T.E. Tikhodeeva, M. Vannoni (EuXFEL) J. Buck, R.K. Rossnagel (DESY) S.G. Schönhense (Johannes Gutenberg University Mainz, Institut für Physik) T.S. Thiess (IEAP)*
The European XFEL provides femtosecond X-ray pulses with MHz repetition rate in an extended photon energy range ranging from 0.3 to 30 keV. Soft X-rays between 0.3 and 3 keV are produced in the SASE3 undulator system allowing both spectroscopy and coherent diffraction imaging of atoms, molecules, clusters, ions and solids. The high repetition rate opens the possibility of implementing femtosecond time-resolved photoelectron spectroscopy (TR-XPES) on solids. This technique allows the simultaneous understanding of the evolution of the electronic, chemical and atomic structure of solids upon an ultrafast excitation. The realization with soft X-rays requires the use of MHz FELs. In this contribution we present the mechanical design and experimental realization of the SXP instrument. The main technical developments of the instrument components and the TR-XPES experimental setup are described.

WEPPP014 **Research on High Quality Channel-Cut Crystal Optics for High Energy Photon Source**
***Z.H. Hong**, D.Q. Diao., M. Li, H. Lian (IHEP) M. Li (University of Chinese Academy of Sciences)*
In this paper, a machining scheme of magnetically controlled small tool was proposed, which gets rid of the limitation of the power system and transmission system, and realized the free machining of channel-cut crystal with narrow space, a high quality channel-cut crystal with high wavefront maintenance and high transmission efficiency in a large size range was obtained. The results of offline characterization showed that: The roughness of inner surfaces reached 0.6 nm RMS; Microstructure analysis show that the perfect lattice substrate was only covered 2.5 nm thickness uniform SiO_2 layer, and there was no uneven bending of the oxide layer caused by micro stress concentration. The results of online tests showed that: the Darwin widths of the channel-cut crystal processed by MC-CMP were consistent with the theoretical values, the two diffraction reflectivity rate of the crystal reached 85.1 %, very close to the theoretical limit of 88.3 %. The morphology of channel-cut crystal treated by MC-CMP technology was uniform, scratches and spot defects were eliminated completely. The wavefront equivalent crystal profile error of the two diffraction reached 130 nrad RMS with 5 mm dimension.

WEPPP015 **Progress of Front Ends at HEPS**
***H. Shi**, P. Luo, Y.X. Ma (IHEP)*
High Energy Photon Source (HEPS) is a 6 GeV synchrotron radiation facility building in Huairou, with a storage ring perimeter of 1390.6 m and 41 straight sections. In phase I, 15 front ends will be installed, including 14 insertion device front ends and 1 bending magnet front end. These front ends are divided into three types: the Undulator front end, the Wiggler front end, and the BM front end. The U-type front end will receive 766 W/mrad^2 of peak power density and 25kW of the total power. The design of the W-type front end is based on compatibility with various insertion devices, including udulators and wigglers. In this paper, the designs and the progress of HEPS front ends are presented.

WEPPP016 **Mechanical Design of XRS & RIXS Multi-Functional Spectrometer at the High Energy Photon Source**
***J.C. Zhang** (IHEP)*
The integration of an X-ray Raman spectroscopy (XRS) spectrometer and a Resonant Inelastic X-ray scattering (RIXS) spectrometer at HEPS is described. The XRS has 6 regular modular groups and 1 high resolution modular group. In total 90 pieces of spherically bent analyzer crystals are mounted in low vacuum chambers with pressure lower than 100Pa. On the other hand, the RIXS spectrometer possesses one spherically bent analyzer crystal configured in Rowland geometry whose diameter is changeable from 1 m to 2 m. The scattering X-ray photons transport mostly in helium chamber to reduce absorption by air. The RIXS and the high resolution module can be exchanged when needed. Six air feet are set under the granite plate to unload the weight when the heavy spectrometer is aligned. The natural frequency and statics of the main granite rack were analyzed and optimized to maintain high stability for the HEPS-ID33 beamline at the 4th generation source. A type of compact and cost-effective adjustment gadget for the crystals was designed and fabricated. Economic solutions in selection of motors and sensors and other aspects were adopted for building the large spectrometer like this.

WEPPP017 **Radiation Shielding Design for Huts of HEPS Beamlines**
***Q.Y. Guo** (IHEP)*
High Energy Photon Source (HEPS) belongs to the fourth generation synchrotron radiation device. The electron beam energy of storage ring is 6 GeV, and the current intensity is 200 mA. After completion, it will be the first high-energy photon source in China. HEPS can provide X-rays with energy up to 300 keV and has the capacity to build over 80 high-performance beamlines. The maximum energy of the HEPS beamline reaches 300 keV, which can construct more than 80 high-performance beamlines. Harmful radiation is inevitably generated, which becomes a direct source of radiation dose for workers during the operation and maintenance. Therefore, it is necessary to adopt a comprehensive shielding method of hut to contain harmful radiation. In this paper, the first step is to standardize the huts and analyze the types of radiation source terms. Secondly, the source term distribution and radiation dose attenuation inside the wall were simulated using FLKUA and STAC8. Finally, the shielding design thickness of the side walls, roof, and back walls of huts were given.

WEPPP018 **Water-cooled Tungsten Bremsstrahlung Collimator with Adjustable Height for Adapting the Offset of Beamline**
***Z.Q. Gao**, Q. Han (IHEP)*
Bremsstrahlung collimator is a device located in HPES(High Energy Photon Source) beamline station. It is used to completely block the possible line of sight of the radiation and to properly collimate the bremsstrahlung radiation so that it has a defined opening angle at collimator exit. Because of the application in vacuum and with the aid of bremsstrahlung ray tracing a tungsten block with transverse dimension 200 millimeters is used as the bremsstrahlung stop. In order to adapt the vertically beam offset caused by monochromator, a lifting mechanism which uses stepper motor as driving part is designed to accomplish the up and down movement of the tungsten block. To meet the white light mode with high power density of the light beam, which might result in a high-heat-load on the tungsten block surface after the interaction between synchrotron radiation and block, a water-cooled structure made of oxygen-free copper rod with inlet and outlet water-cooling channels is assembled in front of the tungsten block. Thus, contributing to heat dissipation of the whole structure.

WEPPP019 **Coating Removal of Silicon-Based Optics in Synchrotron Radiation by Soluble Underlayers**
***Q. Hou**, G.C. Chang, B.J. Ji, M. Li, S.P. Yue (IHEP)*
Multilayer optics is widely used for the x-ray beam monochromatization, focusing, and collimation in synchrotron light source. However, the multilayer coatings might be damaged by the high heat loads, the poor film adhesion, the high internal stress, or the inadequate vacuum conditions. As a result, it is essential to develop a method to make the optical substrate reusable without compromising its quality. In our published work, we successfully prepared a W/B4C multilayer coating with a 2 nm Cr buffer layer on a small-sized Si wafer. The coating was stripped from the Si substrate by dissolving the Cr buffer layer using an etchant. After the etching process, the sample's roughness was comparable to that of a brand-new substrate. We have since utilized this method to clean the multilayers on the surface of a 20 cm ×5 cm silicon-based mirror for Beijing Synchrotron Radiation Facility. The surface roughness and shape were measured, and they reached the level of a brand-new mirror.

WEPPP020 **A Photon Shutter with a Translational Switching Mechanism at HEPS**
***P. Luo**, Y.X. Ma, H. Shi, H.Y. Wang (IHEP)*
Currently under construction on High Energy Photon Source (HEPS) is a 6 GeV at 200 mA-4th Generation Synchrotron Light Source in Beijing. In order to meet all experimental light requirements for the three types of insertion devices of the hard X-ray imaging beamline at HEPS, a photon shutter that considers both large optical aperture and high heat load has been designed for the beamline Front-End. By designing a segmented surface with different grazing incidence angles, the power density of the incident surface irradiation is effectively reduced, while the length of the absorber is effectively shortened. The photon shutter can switch between open and closed states with a translational switching mechanism through a cylinder and a horizontal slide. And it can receive a maximum bam size of 25.2×22.7 mm^2 with handling a maximum total thermal power of up to 17.2kW and a peak power density of up to 652 W/mm^2. The structure of the photon shutter was introduced. Finally, the thermal analyses on the absorber of the photon shutter under various insertion operating modes was completed to verify its safety performance.

WEPPP021 **A Novel Design of Front End Slits for Hard X-Ray Imaging Beamline in High Energy Photon Source**
***Y.X. Ma**, P. Luo, H. Shi, H.Y. Wang (IHEP)*
The Hard X-ray Imaging Beamline, being constructed at High Energy Photon Source (HEPS), will use three types of insertion devices in different operating modes, including CPMU, IAW73 and Mango Wiggler. Therefore, the front end of this beamline will receive synchrotron radiation with different distribution, including peak power density and receiving angle. To adequate diverse power distribution with a general geometry, a novel design of front end slits is development. Its absorbers are reasonably designed into segmented surfaces with different grazing angles according to the power density distribution of synchrotron radiation. Through this design, the slits can withstand thermal loads with a peak power density of 414 $kW/mrad^2$ and a maximum section of 30×30 mm. Detailed thermal analyses of the absorbers under various operating modes are implemented to verify its safety performance under high heat loads. This new type of slits not only can adjust the aperture according to the needs of different operating modes, but also effectively shorten the length of the absorbers in the limited space of the front end.

WEPPP022 **Structural Design of the First Optics Enclosure (FOE) and Hutch for High Energy Photon Source**
***H. Sun**, H. Han, Q. Han (IHEP)*
The High Energy Photon Source (HEPS) will construct 15 Beamlines in the first phase. In order to meet the needs of basic scientific research and protect the personal safety of laboratory personnel, each beamline is equipped with multiple radiation protection sheds, including FOE and Hutch. This paper introduces the overall structure of FOE and Hutch, including the basic radiation protection structure design between the wall panels of the shed, between the side walls and the roof, and the special radiation protection structure design for the relatively weak links of radiation protection such as the ground and wall corners. Additionally, the strengthening measures for FOE were introduced. At present, the structural design of the FOE and Hutch for all line stations has been completed, the installation of the FOE and Hutch for two line stations has been completed, and the installation of the FOE and Hutch for three line stations is currently underway.

WEPPP023 **Selection Calculation for the Absorbers of the Filter Equipment of HEPS**
***H.Y. Wang**, P. Luo, Y.X. Ma, H. Shi, J.L. Yang (IHEP)*
The under-construction High Energy Photon Source is a fourth-generation synchrotron radiation source. It has two operation modes for its BF beamline station's insertion devices and extremely high thermal loads. Therefore, it is necessary to use filters to modulate the energy and power of the beam. Filters can effectively absorb part of the thermal load in synchrotron radiation, thereby reducing the thermal load at downstream optical components or experimental samples. This article introduces the parameter design method of the absorbers in the filter, including material selection, thickness allocation, combination method of absorbers, and determination of the number of filter groups. A complete design process is obtained, and key factors affecting the use of filters are analyzed, providing a theoretical basis for the optimization design of the filter equipment. The filter designed using this method has been successfully applied to BF beamline of HEPS.

WEPPP024 **Mechanical Design of a Hard X-Ray Microscope for High-Resolution Ptychography**
***K.L. Liao** (Jinan Hanjiang Opto-Electronics Technology Company Ltd.) J.D. Fan, B. He, H. Jiang, Y. Tong, Y.D. Yao, J.H. Zhang (ShanghaiTech University) X.Y. Gao (Beijing University of Technology)*
A high-resolution hard X-ray microscope (XRM) optimized for ptychographic imaging was designed and its prototype was constructed and tested at the Test Beamline of Shanghai Synchrotron Radiation Facility. The XRM relies on a compact, high stiffness, low heat dissipation and low vibration design philosophy and utilizes Fresnel Zone plate as nanofocusing optics. The optical layout and overall mechanical design of the XRM are introduced. Several important modules, such as probe module, sample stage system, vacuum chamber module are discussed in detail.

WEPPP025 **Application of CuCrZr in the Front-end of Shanghai Synchrotron Radiation Facility**
***S. Wu** (SARI-CAS)*
Glidcop, oxygen free copper and other materials are mainly used in the Front-end of the Shanghai Synchrotron Radiation Facility(SSRF). CuCrZr material has high heat load capacity, high yield strength and tensile strength, good thermal conductivity and low vacuum outgassing rate. At present, it has been used as a heat sink material in the heat exchanger of nuclear reactors. In this paper, based on the previous process exploration, the Front-end absorber is made of CuCrZr material, and the technical scheme of integral processing of flange and absorber is adopted. The thermal stress and deformation of CuCrZr absorber are analyzed by finite element method, and the processing of CuCrZr absorber is completed, and it is applied to the SSRF BL04Ucanted front end. After a period of electron beam cleaning, vacuum and temperature tests were carried out under high thermal load power, and the characteristics of the material in practical use were analyzed, which proved that CuCrZr material can be used in SSRF under high heat load.

WEPPP026 **Sample Holders and In Situ Cell Construction**
***M. Brzyski** (NSRC SOLARIS)*
In situ and operando spectroscopy became more popular in synchrotron beamline measurments. It contributes to develop beamline samble chambers. New technology like 3D printing provide more possibilites of manufacturing complex sample holders and cell assemblies.

WEPPP027 **Infrared Line Design**
***M. Brzyski**, P.N. Nowak (NSRC SOLARIS)*
The SOLARIS synchrotron in Kraków is a third-generation synchrotron radiation source operating in the medium electron energy range. In 2019 a decision has been taken to design and build an infrared line. We designed the chamber supports and the mirror movement system. the line is at the stage of assembly and testing. We would like to present it

WEPPP028 **SOLARIS National Synchrotron Radiation Centre: The Infrastructure for Science and Industry**
***P.N. Nowak** (NSRC SOLARIS)*
The SOLARIS synchrotron in Kraków is a third-generation synchrotron radiation source operating in the medium electron energy range. The first synchrotron light in SOLARIS was observed in 2016, while the first user experiments were performed in 2018. SOLARIS is expanding its activities, constantly developing experimental beamlines and complementary infrastructure such as cryo-electron microscopes. Research opportunities offered by SOLARIS, the only synchrotron in Central-Eastern Europe, allow for conducting unique scientific projects in fundamental research and applied sciences. It should be emphasized that access to the research infrastructure in SOLARIS is free of charge and provided based on the assessment of the beamtime applications by the international review panel. In the presentation, we will present the SOLARIS synchrotron project and available infrastructure, provide practical information on access to the infrastructure, and show examples of the research results obtained at the Centre by the Users.

WEPPP029 **A New Flexible Design of the FaXToR End Station, the New Tomography Beamline at ALBA**
***L.R.M. Ribó**, NGonzález, L. Nikitina, A.P. Patera (ALBA-CELLS)*
FaXToR is one of the beamlines currently in construction phase at ALBA Synchrotron Light Facility which will be dedicated to fast hard X-ray imaging. It will offer absorption and phase contrast imaging to users. Possible applications of the beamline include 3D inspections in the fields of life science, material science, palaeontology and cultural heritage. FaXToR aims to provide a white or monochromatic beam of maximum 36x14 mm (HxV) at sample position with a photon energy range of 8 to 50 keV. The optical layout of the beamline will by tune the the beam depending on the specific experimental conditions. Among the required optical elements, there is the ML monochromator, the cooled slits, the filtering elements, the intensity monitor and the beam absorption elements. The end station of FaXToR will be equipped with a rotary sample stage and a flexible design of the detective system table, consisting in a dual detection system (displaced of 4 m from each other) to obtain high spatial and temporal resolution simultaneously and a motorized auxiliary table dedicated to complex sample environment or future upgrades. The design and construction process of the beamline will be presented

WEPPP030 **MicroMAX Detector Stage**
S.M. Benedictsson, *M.A. Al-Najdawi, O. Aurelius, G. Felcsuti, J. Lidón-Simon, M. Milas, T. Ursby (MAX IV Laboratory, Lund University)*
The MicroMAX beamline at MAX IV Laboratory will employ two detectors to be used independently and move along the beam depending on the diffraction target resolution, starting close to the sample hanging partially over the sample table. The X-ray beam can be deflected by Kirkpatrick-Baez (KB) mirrors in the horizontal and vertical directions or pass undeflected. The Max IV Design office designed a detector stage as an in-house project based on the ALBA table skin concept design to switch between the two detectors and accurately position the selected detector, both with and without the KB mirrors. To achieve stability and precision during translations, a large granite block is used, as well as preloaded linear and radial guides, and preloaded ball screws with stepper motors and, in most cases, a gear box. Flexures are used to allow linear motion's pitch and yaw angles. The various motions are layered so that alignment to the beam axis can be done first, and then sample-to-detector distance can be adjusted independently. A Finite Element Analysis (FEA) is performed to achieve a stable design and tests measuring resonance frequencies on the finalized stage to verify it.

WEPPP031 **A Study Into the Long-Term Stability of Front-End X-Ray Beam Position Monitor Support Columns at Diamond Light Source**
C.E. Houghton, *C. Bloomer, L. Bobb, D. Crivelli, J.E. Melton, H. Patel (DLS)*
Sand-filled steel columns are used at Diamond Light Source to support front-end X-ray beam position monitors. This approach is chosen due to the relatively large thermal mass of the sand being considered useful to reduce the rate at which expansion and contraction of the column occurred as the storage ring tunnel temperature varied, particularly during machine start-up. With the higher requirements for mechanical stability for the upcoming Diamond-II upgrade, there is now a need to assess and quantify the current system's impact on X-ray beam movement. A study of thermal and mechanical stability has been carried out to quantify the stability performance of the front-end X-ray beam position monitor's columns and the impact that column motion may have on the X-ray beam position measurement. Measurements have been made over a range of different timescales, from 200 Hz up to 2 weeks. The measured stability of the support column is presented, showing that it meets our Diamond-II stability requirements. A comparison of the stability of the column with and without a sand filling is presented.

WEPPP032 **Photon Slits Design for High Beam Power Using Rotational Motions**
X. Liu, *W. Cheng (DLS)*
A new slits design utilising rotatable copper block to absorb high heat load is developed for Diamond I13 X-ray Imaging and Coherence beamline which has two canted in-vacuum undulators for the imaging and coherence branches. It is required that the slits function as virtual focus points for the beamline. Woking for the dual beam geometry, these specialised slits can vary the size of one x-ray beam with rotational motions while allowing the second beam to pass through unaffected. The rotational operations of the slits are achieved by innovatively designed pivoting flexure and commercial flex pivot.

WEPPP033 **Commercial Diamond X-Ray Lenses: Current Status**
S.P. Antipov *(PALM Scientific)*
Next-generation light sources necessitate the use of x-ray optical components capable of handling high power densities. Diamond, with its exceptional thermal and mechanical properties, is an ideal material for refractive focusing optics. Polished diamond x-ray lenses exhibit minimal background scattering. Over the past several years, we have been engaged in the development of a production process for x-ray refractive diamond lenses. Simultaneously, numerous other research groups have been pursuing variations of this task. Recently, we have entered the commercial market, offering diamond lenses for sale. Some geometries have undergone extensive testing, such as at the ESRF, demonstrating focusing performance comparable to industry-standard beryllium lenses. However, due to the complexity of the production process, certain geometries are still undergoing fabrication development and beamline testing. Our process utilizes high-precision femtosecond laser ablation in combination with the chemical mechanical polishing. This poster reviews our current progress, outline the parameter space for laser ablation and polishing of 1D and 2D lenses.

WEPPP034 **Alba Experimental Set Up for the Evaluation of Thermal Contact Conductance Under Cryogenic and Vacuum Conditions**
O. Traver Ramos, *J.J. Casas, C. Colldelram, J.L. Frieiro, B. Molas, M. Quispe, M. Sanchez (ALBA-CELLS)*
The Thermal Contact Conductance (TCC) between two surfaces plays a very important role in the design of components in particle accelerators. The TCC depends on many variables such as surface finish, type of material, pressure, temperature, etc. As a general rule, the TCC comes from experimental results reported in the specialized literature. However, it is not always possible to find this information, especially if components are designed to operate in cryogenic and vacuum conditions, for this reason, assumptions are made that render results with high uncertainty. In this context, ALBA has designed an experimental set up to carry out axial heat flow steady state experiments for the evaluation of TCC under vacuum and cryogenic conditions. The minimum pressure achievable in the set up will be 10^{-5} mbar while the temperature may vary between 80 and 300 K. The results will provide inputs to further optimize ALBA designs, including ALBA II, our ongoing fourth-generation synchrotron upgrade project. This paper describes the experimental setup, the thermal and mechanical design considerations and experimental validation tests.

WEPPP035 **Design and Fluid Dynamics Study of a Recoverable Helium Sample Environment System for Optimal Data Quality in the New Microfocus MX Beamline at the ALBA Synchrotron Light Source**
M. Quispe, *C. Colldelram, D. Garriga, NGonzález, J. Juanhuix, J. Nicolás, Y. Nikitin (ALBA-CELLS) M. Rabasa (ESEIAAT)*
XAIRA is the new microfocus MX beamline under construction at the ALBA Synchrotron Light Source. For its experiments, the quality will be optimized by enclosing all the end station elements, including the diffractometer in a helium chamber, so that the background due to air scattering is minimized and the beam is not attenuated in the low photon energy range, down to 4 keV. This novel type of chamber comes with new challenges from the point of view of stability control and operation in low pressure conditions while enabling the recovery of the consumed helium. In particular, it is planned to collect the helium gas with a purity >99.5 % and then to recover the gas at the ALBA Helium Liquefaction Plant. Besides, the circuit includes a dedicated branch to recirculate the helium used by the goniometer bearing at the diffractometer. This paper describes the fluid dynamic conceptual design of the Helium chamber and its gas circuit, as well as numerical results based on one-dimensional studies and Computational Fluid Dynamics (CFD).

WEPPP036 **Temperature Control of Liquid Nitrogen Open Cycle Cyostats using Transfer Lines with Automatic Needle Valve of Cryogenic Optical Systems in Sirius/LNLS**
L.M. Volpe, *H.K.B. Fernandes, B.A. Francisco (LNLS)*
This article presents a novel temperature control approach for liquid nitrogen open cycle cryostats used in cryogenic optical systems at Sirius in Brazil. Effective temperature management is crucial for maintaining stable conditions and optimal performance of the optical systems. To address this challenge, a system utilizing transfer lines with automatic needle valves is proposed. The automatic needle valves act as adjustable flow regulators, facilitating accurate and rapid adjustments to the liquid nitrogen flow rate, thereby ensuring efficient temperature control. Implementation of this system in the systems has demonstrated significant improvements in temperature stability and control. The automatic needle valves enable precise adjustments, effectively minimizing temperature fluctuations. This temperature control system not only ensures the stability and reliability of cryogenic optical systems at Sirius but also enhances their overall performance. The successful integration of transfer lines with automatic needle valves offers a promising solution for optimizing temperature control in liquid nitrogen open cycle cryostats, benefiting various cryogenic applications.

WEPPP037 **Developments in Mirror Cooling via Peltier at Sirius/LNLS**
L.M. Volpe, *H.K.B. Fernandes, B.A. Francisco, V.B. Zilli (LNLS)*
The development of X-ray mirrors has been stated in three major areas: optical, mechanical, and thermal designs. The last topic deals with modelling and controlling thermal expansion due to the absorption of the incident beam, as well as heat transfer through radiation and contact among the parts. Such control is important to ensure the beam desired profile for each beamline. In order to use a reliable and user-friendly thermal control actuator for beamlines that do not requires complex solutions (such as cryogenics or interfaces between water and vacuum), thermal designs for the mirrors of CARCARA-X, MOGNO, and SABIA beamlines were developed using Peltier devices. The Peltier effect is a well-known thermoelectric phenomenon occurring when an electrical current flows through a junction of two varied materials. This effect can be used to transfer heat from one side of the junction to the other, resulting in a temperature difference. A Peltier dispositive was integrated in a MISO PID control-loop associated with platinum resistance temperature sensors that were distributed along the mirror mechanisms.

WEPPP038 **Carbon Film for Copping the Electron Cloud and the Synchrotron-Radiation-Induced Heat Load**
Y.G. Wang *(IHEP)*
Carbon material has a high reflectivity on the synchrotron radiation. It might be introduced into the accelerator to eliminate heat load in the cryogenic section induced by the high synchrotron radition. Coating carbon film on the accelerator wall has been confirmed a very effective method to mitigate the electron cloud. Here we will analyze the relatonship between the reflectivity and the secondary electron yield.

WEPPP039 **XAFS Acquisition Scheme in a Novel Combined SAXS/XRD/XAFS Technique**
Y. Liu *(IHEP)*
In this study, high-frequency sampling X-ray absorption fine structure (XAFS) acquisition scheme with a time-resolution of ~8s was introduced in the newly developed synchrotron radiation Small-Angle X-ray Scattering (SAXS)/X-ray Diffraction (XRD)/XAFS combined technique. The transmission XAFS spectra of high frequency sampling mode and conventional step scanning mode can be obtained effectively by using a miniature front-rear diamond detector (DD) or a combination of front-diamond detector-rear silicon PIN photodiode (SPPD) detectors. In addition, the data calibration and preprocessing of quick-XAFS (QXAFS) for high-frequency sampling were also discussed in this study. The results show that the DD and SPPD can meet the requirements of detector miniaturization in a compact combined devices containing XAFS.

WEPPP040 **Introduction to the Experimental Method of GIWAXS/GISAXS of Beijing Synchrotron Radiation 1W1A Diffuse Scattering Station**
Y. Chen *(IHEP)*
The diffuse scattering experimental station of BSRF uses the dual focused monochromatic X-ray provided by 1W1A beam line to carry out structural research on crystal and film materials. This experimental station can carry out high-resolution XRD,XRR, GIXRD,GIWAXS/GISAXS and other experimental methods. GIWAXS/GISAXS is an important method for characterizing the condensed structure of conjugated polymers. We have upgraded and optimized the grazing incidence experimental method of the experimental station, and developed a grazing incidence remote rapid sampling platform. Greatly reduces testing time and enables remote online testing operations for users. Subsequently, we further established in-situ steam treatment, in-situ thermal annealing, in-situ drip coating, in-situ spin coating, in-situ scraping coating, and GISAXS testing platforms, enriching the line station grazing incidence testing methods.

WEPPP041 **The Joy of Vibration Mitigation**
J.H. Kelly*, S.A. Beamish, D. Crivelli (DLS)*
The decision was made to build a new Optics Metrology Lab at the Diamond Light Source in a location with 100 times higher floor velocity in the range 50-150 Hz than the original location. This paper describes the successful engineering developments to mitigate this. The raft of measures included 'skyhook' damping i.e. active damping using geophone velocity feedback, novel 2 stage passive vibration isolation and fundamental research into acoustic coupling of air conditioning noise. The new systems have been installed, the final performance tested and the optics scientists have been able to continue their sensitive measurements.

WEPPP042 **Application of Surface-Partially Nitrided High-Purity Ti as a Nonevaporable Getter for Synchrotron Radiation Beamline**
T. Kikuchi*, K. Kataoka, K. Mase, H. Nitani, T. Ohigashi, H. Tanaka (KEK) K. Mase (Sokendai, The Graduate University for Advanced Studies) H. Nitani, T. Ohigashi (Sokendai) M. Ono, I. Yoshikawa, K. Yoshioka (University of Tokyo) T. Sakurai, N. Uezono (Tsukuba University)*
Nonevaporable getter (NEG) pumps are widely used in synchrotron radiation facilities because they are oil-free, vibration-free, space-saving, lightweight, and energy-saving. When a NEG thin film is deposited on the inner wall of a vacuum duct, the residual active gases are pumped after baking. Recently we have developed a new NEG thin film that was prepared by the following simple procedure, sublimation of high-purity Ti under UHV in the range of 10^{-7} to 10^{-8} Pa, followed by N_2 introduction. We confirmed that partially nitrided high-purity Ti coating on inner surface of a vacuum vessel pumped H_2, H_2O, O_2 gases, and CO even after 30 cycles of pumping, baking at 185 °C for 6 hours, cooling down to room temperature, introduction of high-purity N_2, and exposure to air. In the present study, we applied surface-partially nitrided high-purity Ti on the inner surface of the vacuum ducts in the upstream section of BL-12C in the Photon Factory 2.5 GeV ring and baked them at 250°C. Pressure in the section reached ultrahigh vacuum of 2.2×10^{-8} Pa without ion pumps after isolation from the turbomolecular pump with gate valve.

WEPPP044 **Development of High Power Density Photon Absorber for Super-Bend Sections in SSRF**
Q. Tang*, Y. Liu, Y.L. Zhao (SARI-CAS) C. Jin (SKY Technology Development Co., Ltd. Chinese Academy of Sciences)*
There are two symmetrical standard bend sections been updated to super-bend sections in the storage of Shanghai Synchrotron Radiation Facility(SSRF). Photon absorbers made up of CuCrZr were used for absorbing radiation with very high power density in the super-bend sections. Meanwhile, CuCrZr absorbers were also used as beam chamber and pump port for the lattice of super-bend section is very compacted. The absorbing surface was designed as serrate structure in order to diminish the power density. CuCrZr was cold-forged before machining to enhance its strength, thermal conductivity and hardness. Friction welding is adopted for absorber fabrication to avoid the material properties of absorber deterioration. Rectangle flanges of absorbers were designed as step rather than knifer for vacuum seal. These high power density photon absorbers have been installed on the storage ring, both pressure and temperature being in accordance with design anticipation in the case of beam of 240 mA running.

WEPPP045 **Particle-Free Engineering in SHINE Superconducting Linac Vacuum System**
Y.L. Zhao*, Y. Liu, Y.F. Liu, Q. Tang, L. Yin (SARI-CAS)*
The Shanghai high-repetition-rate XFEL and extreme light facility (SHINE) is under construction. The LINAC of SHINE facility is superconducting accelerating structures of high gradients, whose performance is closely related to the cleanliness of superconducting cavities. Therefore, the beam line vacuum system has extremely high requirement for particle free to avoid particles down to submicrometer scale. To control particle contamination, particle free environment has been built for cavity string assembly and other beam line vacuum components installation, clean assembly criterion has been established. Furthermore, the particle generation of vacuum components (valve, pump, gauge, et al.) has been studied. Moreover, dedicated equipment (slow pumping & venting system, non-contact RF shielding bellow) have been developed for particle free vacuum system.

WEPPP046 **The Pumping Properties of Ti-Zr-V Non-Evaporable Getter Film Coated Vacuum Chambers**
J. Li*, Y. Chen, X.R. Hao, J.H. He, H.H. Li, H. Li, C.Y. Liu, Y. Nie, J. Wang, Y. Wang, G. Wei, P. Xiang, J.M. Zhang, Y.X. Zhang, Y. Zou (IAS)*
Wuhan Advanced Light Source (WALS) is a fourth-generation synchrotron radiation facility with 1.5 GeV designed energy and 500 mA beam current. In order to meet specific requirements, most of the vacuum chambers for the WALS 1.5 GeV storage ring are small aperture tubes. To achieve the vacuum requirement, the technology of non-evaporable getter (NEG) films deposited on the inner wall of chambers to deal with the small aperture of vacuum chambers. In this paper, the ternary Ti-Zr-V getter film was deposited on the stainless-steel tubes by using a developed cylindrical magnetron sputtering system. Microstructure characterizations were obtained by scanning electron microscopy. The pumping property for H_2 and CO of the films with different surface morphologies (dense and columnar) activated at various temperature were tested by the pumping property evaluate facility. The result in this paper indicated that the columnar films have a better pumping performance compared with the dense films. With the number of activations increases, the pumping performance decreases. To achieve the same pumping performance, the increase of the activation temperature or activation time is needed.

WEPPP047 **Installation Process of HEPS Storage Ring Equipment**
C.H. Li*, F.S. Chen, S.Y. Chen, L. Dong, G. Feng, P. He, J. Li, S. Lu, H. Qu, Z.H. Wang, L. Wu, Y.F. Wu, Y.D. Xu, M. Yang, S. Yang (IHEP)*
HEPS is a new generation synchrotron radiation source under construction in China. Its storage ring has a circumference of approximately 1.4 km. In order to complete high-precision installation within a limited construction period, it is necessary to identify and solve potential issues in various aspects, including installation operation space, alignment installation process, unit pre-alignment, and unit transportation, before the formal installation in batches. Therefore, a full-process installation experiment was performed to confirm and verify the feasibility of relevant scheme, and to solve existing problems one by one. Based on the experimental results, formal installation operation procedures and specifications were developed.

WEPPP048 **The Fabrication of Bonding Channel-Cut Monochromatic Crystal**
D.Q. Diao.*, Z.H. Hong, H. Lian (IHEP)*
Crystal monochromator is one of the core optical components of X-ray transmission, and its internal residual stress and surface roughness directly affect the quality of X-ray. With the development of synchrotron radiation sources, better uniformity and stability of X-ray beams are required. The beam intensity and position stability of conventional double crystal monochromator is affected by clamping and cooling mechanism. Although channel-cutl monochromator can meet the requirements of X-ray stability, but the polishing of the inside diffraction surface is a really challenge. It is difficult to promote implementation because the only guiding principle of empirical and lack of scientific data support system. So it is imperative to develop crystal monochromator with good beam quality and high stability. This project intends to combine the crystal polishing technology and optical surface shape measuring instrument to carry out research on micro-radian level high-precision crystal orientation and massive crystal silicon bonding technology, and complete a group of stress-free plane crystals with ultra-high surface shape accuracy within 1 μmrad orientation error.

WEPPP049 **Designs of Multiple Experimental Modes for Pink SAXS Station**
Mo,G. Mo *(IHEP)*
Pink SAXS (small angle X-ray scattering) station is dedicated to performing scattering experiments. A classical planar undulator is adopted as the beam source. The pink beam from the fundamental radiation of the undulator at the range of 8-12 keV will be used directly after reflected by a pure silicon reflector. The high flux pink beam will be used to perform high time-resolution SAXS experiments. Monochromatic beam, which is obtained by a normal horizontal monochromator, also can be used alternately to perform high energy resolution experiments. Monochromatic beam and pink beam can be switched through moving in and out of the monochromator. The scattering background is reduced effectively using three sets of scatterless slits. Three diamond compound refractive lenses with different curvatures are employed to focus the 12 keV monochromatic beam at sample position, detector position and infinite position respectively. A totally 24 meters long vacuum detector tube is adopted as SAXS camera. Three vacuum compatibility EIGER detectors are equipped at different positions to collect WAXS, SAXS and USAXS signals respectively. Then simultaneous USAXS/SAXS/WAXS measurement could be performed.

WEPPP050 **Quick Scanning Channel-Cut Monochromator for Millisecond in Situ**
Y.S. Lu*, H. Liang, Y.S. Zhang, L.R. Zheng (IHEP)*
The design and capabilities of a Quick scanning Channel-Cut monochromator (QCCM) for HEPS are presented. The quick scan and step scan are realized by a torque motor directly driven Bragg spindle, controlled by a servo controller. This design allows easy and remote control of the oscillation frequency and angular range, providing comprehensive control of QXAFS measurements. The crystal assembly with cryogenically cooled Si (311) and Si(111) crystals, which extends the energy range from 4.8 keV-45 keV, is located on the same plane in vacuum. The mechanical design of the monochromator is described, numerical study of the dynamics during scan validates the design of the Bragg spindle and crystal. The device was fabricated and tested, results show an oscillation frequency up to 50 Hz with a range of 0.6°, and a resolution of 0.2 arcsecond in step scan mode. This device demonstrates the feasibility of large range quick scan and step scan by a single servo control system.

WEPPP051 **The Design of a 2 m Long Copper Light Extraction Vessel at Diamond Light Source for the Diamond-II Upgrade**
V. Danielyan*, M.P. Cox, R.T. Fielder, S.L. Hodbod, T. Lockwood, P.J. Vivian (DLS)*
Challenges associated with the design are, firstly, the heat loads of I05 beamline upgrade involving the installation of a powerful and highly divergent APPLE-II Knot Insertion Device. Secondly, it is not easy to produce the required homogeneous NEG (non-evaporable getter) coating on the complex internal geometry of the vessel. Synchrotron light raytracing and thermal analysis has shown that an aluminium vessel with discrete copper absorbers was not capable of handling the high heat loads and it was decided to change to a copper vessel with large integrated absorbing surfaces. FEA analysis of the copper vessel shows the peak temperature is reduced from 446°C to 95°C for the copper vessel as compared to the aluminium vessel. NEG coating trials are currently in progress and will be followed by a full prototype. The minimum vertical aperture is 6 mm and the trials will show whether it can be reduced to 5 mm. The change from an aluminium vessel to a copper vessel will not only reduce the peak temperature of the vessel thereby making it a workable solution, but has the added benefits of improved vacuum performance, reduced beam impedance and reduced capital and operating cost.

WEPPP052 **The Mechanical Support System for Shenzhen Innovation Light-source Facility (SILF)**
Z. Yang*, Q.Q. Huang, X.Y. Li, Z.L. Liu, T. Luo, J.X. Tang (Institute of Advanced Science Facilities) X. Cao,* ***Z. Yang*** *(Sun Yat-sen University)*
SILF is a new generation synchrotron radiation facility with a very low emittance and a storage ring at an of energy 3 GeV. The beam stability is determined by the magnet stability provided by the mechanical support system. The storage ring requires a high-performance support system providing high stability and precise alignment capability. The Eigen resonance frequency of the magnet and girder assembly should be higher than 56 Hz to avoid ground vibration amplification. The alignment capability between the girders should be less than 50 um. The adjusting resolution of the girder should be less than 5 um in both transverse and vertical directions. Studies on mechanical support system design are currently being carried out at SILF. This paper describes the progress of the mechanical support system design.

WEPPP053 **PAL-EUV Storage Ring Girder System Design, Manufacturing, and Installation**
B.J. Kim*, S.B. Lee, D.H. Na (PAL)*
The PAL-EUV accelerator is relatively small in size, and the SR_ARC, which corresponds to 1/4 of the Storage Ring, consists of a total of 35 magnets with a diameter of approximately 7.2 m, which is about 1/4 of the full size. The distance between the magnets in this section (Coil Epoxy) is approximately 20 mm, and there are no bellows included. Initially, the Girder System Concept considered placing girders in separate cells, but due to the absence of bellows that compensate for the flexibility of the Vacuum Chamber, it was changed to a 1 piece type that can support the entire SR_ARC. In order to fabricate the curved structure with precision tolerances of approximately 6 m, the girder was divided into 3 pieces and assembled to achieve the 1 piece type. The actual fabrication and installation work were conducted to verify its functionality.

WEPPP054 **Vibration Analysis of Storage Ring Girder for Korea 4GSR**
G.W. Hong*, T. Ha, H.S. Han, H.-G. Lee (PAL)*
Ensuring the mechanical stability of the girder for a 4th generation storage ring (4GSR) is crucial to provide a high-quality photon beam to users because the mechanical motion should be maintained at less than 10 % of the electron beam size which is expected to be sub-micrometer. One of the key roles of the girder is to provide structural rigidity and temperature stability while effectively suppressing vibrations from the ground during accelerator operation. The Korea 4GSR girder is being designed to have the first natural frequency above 50 Hz to minimize the effect of the ground vibration. In order to maintain better mechanical stability, it is necessary to conduct research not only on the natural vibration evaluation of the girder but also on external vibrations to the girder structure. In this paper, we introduce the result of the harmonic analysis of the girder structure using the finite element method.

WEPPP055 **Development of Photon Absorber for Multipurpose Synchrotron Radiation**
S.B. Lee*, T. Ha, M.S. Hong, D.H. Na (PAL)*
A photon absorber is a device used to protect vacuum chambers from intense photon beams generated from insertion devices and bending magnet. Such absorber absorbs excess photons as thermal energy and protects vacuum chambers and experimental apparatuses from potential damage. Simultaneously, these absorbers provide precisely tuned photon beams into beamlines.

WEPPP056 **PAL-EUV Vacuum System**
D.H. Na*, B.J. Kim, S.H. Kim, S.B. Lee, Y.J. Park (PAL)*
The PAL-EUV accelerator consists of a linear accelerator, booster, and storage-ring, including an injector. The electron beam generated by the injector laser is accelerated to 20 MeV in the linear accelerator, then its energy is raised to 400 MeV in the booster before being injected into the storage-ring. The electron beam injected into the storage-ring emits the photons used in the beamline as it passes through the insertion device. All vacuum devices, chambers, and supports for EUV have been manufactured, and individual vacuum leak tests have been completed for both the chambers and the vacuum devices. Currently, all vacuum devices and supports have been installed. Additionally, based on vacuum simulation results, vacuum components such as ion pumps, vacuum gauges, and vacuum valves have been positioned and the required vacuum levels for each section have been satisfied. Specifically, Baking and NEG activation procedures were performed to reach the required vacuum levels for storage-ring, thus achieving the vacuum level required for the EUV accelerator

WEPPP057 **Development of Advanced Mirror Adjustment Device for Multipurpose Synchrotron Radiation**
S.H. Kim*, D. Jeong,* ***S.H. Kim*** *(PAL)*
The Pohang Accelerator Laboratory's PLS-II beamline currently utilizes three types of mirror adjustment devices, which have been developed and in use for several years. Based on the experience gained from the development and production of these mirror adjustment devices, a new type of mirror adjustment device is being developed for the Multi-Purpose Synchrotron Radiation Accelerator (4GSR) beamline under construction in Ochang, Chungcheongbuk-do. The types of mirror adjustment devices are categorized as the KB Mirror System, Bender Mirror System, and Mirror System. In the development of the mirror adjustment device, the design should aim to minimize the deformation of the mirror in the Mirror Mounting process. Additionally, efforts are being made to design the mirror cooling system to maximize cooling efficiency, and various tests are being conducted to improve the mechanical stability and address vibration issues in the Mirror Manipulator structure. The development of the mirror adjustment device aims to upgrade its performance and successfully install it in the Multi-Purpose Synchrotron Radiation Accelerator beamline.

WEPPP058 **Permanent Magnets in SOLEIL II**
A. Berlioux, *Y. Benyakhlef, C.A. Kitégi, F. Marteau, A. Mary, R.E. Raimon, M. Ribbens, K. Tavakoli (SOLEIL)*
Twenty years after SOLEIL Synchrotron was established, the facility needs to adapt to follow new scientific fields that have emerged since. The proposed new lattice for upgrading SOLEIL storage ring will reduce the horizontal emittance by a factor 50 to reach less than 100 pm.rad. This new lattice presents significant challenges and requires compact magnets that provide strong gradients. As a result, permanent magnet (PM) technology is preferred over electromagnet (EM) technology whenever possible. All sextupoles and octupoles will be EM to ensure efficient optic correction. However, all dipoles, reverse bends and quadrupoles will be PM. The replacement of aging infrastructure and the use of PM will lead to a noticeable reduction in SOLEIL's electric power consumption and environmental footprint. SOLEIL II lattice consists of 116 dipoles with gradient and 354 PM quadrupoles which can also be used as reverse bends. All PM multipoles have been designed by SOLEIL's Mechanical Engineering Group in close collaboration with the Magnetic and Insertion Devices Group. This contribution will present the design, assembly procedure, and prototyping of SOLEIL II PM multipoles.

WEPPP059 **Design of a High Stability Six Degrees of Freedom Precision Adjustable Mirror Box**
W.Y. Zhou *(USTC) X. Xia (USTC/NSRL)*
With the construction of synchrotron radiation light source entering the fourth generation light source stage of low emissivity and high brightness, the requirements for the resolution and stability of beam line optical equipment are getting higher and higher. This paper designs and analyzes a high stability six degrees of freedom precision adjustment mirror box. The vibration natural frequency of optical elements is 70.5 Hz, the horizontal and vertical vibration amplification coefficient is 1.46 times of the X-axis of the optical path, and the vibration displacement RMS value is 35.8 nm, Meet the requirement that the mirror vibration of the fourth generation light source beam optical equipment should not exceed 50 nm.

WEPPP060 **Vacuum System for the Booster at HEPS**
P.C. Wang, *Y. Wang (USTC/NSRL) H. Dong (IHEP) J.M. Liu, S.M. Liu, X.Y. Sun (DNSC) B. Tan (Institute of High Energy Physics, CAS) Y.G. Wang, B.L. Zhu (IHEP CSNS)*
The Booster is an important part of injector for the high-energy photon source(HEPS), and the performance of its vacuum system seriously affects the beam injection and re-injection. This article mainly introduces the function and design scheme of the Booster vacuum system, the problems and solutions in the development process of key equipment. At present, the vacuum system of the Booster has been installed and debugged, and the vacuum pressure is better than the design value, which meets the needs of injector commissioning.

09-Nov-23 09:00 – 10:00 China Hall 1+2

THKAM — THKAM: Keynote Talk 3
Chair: C. Colldelram (ALBA-CELLS)

THKAM01 09:00 **Nanopositioning at Sirius/LNLS Beamlines - a Review and Future Opportunities**
R.R. Geraldes *(LNLS)*
Sirius is a fourth-generation synchrotron light source that has been operational since 2020 at the Brazilian Synchrotron Light Laboratory (LNLS). Initial funding covered a total of 14 beamlines, six of which are currently open for users, and eight under commissioning or assembly, due in 2024. In a subsequent phase, 13 more beamlines are expected for the coming years. Thanks to the reduction in source sizes and the increase in brightness and coherence properties, new-generation synchrotrons open unprecedented research opportunities, pushing beamline instrumentation up for performance. This can often translate to requirements such as superior mechanical stability, more advanced motion options, faster and higher-resolution detectors, and larger computing power. This talk reviews Sirius's main nanopositioning and optical beamline systems, summarizing the current engineering framework, providing lessons learned, and discussing future opportunities.

09-Nov-23 10:30 – 12:10 China Hall 1+2

THOAM — THOAM: Precision Mechanics A

Chair: C. Colldelram (ALBA-CELLS)

THOAM01 10:30 **Development and Qualification of Micrometric Resolution Motorized Actuators for the High Luminosity Large Hadron Collider Full Remote Alignment System**

M.N. Noir, *P.B. Biedrawa, J.W. Jasonek, M. Sosin (CERN) P.B. Biedrawa, J.W. Jasonek (AGH University of Science and Technology)*

In the framework of the High-Luminosity Large Hadron Collider project at CERN, a Full Remote Alignment System (FRAS) is under development, integrating a range of solutions for the remote positioning of accelerator components. An important component of FRAS is the motorized actuator allowing the remote adjustment of accelerator components with micrometric resolution. These actuators need to fulfil multiple requirements to comply with safety rules, and be highly reliable and maintenance free as they are located in a harsh environment. The integration of the safety functions required for the FRAS was crucial, with the motorised actuators able to provide an absolute position monitoring of the available stroke, integrating electrical end-stops and having an embedded mechanical hard stop as an additional safety layer. In addition, the design has been elaborated to allow a rapid, in-situ re-adjustment of the nominal stroke in order to cope with potential long-term drifts caused by ground motion. This paper describes the design approach, prototyping and qualification of these motorized actuators.

THOAM02 10:50 **SmarGon MCS2: An Enhanced Multi-axis Goniometer with a New Control System**

W. Glettig, *D. Buntschu, E.H. Panepucci, M. Wang (PSI) A. Omelcenko (SmarAct)*

As an improvement on the commercially available SmarGon multi-axis goniometer (SmarAct GmbH), the MX Group at the Paul Scherrer Institute (PSI) has been pursuing further development of the system. In addition to suggesting mechanical improvements to SmarAct to improve ruggedness and reliability, PSI has developed a brand-new and flexible control system for better customization, reliability and control. Calibration routines were implemented to reduce systemic errors, and the system has been tailored for practical beamline usage. SmarGon is a six degree-of-freedom positioning device, allowing positioning of a sample and orientation around any given point, with <5um sphere of confusion diameter. It was purpose-built for protein-crystallography experiments but, as will be presented here, was also re-purposed for other applications. Two devices have been in continuous 24/7 use for two years at the MX Beamlines PXI & PXII at SLS.

THOAM03 11:10 **Magnetically Levitated 6 DoF Controlled Sample Manipulator for Tomography**

T.A.M. Ruijl, *R. Faassen, L. Koorneef, D. Laro, W. Pancras, M. Princen, M. Wijnhoven, P. Wullms (MI-Partners)*

Tomography is a crucial imaging technique in modern synchrotrons. The latest, 4th generation, offers nanometer imaging resolution and fast data acquisition. However, existing sample manipulators mostly rely on quasistatic actuation principles and are constructed by stacking straightforward 1 DoF stages. Such stacking lacks the required dynamics performance and precision. To fill this need, MI-Partners developed a fully actively controlled (6 DoF) sample manipulator based on electro-magnetic actuation and a metrology system that ensures nanometer precision. It provides translational motion with a stroke of 3 mm and endless continues rotation around the vertical axis for full 360-deg angular tomography reconstruction. The novel actuator configuration has a circular magnet yoke which creates a radial polarized magnet field. Multiple sets of coils, acting as individual 3 phase motors, enabling independent control of 3 vertical and 3 tangential forces. The metrology system includes a tracking intermediate metrology frame. A set of capacitive sensors and interferometers enabling full 360 deg. rotation while allowing 3 mm radial movements and still reaching nanometer precision.

THOAM04 11:30 **Overall Progress on Development of X-ray Mirror Mechanical Systems at High Energy Photon Source (HEPS)**

S. Tang, *Y.H. Dong, X.H. Kuang, M. Li, H. Liang, R.Y. Liao, L.H. Ma, Z.N. Ou, H. Qian, Z.R. Ren, W.F. Sheng, Y. Tao, J. Wang, R.Z. Xu, H.H. Yu (IHEP)*

High Energy Photon Source (HEPS) regarded as a new 4th generation synchrotron radiation facility, is under construction in a virgin green field in Beijing, China. The X-ray optics/mirror mechanical systems (MMS) play an important role, which would be expected to be designed carefully and rigidly for the extremely stable performance requirement of HEPS. In addition, there are indeed big challenges due to so many types of mirror systems, such as white beam mirror (WBM), harmonic suppression mirror (HSM), combined deflecting mirror (CDM), bending mirror, Nano-KB, and the transfocator of Compound refractive lens (CRLs), etc. Therefore, overall progress on design and maunfacturing of the MMS is introduced, in which a promoting strategy and generic mirror mechanical system as a key technology is presented and developed for the project of HEPS. Furthermore, ultra-stable structucture, multi-DOF precision positioning, Eutectic Galium Indium (E-GaIn)-based vibration-decoupling watercooling, clamping, and bending have always been prior designs and considerations.

THOAM05 11:50 **Modeling the Disturbances and the Dynamics of the New Micro CT Station for the Mogno Beamline at Sirius/LNLS**

G.S. Baldon, *F. Ferracioli, R.R. Geraldes, G.B.Z.L. Moreno, G.S. de Albuquerque (LNLS) R.R. Geraldes (TUE)*

At the 4th generation synchrotron laboratory Sirius at the Brazilian Synchrotron Light Laboratory (LNLS), MOGNO is a high energy imaging beamline, whose Nano Computed Tomography (CT) station is already in operation. The beamline's 120x120 nm focus size, 3.1x3.1 mrad beam divergence, and 9ů10^{11} ph/s flux at 22-67 keV energy, allows experiments with better temporal and spatial resolution than lower energy and lower stability light sources. To further utilize its potential, a new Micro CT station is under development to perform experiments with 0.5-55 µm resolution, and up to 4 Hz sample rotation. To achieve this, a model of the disturbances affecting the station was developed, which comprised: i) the characterization and simulation of disturbances, such as rotation forces; and ii) the modeling of the dynamics of the Micro-station. The dynamic model was built with the in-house developed Dynamic Error Budgeting Tool, which uses dynamic substructuring to model 6 degrees of freedom rigid body systems. This work discusses the tradeoffs between rotation-related parameters affecting the sample to optics stability and the experiment resolution in the frequency domain integrated up to 2 kHz.

09-Nov-23 13:30 – 14:50 China Hall 1+2

THOBM — THOBM: Precision Mechanics B

Chair: L. Zhang (SLAC)

THOBM01 13:30 20
Structural Dynamic Testing and Design Evaluation of the Formax Detector Gantry
***G. Felcsuti**, J.B. González Fernández (MAX IV Laboratory, Lund University)*
ForMAX, a new beamline at MAX IV, offers multi-scale structural characterization of hierarchical materials from nm to mm length scales by combining full-field microtomography and small- and wide-angle x-ray scattering (SWAXS) techniques. The sample position features a two-meter-high granite gantry that enables independent movement of the tomography microscope and wide-angle x-ray (WAXS) detector in and out of the x-ray beam, as well as along the beam on motorized floor rails. Ensuring optimal experimental performance requires high stiffness and low vibration amplitudes which are challenging goals to achieve with such slender structures. This study focuses on the structural dynamics of the gantry and summarizes the verifications tests that were conducted to assess the structure's sensitivity to ambient disturbances. Experimental modal analysis was employed to investigate the structural dynamics of the gantry and the obtained mode shapes are compared to the finite element calculations based on the Modal Assurance Criterion (MAC). Special attention is paid to the pneumatic brake on the detector's floor rails that was implemented to increase the lowest eigenfrequency of the gantry.

THOBM02 13:50 20
First Results of a New Hydrostatic Leveling System on Test Procedures at Sirius
***W.R. Heinrich**, G.R.S. Gama, G.J. Montagner, S.P. Oliveira (SETUP) R.B. Cardoso, L.R. Leão, S.R. Marques (CNPEM) R.T. Neuenschwander (LNLS)*
To evaluate the impact of low frequency vibrations and geological effects on large structures, particularly to those from Earth-tides, the Hydrostatic Leveling System (HLS) can be used as a Structural Health Monitoring device. This work presents the first results of a new HLS installed at Sirius, a fourth-generation synchrotron radiation facility, located in Campinas, São Paulo, Brazil. Results have shown that the Setup HLS was able to measure diurnal and semidiurnal tides consistent with the literature. The system's design includes a stainless-steel cylinder, acrylic pipe, temperature and vibration sensors, and a super permalloy core operated via an LVDT system. The utilization of PTFE spoon as a part of the floating system possibilities the friction reduction. Experimental data collected and analyzed with FFT confirmed the presence of tidal components in Setup HLS measurements. This research contributes to the scientific autonomy of Sirius and offers a viable alternative to existing HLS systems.

THOBM03 14:10 20
Progress and Core Technologies Development of Monochromators for HEPS
***H. Liang**, M.W. Chen, X.B. Deng, D.Q. Diao., L. Gao, Z.H. Hong, G. Li, M. Li, Y.S. Lu, D.S. Shen, W.F. Sheng, S.F. Wang, Y.Y. Yang, Z.Y. Yue, L. Zhang, Z.K. Zekuan, Z. Zhang, Y.S. Zhang, A.Y. Zhou (IHEP)*
HEPS is the first low emittance 4th generation light source in China, as monochromators are often limiting the performance of beamlines, many challenges are faced to preserve the quality of the beam. In order to meet the stringent and versatile requirements of 12 in house developed monochromators for different beamlines, several core technologies have been studied and developed. Stability considerations including grouting method, high stiffness support design, high stiffness crystal adjustment mechanics, flow induced vibration control, vibration measurement system and methods are introduced, stability below 10 nrad RMS are measured for operation conditions by laser interferometers. Thermal resistance study at low temperature was carried out, enabling more accurate FEA of cooling. Clamping deformation of crystals at low temperature are experimentally studied, slope errors below 0.1 µrad RMS are measured. Design and test results on different types of monochromators will also be presented. Results show that the in house developed monochromators is able to meet the requirements of HEPS beamlines.

THOBM04 14:30 20
Development of a Mirror Chamber System for SHINE Project
***F. Liu**, Z. Wang, T. Wu (ShanghaiTech University) L. Zhang, W. Zhu (SARI-CAS)*
A 5-dof mirror chamber test system was developed to adjust offset mirror or distribution mirror for the SHINE project. Two linear guides were used for horizontal translation and rough pitch adjustment. three vertical gearboxes were used for height, roll and yaw adjustments. in the vacuum, a fine flexture structure was engineered for the fine pitch adjustment with a piezo actuator. To prevent the cooling vibrations, the cooling module was seperately fixed and the heat from the mirror was conducted by Ga/In to the cooling block. Pitch angular vibration were measured by several equipments with different conditions. Results showed that the pitch angular vibration is below 30 nrad above 1 Hz without active vibration control, and below 10 nrad with active vibration isolation system.

09-Nov-23 14:50 – 16:10 China Hall 3

THPPP — Poster Session THPPP

Chair: L. Zhang (SLAC)

THPPP001 **Advancements in the Optimization Method using Thermal and Mechanical Simulations for Mirror Cooling via Peltier at Sirius/LNLS**
***L.M. Volpe**, B.A. Francisco, V.B. Zilli (LNLS)*
In this article, we present advancements in the optimization method for mirror cooling using Peltier modules at Sirius, the 4th-generation synchrotron facility located at the Brazilian Synchrotron Light Laboratory (LNLS). Complementing the previous approach, we explore the utilization of Peltier modules for mirror cooling at ambient temperature, aiming to minimize surface deformations induced by the photon beam power. By integrating Peltier modules into the design, we investigate their effectiveness in achieving high thermal stability while considering the variable power load. The proposed methodology encompasses evaluations of thermal deformations, considering factors such as power load, cooling conditions, manufacturing errors, and the mirror substrate's properties. Two illustrative examples are showcased to highlight the practical implementation and performance of the proposed optimization method. This research contributes to the ongoing development of mirror cooling strategies, particularly with the integration of Peltier modules, enhancing the thermo-mechanical stability of mirrors in beamline applications at Sirius/LNLS.

THPPP002 **Analysis of Hazards in a Flammable Gas Experiment and Development of Testing Regime for a Polypropylene Vacuum Window**
***S.O. Bundrock**, B. Billinghurst, X.E. Li, D.M. Smith (CLS)*
Far Infrared Spectroscopy (Far-IR) is a bend magnet infrared beamline at the Canadian Light Source. The beamline utilizes a gas cell loaded with experimental gas which light is bounced through and a spectrometer to measure the absorption of the gas. For an experiment at Far-IR utilizing methane and nitrogen at 100K temperatures, issues with icing and inconsistent absorption gradients were noted at the Polymethylpentene Rigid Plastic (TPX TM) window separating the cell filled with the flammable gas mixture from the vacuum of the spectrometer. The possibility of replacing the existing windows with new 50-micron thick polypropylene windows was investigated. Material properties were not available for polypropylene at the operating temperature of the experiment. Due to the hazardous nature of the gas being held back a hazard analysis was carried out to identify potential risks and mitigations for the change. Additionally, with material properties unavailable, a testing regime was established to ensure the polypropylene could survive in the experimental environment. The experiment was successfully completed using the modified window assemblies.

THPPP003 **FEM Simulations for a High Heat Load Mirror**
***J. Seltmann**, H. Geraissate, M. Hoesch (DESY)*
At the variable polarization XUV beamline P04 of PETRAIII the first mirror is used to switch the beam between the two branches of the beamline. The heat load on this white beam mirror is dependent on the degree of polarization and the energy of the first harmonic of the synchrotron radiation. For the linear polarizations the heat load at the mirror position is limited to 1.8 kW by closing frontend apertures. For this project the water cooled "notched" mirror approach by Khounsary and Zhang et al. has been evaluated with FEM simulations. These show promising results for linear horizontal polarization in which the heat load profile is aligned with the mirror length. For linear vertical polarization the heat load is concentrated in the mirror center, which violates the basic concept of the "notched" mirror design and therefore the simulation results indicate only poor performance. To compensate for this a secondary cooling loop has been implemented and will be shown to improve the performance for the linear vertical case significantly. Additionally, new design approach is evaluated to reduce the peak temperatures of the mirror, which ranged at 140–180°C.

THPPP005 **Development of a Vacuum Box Disassembly and Assembly Handcart**
***X.J. Nie**, J.X. Chen, H.Y. He, L. Liu, R.H. Liu, C.J. Ning, G.Y. Wang, J.B. Yu, Y.J. Yu, J.S. Zhang (IHEP CSNS) L. Kang (IHEP)*
This paper developed a dedicated disassembly and assembly handcart for CSNS magnetic alloy cavity vacuum box. The optimal supporting section structure was determined by the use of ANSYS to analyze the strength of different sections. The stress situation of the handcart was improved by adding an extension rod at the end of the handcart. The installation position of the handcart was determined by the center position of the associated equipment. The development of the disassembly and assembly handcart structure was completed through structural optimization, disassembly and assembly process analysis, and positioning scheme design. The development of a handcart can improve the positioning accuracy of the vacuum box and prevent damage to the vacuum box during disassembly and assembly process.

THPPP007 **Optimizing Indirect Cooling of a High Accuracy Surface Plane Mirror in Plane-Grating Monochromator**
***J. Chen**, X.W. Du, Lin. M. Lin, Q.P. Wang, Z. Wang (USTC/NSRL)*
For the cooling of the plane mirror in VIA-PGMs (variable-included-angle plane-grating monochromators), the top-side indirect cooling is preferred for its advantages over the direct cooling, such as cheap, easy to use, etc. But it also arises a challenge to control the residual slope error of thermal deformation of the plane mirror whose requirement has reached to ~100 nano radian. It is the asymmetry thermal deformation on the meridian of the footprint area during the energy scanning. The asymmetry, giving an extra increase to the meridian residual slope error especially in the high heat load condition, may lead to residual slope error unacceptable. However, this problem cannot be effectively solved by increasing footprint meridian size or cooling efficiency. The effective way to handle it is to make the footprint area far from the mirror's edge to decrease the asymmetry of the deformation, but lead to a longer mirror. This paper will illustrate how the asymmetry affects the residual slope error and then, focus on the relationship among the asymmetry, heat load and the distance to provide a reference for optical design before thermal analysis.

THPPP008 **Optimizing X-Ray Mirror Thermal Performance Using Cooling Based on In-Ga Eutectic in Bath**
***J. Chen**, X.W. Du, Lin. M. Lin, Q.P. Wang, Z. Wang (USTC/NSRL)*
The synchrotron radiation facilities have many outstanding performances, such as tiny spot, high stability, etc. For the nearest location, the flow-induced vibration, generated by the coolant in the cooling channels and pipes, has become a crucial point degrading the spot stability at the slit. The cooling schemes utilizing In-Ga eutectic in bath have the ability to decouple the flow-induced vibration significantly from the cooling block to the mirror. Meanwhile, it also has the capacities to solve the problems caused by the clamping force and the non- uniformity of the thermal conductance between contact blocks. However, this cooling scheme applied to the first horizontal deflection mirror has many differences from two top-side cooling in structure, manufacture and notch location. This paper will illustrate these differences and provide an optimizing method to minimize the thermal deformation and residual slope error.

THPPP009 **The Heat Load Calculation Software in Grating Based Beamline at Hefei Advanced Light Facility (HALF)**
***Z. Wang** (USTC/NSRL)*
For the 4th generation synchrotron radiation (SR) light source, the heat load causes severe thermal deformation on the beamline optics as the emittance is reaching at the physical limit. The precise calculation of heat load on the optical elements is important for the thermal analysis including cooling method and thermal deformation simulation. A heat load calculation code has been developed for grating based SR beamline optics, which consists of modules of SR source simulation, mirror reflectivity and grating efficiency. The calculation results has been checked with SRCalc results. This code has been used to calculate the heat load of the Test Beamline optics at Hefei Advanced Light Facility (HALF). The heat absorbed by the first three optical elements, including a toroidal mirror, a plane mirror and a plane grating is calculated.

THPPP010 **Mechanical Analysis and Test for Austenitic Stainless Steel Bolts of Beamline Flange Connection**
***T.T. Zhen**, H.X. Deng, R. Deng, L.J. Lu, S. Sun (SARI-CAS)*
Cryogenic test of 1.3 GHz superconducting accelerator cryomodule for the Shanghai Hard X-ray Free Electron Laser Installation Project(SHINE) is going on. For achieving higher reliability, mechanical analysis and test for austenitic stainless steel bolts of beamline flange connection were finished in the preliminary work. In order to ensure the magnetic permeability and strength requirements, high-strength austenitic stainless steel bolts were selected. The minimum breaking torque was determined by empirical formula. For higher sealing performance, the torque coefficient was re-judged by the preload test, the yield strength was obtained by the tensile test, then the minimum failure torque under real working conditions was obtained according to the relationship between preload and torque. A finite element model was established to get the deformation curve of the gasket with the preload force, and the measured results were compared to ensure the correctness of the simulation. Finally, the deformation curve was used to calculate the change of preload after bolt cooling and reheating, so as to ensure that the bolt would not be plastically deformed due to temperature change.

THPPP011 **Design and Simulation Optimization of Storage Ring Magnet Supports**
***Q.Q. Huang**, X.Y. Li, Z.L. Liu, T. Luo, J.X. Tang, Z. Yang (Institute of Advanced Science Facilities)*
Mechanical support is fundamental for the accelerator equipment, its stability ensures the operation of many components on-top in high performance, such as the magnets, vacuum chambers and beam diagnostics, and thus the entire light source. The high stability of mechanical support usually refers to low static deformation under normal working conditions and high first-order natural mode. Therefore, it is extremely important to optimize the mechanical support in these regards. This paper focus on the design and optimization of the mechanical supports for Shenzhen Innovation Light source Facility (SILF) with the help of SolidWorks and ANSYS software. The design and optimization processes are presented in detail. The optimized design of mechanical support is then combined with the magnets

model with considering as much as possible the details to reflect the reality, so as to ensure the relevant physical requirements are fulfilled.

THPPP012 **Shape Optimization Design of Key High Heat Load Optical Components in the First Phase of S3FEL**
***Z.M. Xu** (IASF)*
The Shenzhen Superconducting Soft X-ray Free Electron Laser (S3FEL) is a new light source under proposal phase at Institute of Advanced Science Facilities (IASF), Shenzhen. S3FEL consists of 2.5 GeV CW superconducting linear accelerator and four initial undulator lines, aiming to generate X-rays between 40 eV and 1 keV at rates up to 1 MHz. In its first phase,four beamlines will be built. In order to meet the needs of FEL wavefront coherent transmission, the mirror's shape needs to be optimized to obtain the nanoscale height error and slope error below 100 nrad.In the paper, a perturbation model of the deformation and objective function of the mirror shape under the combined action of X-ray thermal power and resistive heaters is established, and a shape optimization method based on the SVD method is proposed. And shape optimization design of key high high load optical elements,such as offset mirror,monochromator and KB mirror is described,using shape compensation based on multiple heaters. Using this scheme, both the height error and the slope error meet the requirements.

THPPP013 **Studies on the Influences of Longitudinal Gradient Bending Magnet Fabrication Tolerances on the Field Quality for SILF Storage Ring**
***J. Zhu**, D.H. Liang, C.G. Wang, M. Zhang (IASF)*
The advanced storage ring of 4th generation synchrotron radiation facility, known as the diffraction-limited storage ring (DLSR), is based on multi-bend achromat (MBA) lattices, which enable an emittance reduction of one to two orders of magnitude pushing beyond the radiation brightness and coherence reached by the 3rd generation storage ring. The longitudinal gradient bending (LGB) magnets, with multiple magnetic field stages in beam line direction, are required in the DLSR to reduce the emittance. The permanent magnet based LGB magnets are selected for the Shenzhen Innovation Light-source Facility (SILF) due to the advantages of operation economy, compactness and stability compare to the electro-magnet. In this paper, the influences of typical LGB magnet fabrication tolerances on the field qualities are presented using a dedicated parameterized finite element (FE) model, such as the poles height and width tolerances, the pole tips parallelism (in different orientations) and etc. Meanwhile the influences of permanent magnets discreteness and the magnetic forces (between top and bottom pole tips) induced yoke deformation on the field qualities are studied and presented.

THPPP014 **A "Special-Shaped Copper Exchanger Cooling Scheme" for the White Beam Mirrors Under Ultra-High Heat Loads**
***J.Y. Liu**, Y.J. Gong, Z. Ji, H. Qin, X.X. Yan (IASF)*
X-ray optics exposed to the intense white-beam X-rays in diffraction-limited synchrotron light sources are subject to thermal deformations that must be removed by an efficient cooling system. A special-shaped copper exchanger (SSCE) cooling scheme for white beam mirrors (WBM) is proposed in this study. The influence of the cooling mechanism on heat transfer efficiency is studied, and the corresponding relationship between mirror optical profile and temperature distribution is revealed. On this basis, optimization is carried out: grooves on the cooling exchangers are customized with the size designed to adjust local heat transfer efficiency, achieving accurate control on crystal temperature distribution and further obtaining an approximately flat optical profile within beam footprint in this way. An example of an effective-length of 550 mm WBM with SSCE cooling scheme is verified by FEA, whose slope error is less than 0.2 µrad RMS for at 230 W absorbed heat load. It exhibits great advantages in the flexibility and cost saving for optical profile control compared with the previous ways.

THPPP015 **Mechanical Design of A Novel Precise Secondary Source Slits**
***X.X. Yan**, Y.J. Gong, Z. Ji, J.Y. Liu, H. Qin (IASF)*
Secondary source slits are extensively adopted in the coherent or nano-focusing beamline, which can well define a beam size of order of micros or nanometers and deliver the beam to downstream optics with high stability as well. In order to achieve the nano-resolution and hundreds of micron stroke simultaneously, a set of precise slits is designed based on flexure hinges in this paper. The coarse and fine adjustments of each blade can be accomplished with or without a flexible displacement-amplified mechanism, as a factor of 9.8, driven by a piezo actuator. Furthermore, the kinematic and dynamics models are simulated and investigated by finite element analysis (FEA) and numerical analysis. Finally, the optimized micro-displacement mechanism based on flexure hinge can provide a stroke of 200 µm with 3 nm resolution, whose eigenfrequency is greater than 300 Hz.

THPPP016 **Numerical and Experimental Studies to Evaluate the Conservative Factor of the Convective Heat Transfer Coefficient Applied to the Design of Components in Particle Accelerators**
***M. Quispe**, J.J. Casas, C. Colldelram, M. Sanchez (ALBA-CELLS) H. Bello (La Romanica) R. Capdevila, M. Rabasa, G.A. Raush (ESEIAAT) S. Grozavu (Universidad Politecnica de Madrid, ETSI Aeronauticos)*
The fluid boundary condition applied to the design of components in Particle Accelerators is calculated as a global variable through experimental correlations coming from the literature. This variable, defined as the Convective Heat Transfer Coefficient, is obtained using the correlations of Dittus and Boelter (1930), Sieder and Tate (1936), Petukhov (1970), Gnielinski (1976), among others. Although the designs based on these correlations work properly, the hypothesis of the present study proposes that the effectiveness of these approximations is due to the existence of a significant and unknown conservative factor between the real phenomenon and the global variable. To quantify this conservative factor, this work presents research based on Computational Fluid Dynamics (CFD) and experimental studies. In particular, recent investigations carried out at ALBA confirm in a preliminary way our hypotheses for circular pipes under fully and non-fully developed flow conditions. The conclusions of this work indicate that we could dissipate the required heat with a flowrate lower than that obtained by applying the experimental correlations.

THPPP017 **Beamline Components of Ultimate Stability and Precision**
***W. Diete**, A. Andrianov, A. Schacht, I. Schweizer, S. Szillat, C. Venkataraman, T. Waterstradt, U. Wiesemann (AXILON AG)*
The continuous advances towards diffraction-limited synchrotron light sources and free electron laser facilities (FEL) require beamline components with ever-increasing optical and mechanical performance. Key aspects are the positional stability of the x-ray beam at the experiment and the quality of the installed optical elements. AXILON is a worldwide leading company providing state-of-the-art beamline equipment for high-end beamlines. In this poster we provide an overview of our recent achievements for beamline components. Results of our newest generation of cryo-cooled monochromators demonstrate ultimate performance achieving beam stabilities well below 50 nrad. Latest mirror systems, including mechanical benders, also achieve similar beam stabilities with the bending mechanism preserving the mirror quality with slope errors below 100 nrad rms, even when bent to the final elliptical shape. Finally, we give an update on our achievements with X-ray microscopes providing design concepts and first test results of a new microscope for ptychography, with a targeted positioning stability of 1-2 nm.

THPPP018 **Delta Robot 2.0: The Nano-Positioning System for the Hard X-ray Nanoprobe at the Australian Synchrotron.**
***M. Semeraro**, N. Afshar, C.M. Kewish, J. McKinlay, C. Morey, M.D. de Jonge (AS - ANSTO) J.H. Kelly (DLS)*
A nano-positioning system for the Nanoprobe beamline at the ANSTO Australian Synchrotron has been designed in collaboration with Diamond Light Source (DLS). Based on the DLS I14 delta robot, this design extends the bandwidth and uses an interferometer arrangement that reduces Abbe errors to improve positioning stability at high scan rate. Voice coil actuators and advanced control algorithms target precise and stable scanning with 3 µmm range in XYZ with 10 nm-rms stability; a significant challenge that was used to upskill in mechatronics engineering across our facility and improve design collaboration between mechanical and controls engineering groups. In addition to scanning, 360° rotation and 50 mm focusing, and automated sample exchange are supported. The design, fabrication, and construction of the system is discussed, with preliminary results demonstrating its performance in terms of positioning accuracy, stability, and repeatability. This work represents an advance in the development of nanoprobe positioning systems for X-ray microscopy, with promising outlook for a range of scientific and engineering applications.

THPPP019 **The Loading Chamber of the Sapoti Cryogenic Nanoprobe at the Carnauba Beamline at Sirius/LNLS**
***R.C. Gomes**, G.G. Basilio, J.L. Brito Neto, R.R. Geraldes, A.Y. Horita, F.R. Lena, M.B. Machado, Y.A. Marino, E.O. Pereira, P.P.R. Proença, M.H.S. Silva, R.A.A. Taniguchi, H.C.N. Tolentino (LNLS)*
SAPOTI will be the second nanoprobe to be installed at the CARNAUBA (Coherent X-Ray Nanoprobe Beamline) beamline at the 4th-generation light source Sirius at the Brazilian Synchrotron Light Laboratory (LNLS). The Loading Chamber was designed to: i) preserve the vacuum level and cleanliness of the Main Chamber, with the optical system and a cryogenic nanopositioning sample stage, ii) store up to six samples in cryogenic condition using a Pulse Tube Cryocooler in a rotary carousel. The samples are loaded using a load-lock system and a customized sample cartridge, which can carry up to three samples and gets engaged in the carousel. Then, a linear stage with a custom cryogenic gripper gets a sample and goes toward the sample stage in the Main Chamber through an embedded gate valve designed to separate the environments. The overall alignment budget and the temperature-related limited amount of time required for this procedure were the biggest technical challenges for this project. This work presents the mechanical design, thermal models, alignment requirements, automation and operational procedures, including the assembly and first offline commissioning results.

THPPP020 **The Pre-Alignment of High Energy Photon Source Storage Ring**
***S. Lu**, L. Dong, L.L. Men (IHEP) J. Liang (DNSC)*
In order to achieve 10 µm pre-alignment accuracy of storage ring in transverse and vertical, four laser trackers were used for set up a four-station multilateration measurement system. Experiment results show that the relative displacement measurement accuracy is better than 3 µm in 3-meter workpiece range, which can satisfy the real-time position feedback accuracy of the magnets in the process of ultra-high-precision pre-alignment. After two years of research and development, three pre-alignment standard workstations have been established. And the laser multilateration measurement method is adopted to the pre-alignment of the three, five and eight magnet girders in the storage ring of HEPS. Currently, 140 out of 288 girders have been pre-aligned after half a year of work.

THPPP021 **Ultra-Stable and Multi-DOF Bent KB Mirror Mechanical System for Hard X-Ray High Energy Resolution Spectroscopy (HX-HERS) Beamline of HEPS**
***R.Z. Xu**, M. Li, W.F. Sheng, S. Tang, H.H. Yu (IHEP)*
The KB mirror system designed for the HX-HERS beamline was expected to focus the spot size down to 2 µm×2 µm and achieve 5-DOF adjustment of each mirror. However, the long mirror length leaded large size of the overall mechanism and the limited height space for multi-dimensional adjustment makes the mechanical design of the KB system with both stability and functionality difficult. In this KB system, each mirror is bent by a four-bar bender universally used in HEPS to obtain the required profile. A combination of parallel and serial mechanism with totally 11-DOF is designed to realize the adjustment requirements. Specifically, the parallel mechanism is a three-point support design that serves as the base of the KB mirror chamber and offers coarse tuning of 5-DOF, exhibiting great compactness and high stiffness. The series mechanism is a stacking of four angle and two displacement adjustment mechanisms up to 6-DOF. These independent stages with high resolution are assigned to VFM and HFM respectively to achieve fine adjustment of their relative positions. In the design of each angle and displacement adjustment stage, the height and rigidity of the mechanism are also fully considered.

THPPP022 **A Compact Direct Measurement Mehod for Relative Positioning of KB Mirrors Nano-Experimental Apparatus Based on Grating Interferometers**
***S. Tang**, T. He, M. Li, R.Y. Liao, Z.N. Ou, W.F. Sheng, Y. Tao, H.H. Yu, L. Zhou (IHEP) T. He (University of Chinese Academy of Sciences) H.H. Yu (UCAS)*
Positioning measurement is regraded as an effective way for the position compensation and feedback of nano-experimental apparatus. However, it usually suffers many restrictions from a complicated applied occasion of a typical performance beamline for next-genearation synchrotron radiation light source. To deal with the problem, a compact direct measurment method based on grating interferometers is presented. The principle, configration, experiment are designed and implemented for the verifiation of the feasiblity. It performs a high resolution in orthogonal/lateral direction relatived to laser beam, which can overcome an infeasible shortage of a typical interferometer for direct lateral positioning. So, it is used to positioning measurment & compensation between KB mirrors and nano-stages of a sample for the experiments of CDI, bragg-CDI, pytchograph, XPCS, etc. Compared with the exisited methods, huge frame, two vacuum chambers restriction, multi-axis interferometer and benchmark relay are avoided for the compact system by using posposed method.

THPPP023 **Design and Test of Crystal Components in HDCM**
***Y.Y. Yang**, H. Liang (IHEP)*
Vertical diffraction monochromator is a typical optical device in synchrotron radiation device. Its main requirements and characteristics are high Angle accuracy and stability. Due to the high requirements of new light sources, high precision and high stability have become a common difficulty. This paper mainly introduces the design and test of an internal crystal module of HDCM. There are two main parts: the first crystal and the second crystal. The first crystal assembly includes crystal cooling and clamping, using microchannel edge cooling and flat plate clamping schemes. The second crystal component, through the motor to the top, drives the flexible hinge, and then realizes the rotation of the crystal. At the same time, the Angle monitoring system is designed. The design scheme is verified by processing. The shape of the clamping surface of a crystal component meets the requirements of use. The motion test of the two crystal components is carried out in the atmosphere, vacuum and low temperature vacuum environment, and the results are much higher than the required parameters. And the whole stability is tested. It has high stability.

THPPP024 **Fast Setup Alignment of a Highly Mobile Experiment with a Raspberry Pi and a Beckhoff PLC and the Combination of the PLC to the DAQ.**
F. Scholz *(DESY)*
The so-called Focus-Finder Setup of DESY uses a Beckhoff PLC to control the scanning motor during the measurement. While the measurement isrunning, the external trigger of a camera is used to save the timestamp and encoder value internally in the Beckhoff. Later, this data is used to synchronize the taken pictures with the corresponding encoder position. In our new enhanced setup, we use the Beckhoff PLC also for controlling all the additional motor axes of the experiment to align the scanning motion axis with the beam path. This is done by using a 7-inch touchscreen with an attached Raspberry Pi 3+ and pyqt5-based software to create the GUI. Together, this helps to reduce the setup and alignment time by factors.

THPPP025 **Commissioning of the Intermediate Focus Setup at P04 at DESY**
F. Scholz*, M. Hoesch, M.-J. Huang (DESY) J. Buck, M. Kalläne (CAU) B. Pfau, M. Schneider (MBI)*
The soft x-ray beamline P04 at PETRA III includes an experiment and beam-diagnostic station called Intermediate Focus (IF). The station holds an experimental station for soft x-ray scattering, as well as diagnostic and beam shaping equipment to propagate the beam further into the ASPHERE III setup of the University of Kiel (CAU). The IF station receives the beam over a pair of Kirkpatrick-Baez (KB) mirrors that produce 40 µm x 40 µm beam spot at the IF position. An additional set of KB mirrors inside the ASPHERE III instrument refocuses this spot into the ultimate focus. Among the beam shaping equipment, a set of interchangeable pinhole serve as a new source point. With a size between 5-100 µm they will produce a sub-micron beam size, which is less than 1 µm x 1 µm at the sample position. The IF station includes two features that will be presented: (a) A UHV switchyard that allows to bring either the scattering instrument or the beam shaper into the beam (collaboration with Max-Born-Institute Berlin). The switch between the setups works without breaking the vacuum. (b) The beam diagnostic and shaping assembly, including measurement and viewing components.

THPPP026 **Motorized Universal Adjustment Platform For Micrometric Adjustment of Accelerator Components**
M.N. Noir*, D.B. Baillard, P.B. Biedrawa, L. Gentini, J.W. Jasonek, F.-X. Nuiry, V. Rude, R. Seidenbinder, M. Sosin, K. Widuch (CERN) P.B. Biedrawa, J.W. Jasonek (AGH University of Science and Technology)*
In order to optimize alignment activities in a highly radiative environment, the Geodetic Metrology Group at CERN has developed a standardized 6 degree of freedom (DOF) Universal Adjustment Platform (UAP). After a first prototyping phase in 2021 with a manual UAP, the design has been consolidated and is now compatible with the installation of motorized actuators to form a remotely adjustable 5-6 DOF platform able to perform positioning with micrometric resolution. This paper presents the UAP and related motorized actuator development, elaborated in the frame of the High-Luminosity Large Hadron Collider project. The mechanical integration approach, design solutions, and test results are discussed.

THPPP027 **The Diminishing Effect of Increasing First Natural Frequency on the Real World Stability of Mirror Systems**
E.R. Jane*, L. Mateos (FMB Oxford)*
The drive to ever higher stability mirror systems for x-ray beamlines is of utmost importance to exploit the full potential of smaller, coherent 4th generation sources and advancements in optical polishing. Mirrors are rarely used dynamically during beam operation and as such they can be treated as static systems. Therefore, above the determined value from each facilities floor spectrum, the vibration amplitude becomes negligible. Extensive factory testing has shown, above a threshold value, there is no correlation between the actual vibrational stability of systems and their first natural frequencies. Furthermore, water cooled systems typically do not lead to increased 1st natural frequency, even though marginal increases in vibration are experienced. It is also shown utilization of coupled optical geometry provides the lowest vibrational performance. Therefore, does the trend of increasing the specification of the 1st natural frequency provide a cost effective and functional approach to real-world optical system design? Or should a holistic approach involving beamline design, optical layout and manual alignment techniques be used to realize ultimate vibrational performance?

THPPP028 **Modification of CSNS-II Injection Zone and Stripper Foil**
J.X. Chen *(IHEP CSNS) L. Kang, L. Liu, G.Y. Wang, J.B. Yu, J.Y. Zhang (IHEP)*
The injection energy of CSNS-II will increase to 300MeV, and the existing injection area layout can not meet the demand after the energy increase. It is necessary to reform the injection area, it includes magnet, beam measuring element, vacuum equipment, stripper foil and so on. Due to the increase of injected energy, the beam loss is greatly increased, and the on-site maintenance of personnel is more difficult, new structures for equipment such as stripper foil will also add remote maintenance capabilities. In this paper, the layout of CSNS-II injection zone is introduced, and the new design of the stripper foil is analyzed, the prototype is developed and verified, which lays a foundation for the development of stripping membrane equipment.

THPPP029 **Technologies Concerning Metal Seals of the UHV System for Accelerators**
H.Y. He *(IHEP) L. Liu, P.C. Wang (IHEP CSNS) B. Tan (DNSC)*
Reviewed the domestic research on structural design and sealing function principle of the metal seals, wildly used in the Ultra High Vacuum (UHV) system for accelerators. Analyzed and summarized the key technologies concerning the material, contact forms, machining process and test methods of sealing performance. The study will become the basis of designing, machining and quality measuring for the ultra-vacuum metal seals. It provided the foundation for generating seals standards to promote the development of vacuum technology application.

THPPP032 **Automatic Collimation Device For A Long coil Magnet Measurement System**
R. Liang*, F.S. Chen, Q. Li (IHEP)*
The automatic collimation device is designed for a long coil magnet measurement system. The device is able to automatically collimate dipole magnets before the magnetic measurement. During the automatic collimation, the magnetic center position and center plane of the long coil on the magnetic measurement system is coincided, and relative coordinates of the magnet on X-direction is also confirmed, which determines moving distance the long coil. Traditional collimation method is based on a collimator and a theodolite manually, which requires two specialists and long operation time. While the automatic device is designed to eliminates flaws above. The automatic collimation device possesses an automatic bracket for supporting and moving the measured magnet, a measurement instrument on a 7-DOFs manipulator, and a control system for the device. The automatic collimation follows such process that firstly, the measured magnet is put on the automatic bracket, secondly the measurement instrument determines error between center planes of the long coil and the measured magnet, then the automatic bracket corrects posture of the magnet automatically.

THPPP033 **Design of Ultra-Stable and Multi-DOF Generic Mirror Mechanical System at High Energy Photon Source (HEPS)**
L.H. Ma*, M. Li, W.F. Sheng, S. Tang, J.Y. Wang (IHEP) M. Li, W.F. Sheng (University of Chinese Academy of Sciences) S. Tang (UCAS)*
The main function of the generic mirror chamber system in HEPS is to support, adjust the pose and provide the ultra-high vacuum environment of the optical elements in the beamline. Its pose adjustment requires micrometer or submicroradian level repetitive positioning accuracy and adjustment resolution. The white beam bending mirror chamber in the generic mirror chamber system of the Hard X-ray Nanoprobe Multimodal Imaging Beamline(B2) is taken as an example, to discuss the design of its pose adjustment mechanism. It needs to achieve 5-DOF for pose adjustment function. This paper proposes using a multi-layer marble structure and a combination of multiple motion mechanisms to achieve this function. The motor and screw-nut pair drive sliders can achieve 2-DOF adjustment. The motor and screw-nut pair drive two wedge-shaped blocks can achieve 2-DOF adjustment. The motor and straight circular flexible hinge drive a disc-type flexible hinge can achieve one angle adjustment. Finally, through series of numerical calculations, finite element simulations and physical experiments, it is demonstrated that the design indexes meet the requirements, thus verifying the feasibility of the scheme.

THPPP034 **Research on the Identification Method of Micro-Vibration Harmonic Signal Based on Kurtosis**
R.H. Liu*, G.Y. Wang (Institute of High Energy Physics, CAS) L. Kang (IHEP) L. Liu, J.S. Zhang (IHEP CSNS)*
Large synchrotron radiation equipment works in complex microvibration environment which includes random vibration and periodic harmonic vibration signals. The harmonic signal will affect the identification of the working mode of the structure, and the identification of the harmonic signal can be used as the identification of the micro-vibration source. In this paper, according to the difference between the statistical characteristics of the system response and the harmonic response, a kurtosis value method based on random variable is applied to identify the harmonic response. The effectiveness of the method is verified by the simulation and the vibration data results of Shenzhen Sager Tower, which provides a new method for eliminating the influence of harmonic response in the following working modal parameter identification and vibration source identification of synchrotron radiation device.

THPPP035 **Mechanical System of the Undulator Prototype for the SHINE FEL-I**
S.W. Xiang*, Z.Q. Jiang, Y.Y. Lei, J. Yang, Q. Yuan, W. Zhang, T.T. Zhen, S.D. Zhou (SARI-CAS)*
The Shanghai High repetition rate XFEL and Extreme light facility (SHINE) is under construction and aims at generating X-rays between 0.4 and 25 keV with three FEL beamlines at repetition rates of up to 1 MHz. The three undulator lines of the SHINE are referred to as the FEL-I, FEL-II, and FEL-III. A undulator prototype U26 has been developed and tested at SSRF. This paper describes the design and performance test of the U26 mechanical system, which can also meet the requirements of the U55 for the FEL-II. By using a specially designed double lever compensation springs can eliminate magnetic force on the drive system. Engineering simulations undertaken and experiments performed to validate the mechanical structure design are presented together with measurement results.

THPPP036 **Prototype of High Stability Mechanical Support for SHINE Project**
***R. Deng**, H.X. Deng, F. Gao, X. Huang, Z. Lei, T.T. Zhen (SARI-CAS)*
Quadrupole stability of undulator segment is key to the beam performance in SHINE project. Vibration stability requirement of quadrupole is not larger than 200 nm displacement RMS between 1 and 100 Hz, but the field test of SHINE tunnel shows that the underground vibration during the day time is greater than 200 nm. In this paper, a mechanical support including marble base and active vibration reduction platform is sophisticated designed. With this support, vibration stability of the key quadrupole is expected to be improved and the performances of the quadrupole meet the demands.

THPPP037 **A Micro-Vibration Active Control Method Based on Piezoelectric Ceramic Actuator**
***Z. Lei**, H.X. Deng, R. Deng, X. Huang (SARI-CAS)*
In linear accelerator, ground vibration is transmitted to beam element (quadrupole magnet, etc.) through support, and then reflected to the influence of beam orbit or effective emittance. In order to reduce the influence of ground vibration on beam orbit stability, an active vibration isolation platform can be used. In this paper, an active vibration isolation system is proposed, which realizes the inverse dynamic process based on a nano-positioning platform and combines with a proportional controller to reduce the transmission of ground-based excitation to the beam element. The absolute vibration velocity signal obtained from the sensor is input to the controller as feedforward signal. The controller processes the input signal and then the output signal drives the piezoelectric ceramic actuator to generate displacement, realizing the active vibration control. The test results of the prototype show that the active vibration isolation system can achieve 50 % displacement attenuation, which indicates that the vibration control strategy has certain engineering application value in the construction of large accelerators.

THPPP038 **Girders on Storage Ring in SOLEIL II**
***J. Da Silva Castro** (SOLEIL)*
After two decades since its establishment, the SOLEIL Synchrotron facility needs to adapt to follow new scientific fields that have emerged since. After the Conceptual Design Report (CDR) phase for the facility Upgrade, the SOLEIL teams have been working for several months on the Technical Design Report (TDR). The 'SOLEIL Upgrade' project is called 'SOLEIL II' and is divided into several sub-projects. Among these sub-projects, one concerns storage ring Girders that will support all magnets of the new Lattice. These 86 Girders, each one supported by 2 plinths, must ensure an excellent degree of vibration stability. Before obtaining a final design for these Girders, a significant amount of study work has already been carried out (design, finite elements simulations, sub-assembly prototyping, dynamic measurements, tests, etc.). To validate the concepts, a fully equipped prototype girder was launched into manufacturing. In this contribution the preliminary studies and the ongoing investigations on SOLEIL II girder design will be presented.

THPPP039 **Development of the BPM Support for HEPS**
***A.X. Wang** (USTC/NSRL)*
The stability of beam orbit is absolutely the key performance indexes of a modern synchrotron radiation light source, which affects the performance of accelerator and the quality and stability of synchronous light in experimental line station directly. As a fourth generation synchrotron radiation light source, High Energy Photon Source (HEPS) has characteristics of high energy and low emissivity, which requires very high stability of beam orbit. Beam position monitor (BPM) is an precise instrument used for measuring beam position and orbit, and its mechanical vibration amplitude must less than 100 nm. Therefore, a independent support need to be distinctively designed. Based on the thermal stability and vibration stability, an ultra stability structure of rigid support is designed and optimized. Through the finite element modal analysis of ANSYS, the thermal expansion variation and the characteristic frequency of the support is verified.

THPPP040 **The Girder System Prototype for the New ALBA II Storage Ring**
***L.R.M. Ribó**, J.B. Boyer, C. Colldelram, NGonzález, L. Nikitina, F. Pérez (ALBA-CELLS)*
The main goal of the upgrade of ALBA Synchrotron Light Facility into ALBA II is the transformation of the current accelerator into a diffraction limited storage ring, which implies the reduction of the emittance by at least a factor of twenty. The upgrade will be executed before the end of the decade and will be profiting at maximum all existing ALBA infrastructures, in particular the building. The whole magnet layout of the lattice has to be supported with a sequence of girders for their positioning with respect to another located in an adjacent girder with an accuracy of 50 µm to ensure the functionality of the accelerator. Besides the girders must enable the remote repositioning the magnets against the overall deformation of the site while ensuring the vibrational stability of the components on top. Easiness of assembling and installation of the different subsystems of the machine on top of the girder has to be considered also as a design requirement, in order to minimize the installation time. Two prototypes are planned to be built next year in order to check its full functionality

THPPP041 **Design of HEPS Booster Synchronous Radiation Light Extraction System**
***J.M. Liu**, S.M. Liu, X.Y. Sun, B. Tan, P.C. Wang (DNSC), Y. Ma, D.C. Zhu (IHEP) B.L. Zhu (IHEP CSNS)*
The HEPS Booster synchronous radiation light extraction system is a bending magnet source designed specifically for Booster beam size monitor, consisting of a vacuum chamber, diaphragm, and reflector. The function of the system is to provide specific synchrotron radiation light for the optical imaging system to measure the beam size. At present, the system has been successfully manufactured and installed. This article will introduce its design, thermal analysis, and manufacturing accuracy.

THPPP042 **Novel Joining Methods for Permanent Magnet Structure for Short Period Cryogenic and In-vacuum APPLE Undulators at HZB**
***C. Kuhn**, J. Bahrdt, J. Bakos, S. Gaebel, S. Gottschlich, S. Grimmer, S. Knaack, F. Laube, A. Meseck, E.C.M. Rial, A. Rogosch-Opolka (HZB) A. Meseck (KPH)*
The trend towards shorter period length, in-vacuum and cryogenic permanent magnet insertion devices at 4th and 5th generation light sources has greatly increased the challenge of bonding magnet assemblies to mechanical support structures. Adhesive bonding using epoxy glues, as previously used at HZB, is unsuitable for UHV environments, and short period lengths and small geometries present significant design and assembly challenges when clamping magnet assemblies to support structures. Driven by the changing requirements for the attachment of magnets and highly permeable materials to complex structures within UHV environments at cryogenic temperatures, a novel joining process has been developed, manufactured and tested at HZB in cooperation with VACUUMSCHMELZE GmbH. This paper will present the results of vacuum, thermal, deformation and lifecycle tests of magnetic samples and prototype assemblies. The results demonstrate the suitability of these methods for use in technically demanding new undulators under development at HZB.

THPPP043 **Status of the Shenzhen Innovation Light Source Facility**
***T. He** (Institute of Advaced Science Facilities)*
The Shenzhen innovation light source facility (SILF) is a fourth generation of medium energy synchrotron radiation light source, which includes beamline system and accelerator system. The accelerator complex is composed of a 200 MeV linac, a 0.2-3.0 GeV booster and a 3.0 GeV storage ring. The circumference of the storage ring is 696 m, which includes 28 hybrid-7BA lattice periodic units to achieve an emittance below 100 pmrad. The SILF focuses on supporting the development of the domestic core industries, basic science frontier research and major strategic requirements, such as integrated circuits, biomedicine, advanced materials and advanced manufacturing. With the Shenzhen Municipal Government's approval of the SILF project proposal on Sep10 2020, the feasibility study and the conceptual design report of the SILF were completed in 2022. The preliminary design of the SILF is in progress.

THPPP044 **Magnet Designs for the Multi-Bend Achromat Lattice of the Shenzhen Innovation Light-source Facility**
***C.G. Wang**, D.H. Liang, G.M. Liu, M. Zhang, J. Zhu (IASF)*
The Shenzhen Innovation Light-source Facility (SILF) is a 4th generation diffraction limited storage ring project with an operating energy of 3 GeV, which is prosed by the Institute of Advanced Science Facilities, Shenzhen. For the storage ring, hybrid seven-bend achromat (H7BA) lattice is used in order to achieve a low electron beam emittance. There are longitudinal gradient bends (LGB), strong dipoles with longitudinal gradient (SUPB), dipole and quadrupole combined function magnets, strong quadrupoles with large vertical gaps, strong sextupoles, octupoles and corrector magnets in each unit cell. The field requirements of these magnets and the limited space available pose several design challenges. This paper presents a summary of magnet designs for the various magnet types.

THPPP045 **Injection with a Nonlinear Kicker in the SILF Storage Ring**
***Z.B. Sun** (IASF)*
The Shenzhen Innovation Light-source Facility (SILF) is a fourth-generation storage ring with an energy of 3 GeV that is proposed by the Institute of Advanced Science Facilities, Shenzhen. Through repeated optimizations, the storage ring has achieved a dynamic aperture of 15 mm, making it suitable for an off-axis injection scheme. In this study, we investigated the feasibility of two injection schemes - conventional local bump injection and nonlinear kicker injection, for the SILF storage ring. We also compared the advantages and disadvantages of these two injection schemes. Through simulation work, we demonstrated how to achieve a higher injection efficiency using nonlinear kicker injection. Our results provide valuable insights into the potential use of these injection schemes in the SILF storage ring.

THPPP046 **Design, Manufacture and Installation of Electromagnets in HEPS Storage Ring**
***L. Wu**, S.Y. Chen, C.H. Li, Y.D. Xu, S. Yang (IHEP)*
The HEPS storage ring comprises 48 7BA (seven-bend achromat) cells that are grouped in 24 superperiods,with a circumference of 1360.4 m.There are 37 independent magnets in every cell, of which 5 dipoles are permanent magnets and the rest of magnets are all electromagnets including quadrupoles, dipole-quadrupole combined magnet, sextupoles and octupoles. These electromagnets with small aperture and high magnetic field gradient should achieve high machining and assembly precision. All sextupoles and octupoles are processed by a whole piece of ferromagnetic material. Quadrupole and dipole-quadrupole combined magnet are classified into four types according to different design and processing schemes. At present, the magnet processing is about to be completed, and the magnets are being installed. This paper will introduce the design, processing, and installation of all types of HEPS storage ring electromagnets, and share the difficulties and experiences in the design and processing period.

THPPP047 **NEG Film Development and Massive Coating for HEPS**
***Y. Ma** (IHEP)*
About 1000 m total length of vacuum chambers will be NEG coating of HEPS, due to their small aperture. Two setups of massive NEG coating have been built up for vacuum pipes of HEPS at IHEP Lab. And a lot of test vacuum pipes have been coated, which shows that NEG film has good adhesion and thickness distribution, and good pumping speed. More details of NEG coating will be introdcuced.

THPPP049 **Realization of a Compact APPLE X Undulator**
***L.K. Roslund**, M.A. Al-Najdawi, L.F. Balbin, S.M. Benedictsson, M. Ebbeni, M. Holz, H. Tarawneh, K. Åhnberg (MAX IV Laboratory, Lund University)*
The APPLE X is a compact elliptically polarizing undulator with a small round magnetic gap that provides full polarization control of synchrotron radiation at a lower cost and in less built-in space than comparable devices. The APPLE X will be the source for MAX IV's potential future Soft X-ray (SXL) FEL. The mechanical design, finite element analysis optimization, assembly process, magnetic measurements, and shimming of a full-scale 2 m, 40 mm-period SmCo permanent magnet undulator are presented.

THPPP050 **Overview of Undulator Solutions for the Polfel Project**
***J.J. Wiechecki** (NSRC SOLARIS) P. Krawczyk, R. Nietubyc (NCBJ) P.R. Romanowicz, D.T. Ziemianski (CUT)*
The PolFEL project, consisting in building a free electron laser, will be the first in Poland and one of the several sources in the world of coherent, tuneable electromagnetic radiation within the range from THz to VUV, emitted in pulses from femtoseconds to picoseconds, with high impulse power or high average power. The research infrastructure will include a free electron laser (FEL), a photocathode testing laboratory, end-stations and laboratories necessary for the operation of the apparatus, and the laboratories for users from the beamlines. The main FEL accelerator will consist of three independent branches, which will include chains of undulators adjusted to three different energy ranges: VUV, IR and THZ. The main challenge was the unification of the final solution in such a way, that it would apply to all three branches. The main goal for this approach was to save time, and costs as also human and material resources. This publication presents an overview of issues and solutions related to the construction of undulators for the PolFEL project and the challenges that had to be fulfilled to reach the final design that would be satisfactory for all participants.

THPPP051 **The Aluminium Vacuum Chamber**
***Y.M. Wen** (SINAP)*
There are two out-vacuum undulator lines been adopt in Shanghai Hard Free Electron Laser(SHINE),so there are Aluminium vacuum chambers in SHINE. There are 42 sets small gap out-vacuum undulators (U26),the length is 4 m. The minimum working gap of the U26 is 7 mm, the beam clear area of the vacuum chamber is 5 mm×11 mm, The vacuum pressure is lower than 1×10^{-7} Torr, and the internal surface roughness of the ellipse is less than 200 nm. At present, the first article has completed offline vacuum pre-installation and debugging. The minimum thickness of the U26 aluminum vacuum chamber is only 0.5 mm, the gap between the U26 aluminum vacuum chamber and the magnet is only 0.5 mm, the total length is 4.35 m, there is very difficult for the U26 aluminum vacuum chamber. In order to develop this vacuum chamber, the structural design has been optimized, the tooling should be precise and the process should be optimized during processing.The internal surface roughness of the ellipse is less than 200 nm by abrasive flow polishing. At present, the development accuracy of U26 aluminum vacuum chamber reach the requirements.

THPPP052 **Design and Development of Coated chamber for In-air insertion devices**
***P.C. Wang**, Y. Wang (USTC/NSRL) J.M. Liu (DNSC) L. Zhang (IHEP)*
The insertion devices is an important guarantee for further improving the performance of the light source and meeting the needs of different users. For In-air insertion devices (undulator, wiggler, etc.), the magnetic structure is in the air, and there is a vacuum chamber in the middle of the magnetic structure to ensure the normal movement of the beam. In order to increase the magnetic field strength, the magnetic gap is generally relatively small. Factors such as small space, high precision, and low conductance all pose challenges to the design and processing of vacuum chamber. This paper introduces the development process of the vacuum chamber prototype of the coating type insertion devices. At the same time, taking the application of the prototype in the HEPS project as an example, the simultaneous light analysis and vacuum pressure distribution calculation are carried out, and the NEG coating scheme is proposed as an more economical means to obtain ultra-high vacuum. And the prototype NEG coating progress is introduced.

THPPP053 **Canadian Light Source LINAC Upgrade Project: Enhancing the Mechanical Reliability and Operational Security of Canada's Synchrotron**
***L.X. Lin**, J.N. Campbell, S.R. Carriere, F. Le Pimpec, K.D. Wyatt (CLS)*
The Canadian Light Source Inc. (CLSI) is undertaking a significant Linear Accelerator (LINAC) injector Up-grade Project to enhance both the mechanical reliability and operational stability of Canada's primary re-search synchrotron facility. In late 2018, a critical gun failure led to a seven-month facility downtime. . This incident raised concerns that the original LINAC from 1980 continued to be a high risk to daily facility operations. Furthermore, several other mechanical systems within the facility, including cooling/heating water, HVAC, and certain aspects of the LINAC vacuum systems, have also aged, resulting in decreased reliability. The upgrade to the LINAC and its associated mechanical systems presents an opportunity to significantly improve the operational reliability of the entire facility.

THPPP054 **The Development of Multiplexing Imaging Experimental Instruments**
***S.H. Kim** (PAL)*
Pohang Accelerator Laboratory X-ray Free Electron Laser (PAL-XFEL) has been officially provided to users from 2017. After the first user beam time, the PAL-XFEL beamline have proceeded with the development of a multiplexing experimental device as one of the specific coherent diffraction imaging science programs to secure global competitiveness. A multiplexing imaging device has been developed to enable small and wide-angle diffraction and X-ray emission spectroscopy experiments to be performed simultaneously in one chamber under a vacuum level of 10^{-4} to 10^{-5} torr. In addition, we adopted the Jungfrau 5M x-ray detector through a module arrangement suited to the purpose of our experiment. These developments also will be applied to the Korea's Fourth-Generation Storage Ring (4GSR) beamline instruments.

FRKAM — FRKAM: Keynote Talk 4

Chair: S.A. Macdonell (DLS)

FRKAM01 09:00 60

An Introduction to Accelerator Physics

C. Zhang *(IHEP)*

This talk will begin with a survey of the most common accelerator types and an introduction to charged particle beam dynamics. Both linear and circular machines will be covered, with emphasis on electron beam rather than proton or ion beams. For linear accelerators, an overview of microwave structures and sources will be given. More time will be spent on circular accelerators, covering the transverse beam dynamics concepts of orbit, phase space, beam emittance, betatron functions and envelope, dispersion, tunes, chromaticity with its correction and beam stability. Interaction of accelerator physics and technology are also discussed.

FROAM — FROAM: Accelerator

Chair: S.A. Macdonell (DLS)

FROAM01 10:30 20

Design and Testing of HEPS Storage Ring Magnet Support System

Z.H. Wang*, S.Y. Chen, C.H. Li, M.X. Li, H. Wang, L. Wu, Y.D. Xu, S. Yang, N.C. Zhou (IHEP)*

Very low emittance of High Energy Photon Source (HEPS) demands high stability and adjusting performance of the magnet support. To meet the requirements,During the development of the prototype, the structure of the prototype was determined through topology optimization, static analysis, and modal analysis, and the rationality of the structure was verified through prototype experiments. During the field installation, the performance of the magnet support was again verified to be better than the design requirements through transportation experiments and test work after installation, i.e., the first eigen frequency of the support unit is higher than 55 Hz and the moving resolution can reach 1 µm.

FROAM02 10:50 20

Vacuum System of SPS-II: Challenges of Conventional Technology in Thailand New Generation Synchrotron Light Source

T. Phimsen*, S. Boonsuya, S. Chaichuay, S. Jummunt, N. Juntong, P. Klysubun, S. Prawanta, T. Pulampong, K. Sittisard, S. Srichan, P. Sudmuang, P. Sunwong (SLRI)*

Siam Photon Source II (SPS-II) is the first Thailand's 4th generation synchrotron light source. It not only provides high-energy and high-brightness synchrotron radiation for both academic and industrial research after its completion, but it is also strategically aimed to build up a stronger Thai industrial community during the design and construction period. Vacuum system is one of the systems expected to play a key role in leveling up the local manufacturing capability of the country. Most of the main components in the system are planned to domestically fabricate through technology transfer. Instead of NEG coating technology, this vacuum system design of SPS-II storage ring is based on the conventional technology which involves Thai industry potential and expertise. This paper reviews the challenges and adaptation of conservative design in dense DTBA magnet lattice with magnet aperture limitation. The vacuum chambers and bending magnets have been modified to accommodate IR beamlines which are included in the second phase plan. Pressure profile of the vacuum system in storage ring is evaluated. Then, the progress of overall vacuum system of SPS-II is described.

FROAM03 11:10 20

New Kicker Chambers for the ESRF-EBS Storage Ring

T. Brochard*, L. Eybert, C. Maccarrone, S.M. White (ESRF)*

During the commissioning phase of the new ESRF-EBS (Extremely Brilliant Source) machine, we noticed a weak point in one of the four kicker ceramic chambers, in the 16-bunches injection mode system. These chambers are made by glazing together four machined ceramic parts, then brazing on metal parts at the ends to make the vacuum connections. To avoid damaging the other kicker ceramic chambers, we had to limit the machine's maximum current, in 16-bunches mode. After analysis of the first design, to ensure reliable injection and enable the machine to operate at its nominal current, we had to modify the kicker ceramic chambers to a more robust design. This new design is based on a single-piece ceramic body, in which the internal profile is respected, and then brazed metal parts at the ends to connect to the adjacent chambers. All the complexity of this design lies in the realization of the single-piece ceramic body with the omega shape reduced aperture.

FROAM04 11:30 20

Stability and Vibration Control for High Energy Photo Source in China

F. Yan*, J.P. Dai, Z. Duan, P. He, X.Y. Huang, D. Ji, Y. Jiao, C.H. Li, J.Y. Li, G.P. Lin, H.Z. Ma, W.M. Pan, H. Qu, J.Q. Wang, Q.Y. Wang, Z.H. Wang, Y. Wei, G. Xu, Y. Yang, J.H. Yue, P. Zhang (IHEP) T.G. Xu (IHEP CSNS)*

TThe High Energy Photon Source (HEPS) is the first high-energy diffraction-limited storage ring (DLSR) light source to be built in China with natural emittance of few tens of picometer radian. Beam stability is critical for such an ultralow-emittance facility. Controlling and minimizing the sources and transmission of vibrations internally and externally of HEPS is an important issue for achieving the stability needed to generate and operate the high brightest beams. In this presentation, we report that the vibration levels on bare HEPS ground, the ground motion analytical model related with frequency, the designed site vibration specifications together with the careful consideration and basis. Also, the stable building design concepts, passive and active ways to minimize effects on the stability of the photon beam and critical accelerator and beamline components caused by ambient ground motion sources and the actual control effect will be introduced in detail.

AUTHOR INDEX

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Tuesday, Nov. 7, 2023	09:00-17:30
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AM	**Exhibitor Talk & Coffee Break (10:00-10:30)**
	10:00-10:05 Ningbo Ninggang Permanent Magnetic Materials Co., Ltd. (THEAM01） 10:05-10:10 MoreTek Electronic Technology (Suzhou) Co., Ltd. (THEAM02）
	FRIDAY
	NOV. 10
AM	**Exhibitor Talk & Coffee Break (10:00-10:30)**
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Optique Peter

Optique Peter is a 223 years old family business with solid experience in research and industry.

Our main activities are the design and manufacture of X-Ray imaging systems, optical instruments for nuclear research centres and special microscopes for research laboratories.

We generate 75% of our turnover from exports and are present in China since 2009.

Our X-Ray imaging systems are mostly dedicated to synchrotron applications such as X-Ray imaging microscopes, zooms and macroscopes, beam diagnostic and optical components.

We have manufactured and delivered more than 120 X-Ray systems to 39 research institutes and synchrotrons.

Booth No. : B05

Hefei Juneng Electro Physics High-tech Development Co., Ltd.

合肥聚能电物理高技术开发有限公司

As an important research and development base of electro physics device at domestic and abroad, Hefei Juneng Electro Physics High-tech Development Co, Ltd is mainly engaged in design and development of electro physical devices. The company has gradually formed a development team composed of doctors, masters, senior engineers, technicians and experimentalists. With strong R&D capability and rich manufacturing experience, Juneng Company has successfully participated in EAST superconducting Tokamak, BEPC Positron Collider of Beijing Institute of High Energy Physics, Shanghai Synchrotron Radiation Facility of Shanghai Institute of Modern Physics, Steady-State High Magnetic Field Experimental Device, Synchrotron Radiation Accelerator, China Spallation Neutron Source, European X-ray Free Electron Laser (EXFEL) Undulator, GSI accelerator of Germany, Flux Coil Magnet of Princeton University and various other electrio physics devices have been developed. Juneng Company has applied over 60 national patents in total.

Booth No. : B02

Edwards TECHNOLOGIES Trading (SHANGHAI) Co., Ltd.

埃地沃兹贸易(上海)有限公司

Edwards is a leading developer and manufacturer of sophisticated vacuum products, abatement systems and related value-added services. These are integral to manufacturing processes for semiconductors, flat panel displays, LEDs and solar cells; are used within an increasingly diverse range of industrial processes including battery, power, glass and other coating applications, steel and other metallurgy, pharmaceutical and chemical; and for both scientific instruments and a wide range of R&D applications.

Edwards has over thousands full-time employees operating in approximately 20 countries worldwide engaged in the design, manufacture and support of high technology vacuum and exhaust management equipment.

Further information about Edwards can be found at www.edwardsvacuum.cn.

Booth No. : B11

Hefei Keye Electrical Physical Equipment Manufacturing Co., Ltd.

合肥科烨电物理设备制造有限公司

Keye founded in 2007. Keye has long been engaged to many national major technical equipment and national major science and engineering projects, such as HEPS, CEPC, CSNS, EAST, ITER, BEST, CFQS, CFETR, CRAFT, KTX, SESRI, J-TEXT and Hefei Superconducting Proton Cyclotron, etc.

Keye has grown into a high-tech enterprise and an electro-physical development base at home and abroad with integrated capacity of development, design, manufacture and fabrication via abundant experiences in mechanical design, computer simulation analysis, cryogenic and vacuum equipment, welding technology, superconducting coil development, computer and electrical control system, fusion engineering research facility and instrumentation devices.

Booth No. : B01

AVS, Added Value Solutions

AVS, 增值解决方案

AVS is an international company which aims at providing technology-based services to innovative and challenging projects. Strongly focused on the development of outstanding devices, instruments, mechanisms and structures, our expertise covers design, manufacturing, assembly, tests and supply under ISO 9001 and EN 9100 certifications, providing our customers all the way up from concept to turnkey projects.

AVS has crossed heritage on UHV compatible mechatronic devices, machine tools, beam diagnostics and instruments for synchrotrons, laser facilities, neutron sources, and fusion reactors, among others.

AVS has delivered major projects to all prominent light sources including ESRF, APS, MAX IV, SIRIUS, ALBA, PSI, ALS and others.

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SILVER SPONSORS

Booth No. : B28

三英精控

Sanying MotionControl Instruments Ltd

三英精控（天津）仪器设备有限公司

Sanying MotionControl Instruments Ltd is a company specializing in the development of precision motion control technology and products, and is committed to providing systematic technical solutions and integration for scientific research, innovative research and development, and manufacturing of high-end instruments and equipment. A professional manufacturer that meets the market's demand for precision motion control technology.

Sanying MotionControl Instruments Ltd adheres to the tenet of “high-end innovation, lean manufacturing” and the goal of “building an international brand of high-end manufacturing in China”, providing key technologies and building a solid foundation for the upgrading and transformation of China's manufacturing equipment industry.

Booth No. : B14

BEIJING YUYAN PRECISION INSTRUMENT CO., LTD.

北京玉研精密仪器有限公司

Beijing Yuyan Precision Instrument Co., Ltd. is a supplier of complex ultra-high vacuum systems. We focus on the research and development of ultra-high vacuum precision motion systems, X-ray optical experimental systems and multi-environment complex in-situ experimental systems. At present, we have carried out extensive and in-depth cooperation with most scientific research institutions and colleges in China.

Booth No. : B25

Shanghai Kelin Technology Development Co., Ltd.

上海克林技术开发有限公司

Shanghai Kelin Technology Development CO., LTD. was established in May 1989. It is one of the member of China Particle Accelerator Association。It is a high-tech enterprise , has undertaken several national torch program projects, and had won the Shanghai science and technology achievement certificate and Shanghai municipal new product award for many times. Main business for particle accelerator equipment research and development, manufacturing and assembly integration. The products involve the research and application of nuclear physics, particle accelerator, aerospace, nuclear medicine and other fields. The equipment supplied includes electromagnet, RFQ, IH-DTL, APF-DTL, IH-Buncher, Re Buncher, High frequency vacuum chamber, Undulator and beam line experiments, etc.

Booth No. : B27

GKINST Co., LTD.

安徽国科仪器科技有限公司

GKINST Co., LTD. is a high-tech enterprise which specializes in scientific instruments for structural characterizations, integrating R&D, production, sales and service. The company has successfully developed high-end analytical equipment such as HP-XRD, SAXS, DLS, and participated in major projects constructing national level facilities. It has gained well market recognition by establishing cooperations with well-known national scientific research institutes and listed companies. It is the core value of the company to provide customers with fully integrated, high added value, high-quality service, and it is also our vision and mission to help develop domestic high-end instruments.

Booth No. : B26

Pfeiffer Vacuum (Shanghai) Co., Ltd.

普发真空技术（上海）有限公司

Pfeiffer Vacuum (stock exchange symbol PFV, ISIN DE0006916604) is one of the world’s leading providers of vacuum solutions. In addition to a full range of hybrid and magnetically levitated turbopumps, the product portfolio comprises

backing pumps, leak detectors, measurement and analysis devices, components as well as vacuum chambers and systems.

Ever since the invention of the turbopump by Pfeiffer Vacuum, the company has stood for innovative solutions and high-tech products that are used in the Analytics, Industry, Research & Development, Coating and Semiconductor markets. Founded in 1890, Pfeiffer Vacuum is active throughout the world today. The company employs a workforce of some 4,000 people and has more than 20 subsidiaries. For more information, please visit www.pfeiffer-vacuum.com.

Booth No. : B16

JJ X-Ray

JJ X-Ray is a dynamic and forward-thinking company based in Denmark. We specialize in the design, production, testing and commissioning of synchrotron, free-electron laser (FEL) and neutron beamline equipment. Our team of dedicated experts has practical experience in high precision instrumentation in these facilities. We develop state-of-the-art equipment that empowers scientists to push the boundaries of science. As many of us have a Ph.D. in the field of synchrotron experimentation, we know the challenges and high expectations; we truly understand our customers. We are an agile company without sharp boundaries between departments enabling us to keep the customer in focus.

Booth No. : B13

Agilent Technologies, Inc.

安捷伦科技（中国）有限公司

Agilent Technologies is your vacuum resource: a one-stop, truly global vacuum supplier with complete solutions for Academic Research, Instrumentation Manufacturers, Industrial Applications and Analytical Labs.
Equipped with highly developed technical skills and rich experience in the vacuum field, we incorporate your needs to develop unique products that are user friendly, easy to maintain, robust and durable, at a low cost of ownership to you.
It has been our focus and core competence for more than 60 years during which we have introduced many key innovations, from the Ion Pump, ConFlat sealing technology, and High Speed Diffusion Pumps to ContraFlow Leak Detection, IDP-Series Dry Scroll Pumps and TwisTorr turbomolecular pumps.

EXHIBITORS

Booth No. : B24

FMB Oxford Ltd

FMB Oxford is a UK based designer, developer, and manufacturer of equipment for particle accelerators, including X-ray Synchrotron, FEL and Neutron sources. Our company has more than 30 years' experience supplying complete beamlines and individual equipment into new and upgrading facilities, continually innovating, integrating, and optimising to provide performance that enables Scientists to achieve world leading results.
We welcome the opportunity to talk to you about your current and future requirements and how we can contribute to your success. We're always happy to discuss new concepts with our depth of knowledge and appetite for challenge making your ideas a reality.

Booth No. : B15

Queensgate

Queensgate Instruments was founded in 1979 and spun out of the ground breaking research in nanomotion at Imperial College in London. The company defined new levels of accuracy and performance in nanopositioning systems.
Queensgate's early research and product developments proved to the world that it could play a major part in the research and development in various industries including biotechnology, medicine, astronomy, aerospace, semiconductors, mass computer storage devices, fiber optics, and optics.
Queensgate offers a wide range of nanopositioning products and systems that includes stages, control electronics, precision displacement sensors, and software. Queensgate also offers custom products and solutions for the most challenging problems faced.

Booth No. : B09

Beijing He-Racing Technology Co., Ltd

北京高能锐新科技有限责任公司

Beijing HE-Racing Technology Co.,Ltd. (HERT) established in 2013, formerly known as Machine Shop(from 1973) of IHEP. HERT accumulates a great deal of experience in developing accelerator devices and equipment, can provide types of Magnets and Insertion Devices, Accelerator Structures, DTL, RFQ, Super Conductivity Cavity, High Power Couples, Microwave Devices and Linac unit.
More than 5000 magnets and 3000 Microwave, RF&SC devices had been used in many scientific facilities, such as BEPCI/BEPCII, SSRF, HLSII, CSNS, CiADS, HEPS-TF, HEPS, PAPS, CSNSII, SHINE, SXFEL, DCLS, PLS&PLSII, KEK Super B, PEP-II, SPEAR3, CLS, MAX-IV, E-XFEL, KIPT, NSLSII, etc.

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Booth No. : B17

Motionsmart Precision Technology Co., Ltd.

动智精密设备科技（上海）有限公司

Motionsmart Precision Technology Co., Ltd. has been committed to provide equipment industry and scientific research with advanced motion and sensing solutions. Our product category includes ultra precision piezoelectric scanning systems, high precision parallel 6DOF positioning systems, picometer laser interferometric displacement sensor, and high precision motion modules and sensing systems designed for industrial applications. Our products are widely used in optoelectronics, semiconductor equipment, biological equipment, precision, synchrotron radiation and high-end scientific research applications. We are contributing to the success of Chinese customers in equipment technology, and to the success of industry upgrade and development of science and technology.

Booth No. : B23

Shanghai Shuosong Electronic Technology Co., Ltd.

上海硕颂电子科技有限公司

Shanghai Shuosong is a high technology enterprise that specialized in x-ray window developing and manufacturing for beamlines, analytical instruments, radiation detectors, scintillation detectors, medical and NDT equipment. We have cooperated with many universities and research facilities since its set up. Our main products include beryllium foil, brazed beryllium window, water-cooling beryllium window, as well as detector window design and full solutions. All products in Shuosong are customized, we wish to cooperate with you with high quality products and quick delivery.

Booth No. : B18

Allectra

北京麦迪森科技有限公司（独家代理）

Allectra is a leading manufacturer and supplier of High Vacuum and UHV components including custom items to synchrotrons worldwide.
Allectra was founded in 2002 by two physicist entrepreneurs. In the last twenty years we have seen widespread adoption of our proprietary technology across multiple scientific disciplines.
Allectra has three manufacturing facilities with scientific and engineering capabilities, one in the UK and two in Germany.
We specialise in vacuum connectivity, signals and custom manufacturing of complex projects in High Vacuum or UHV. Our product range includes electrical feedthroughs and associated cables, KAP301 radiation resistant wires and Allectra designed components.

Booth No. : B12

SKY Technology Development CO., LTD. Chinese Academy of Sciences

中国科学院沈阳科学仪器股份有限公司

SKY Technology Development Co.,Ltd. Chinese Academy of Sciences（SKY Technology）founded in 1958. After half century development, based on vacuum technology with the concept of innovation in mind, SKY has created vacuum equipment for high technology、new materials and new energy fields such as high-end R&D equipment, semiconductors, solar energy and LEDs. Focused on equipment manufacturing, SKY has become a modern company integrated with R&D, manufacture, market and service of vacuum instrument and device.
Main Products:
Vacuum Applying Products:
(1) Vacuum thin film equipment: PVD coating equipment, CVD coating equipment;
(2) New materials preparing equipment: vacuum metallurgy equipment, crystal material preparing equipment;
(3) Major national science and Engineering facility: Vacuum interconnected facility, synchrotron radiation facility;

Booth No. : B30

Physik Instrumente (PI Shanghai) Co., Ltd

普爱纳米位移技术（上海）有限公司

PI has been remarkable for its superior quality and innovative technology. With its strong technical strength and advanced skills in precision machining, digital and analog control circuit, subnanometer capacitive position sensors and original PICMA piezo ceramic actuators, PI has solidified its presence in advancing the micronpositioning and nanopositioning technology to the forefront, thus making it a reliable partner for many high-tech enterprises and well-known labs worldwide.

Booth No. : B29

HUBER Diffraktionstechnik GmbH & Co. KG

北京纳德虎博科技发展有限公司

The outstanding precision and reliability of Huber's products (Website: www.xhuber.com) have made them widely used in laboratories and research centers worldwide. Huber's diffractometers are recognized as the best in the world. They are known for their durability, precision, high degrees of freedom, open sample environment, versatile and flexible modes, precise return to position, and long lifespan. They excel in designing customized solutions to meet specific customer requirements.

Furthermore, Huber is increasingly focusing on the development and production of high-precision positioning systems. These systems are primarily used in laboratory settings and synchrotron beam sources for X-ray diffraction. They also find applications in neutron diffraction experiments, laser technology, astronomy, and precision measurement technology.

Booth No. : B21

TOYAMA Co., Ltd.

Toyama is fundamentally an engineering company, manufacturing ultra-precision systems for experimentation at the cutting edge of science. Our product range covers all aspects of soft and hard x-ray synchrotron science and includes not only beamline components but also front ends and end stations. We have been engaged in manufacturing various ultra-precision systems such as monochromators, diffractometers, reflectometers, q-and nano-RIXS spectrometers, nano-ARPES, STXM, ellipsometry for polarization analysis of soft x-ray and so on. Our experience ensures that we can meet your requirements which needs highly customized design and manufacturing skills.

Booth No. : B20

Yangtze Optical Fibre and Cable Joint Stock Limited Company

长飞光纤光缆股份有限公司

Yangtze Optical Fibre and Cable Joint Stock Limited Company (also known as 'YOFC') established in Wuhan, Hubei Province in May 1988, is a technologically innovative enterprise specializing in optical fibre preforms, optical fibres, optical fibre cables and integrated solutions, and also a global leading supplier in these areas.

Adhering to the mission of 'Smart Link Better Life', YOFC devotes itself to becoming the leader in information transmission and smart links through its core value 'Client Focus Accountability Innovation Stakeholder Benefits', and builds its strategies in the following 5 aspects: Overall business growth; Internationalization; Diversification; Technological innovation & digital transformation; Synergy growth of capital operation.

Booth No. : B31

Harbin Core Tomorrow Science and Technology Co., Ltd.

哈尔滨芯明天科技有限公司

Harbin Core Tomorrow Science and Technology Co., Ltd. ("CoreMorrow") focuses on the research and development, production and sales of nano-scale precision positioning products, mainly serving customers who manufacture high-end precision equipment. After nearly 20 years of rapid development, our customers have covered a wide variety of universities, scientific research institutes and high-end precision equipment manufacturing enterprises around the world. CoreMorrow products have been widely used in semiconductor technology, photonics, telecommunications, integrated optics, optical instruments and devices, medical biological microscope equipment, life sciences, precision machining equipment, medical design, data storage technology, nanotechnology, nanofabrication, nanoautomation, image processing, etc.

Booth No. : B19

TRUMPF Hüttinger Electronics

通快霍廷格电子

TRUMPF Hüttinger, headquartered in Germany, is the global market leader for process power, semiconductor, display, and solar supplies.

We are developing, manufacturing plasma power supplies for a wide range of deposition and dry-etch processes. Our products offer best in class uptime, energy efficiency, coating quality and high productivity. TRUMPF Hüttinger has sales and service subsidiaries in Asia, Europe and America.

Booth No. : B22

ScandiNova Systems AB

Based in Uppsala, Sweden, ScandiNova is developing and producing the cutting-edge pulsed power systems of tomorrow. Our unique products and applications originate from years of groundbreaking solid-state research. With our patented technology, outstanding reliability, and perfect precision we are changing the playing field of a whole industry.

A revolutionary technological shift that already has awarded us collaborations with internationally recognized organizations such as CERN, Elekta and Varian, a Siemens Healthineers company. Proving that our unique technology is rapidly becoming the new market standard among the world's largest suppliers of radiotherapy equipment, industrial x-ray, and other industrial applications.

Booth No. : B06

BESTEC GmbH

Bestec offers innovative customized UHV systems for
- VUV, soft and hard X-ray illumination for synchrotron/XFEL radiation and soft X-ray laboratory sources,
- VUV an soft X-ray reflectometry/ellipsometry, diffractrometry and spectroscopy
- Systems for fabrication and analytics of nanostructured surfaces.

Our product portfolio ranges from soft X-ray lab sources and beamline components to thin film deposition systems and dedicated soft X-ray reflectometers, ellipsometers and spectrometers for the qualification of complex layered surface systems and basic research. We provide integrated system solutions as well as single components for both scientific and industrial applications.

Booth No. : C01

AXILON AG

AXILON is your industrial partner in the international synchrotron, accelerator & photon community. Based on the extensive and long-term experience (> 25 years) of our dedicated experts, we serve our customers with excellent and efficient solutions for complete beamlines, beamline components, monochromators, cryo coolers, mirror systems, experimental stations, X-ray microscopes, Insertion Devices and other special engineering and manufacturing solutions. Axilon is proud of the high level of satisfaction expressed by our customers.

Booth No. : C02

MI Partners

MI-Partners is a company specialized in the development of high-end mechatronic systems. The development of these systems is often very challenging in terms of accuracy and/or speed. We deal with the full trajectory in system design: starting from whiteboard and specifications, we generate concepts and make a concept selection, together with our customer. Then we start an iterative design process, where modelling, performance prediction and mechanical design go hand in hand. We outsource the manufacturing of the parts, but assembly and testing is done in-house. As we mostly develop one-of-a-kind machines, such as prototypes, test equipment or research equipment, we always face unique challenges. Our company consists of 40 highly educated and skilled engineers. MI-Partners' main competences being concept design, precision engineering, thermal design, dynamics and control.

Booth No. : C03

Beijing Oriental Jicheng Co.,Ltd.

北京东方中科集成科技股份有限公司

Initiated by OSIC HOLDINGS, one of the largest comprehensive groups of Chinese Academy of Sciences (CAS) in 2000, Beijing Oriental Jicheng Co. Ltd., (short for BOJ) is a high-tech enterprise registered in Zhongguancun Science Park. Under the great support of all shareholders and relevant government departments, BOJ has successfully listed in A-share market of Shenzhen Stock Exchange, with the stock code 002819, in November 2016. After 16 years' vigorous growth, BOJ has a new startup in new platform.

Booth No. : C04

SAES

SAES is a leading supplier of UHV and XHV state of the art Non-Evaporable Getter solutions, including compact NEG pumps, combination of NEG and ion pump (NEXTorr) and NEG coating deposition for synchrotrons and accelerators facilities.

The recent acquisitions of Strumenti Scientifici Cinel and SAES RIAL Vacuum have widened SAES vacuum offer, which now includes also vacuum chambers and complex components for the particle accelerator community as well as scientific instrumentation for synchrotron beamlines up to the delivery of complete turn-key beamlines.

Booth No. : D05

Shenzhen Hangzhi Precision Electronics Co, Ltd.

深圳市航智精密电子有限公司

Shenzhen Hangzhi Precision Electronics Co, Ltd. is a high-tech enterprise dedicated to the R&D, production, sales, and solution customization of high-precision current, high-precision voltage, and high-precision electrical measuring instruments. Hangzhi's high-precision current sensors and voltage sensors are fluxgate-based current measurement and control componentthat senses current via classical control theory rather than conventional chip induction.

Booth No. : D03

LAB Motion Systems

For many years LAB Motion Systems has been a reliable partner of synchrotrons all over the world. Our nano-precision motion stages are compatible with the highest resolutions required in the 4th generation of synchrotron beamlines. Beamlines performing computed nano tomography, biomedical imaging, microscopy, diffraction and macromolecular crystallography all benefit greatly from our nano-precision motion systems.

As a part of total solution, we provide premium motion controller that is Epics and Tango compatible. Meantime all LAB Motion Systems products use standard motors and encoders that are compatible with most controllers used at synchrotrons.

For more details, please visit our website www.labmotionsystems.com or visit our booth during MEDSI2023 in Beijing.

Booth No. : D02

Specreation Instruments Co., Ltd.

安徽创谱仪器科技有限公司

Specreation Co., Ltd., founded in August 2017, dedicates to the development of high-end short-wavelength spectroscopic instrument and systems. The core team comes from the University of Science and Technology of China. Based on the relevant techniques and experiences accumulated in the field of large scientific facilities, we possess the capabilities of key components, instrumentation and system integration in the X-ray to vacuum ultraviolet range and hope to provide more delicate measurement and detection tools for large scientific facilities, basic scientific research and advanced industries.

Booth No. : D04

IRELEC

上海磐世生物科技有限公司

IRELEC

www.irelec-alcen.com

+33 476441296

China

Shanghai Pursuing Life Science Co., Ltd

www.ps-life.cn

+86 021 61731530/13381669136

IRELEC was founded in 1985 in the Grenoble France basin in the electron beam irradiation technology sector.

Irelec's precision systems can deliver the performance improvements vital to pushing back the frontiers of science and achieving greater quality and efficiency in industry.

Our high-precision and automated equipment, powered by advanced, user-friendly software, can add value to synchrotron beamlines, biobanks, and industrial processes in a wide range of fields.

We have provided our system to multiple units in China, and we look forward to providing better products and services to our customers in China.

Booth No. : D01

Qingdao United-Win Measurement Machinery Co., Ltd.

青岛联盈创科精密仪器有限公司

Qingdao United-Win Measurement Machinery Co., Ltd. is a professional manufacturer specializing in the research and development, production, and sales of granite precision measurement and mechanical components. The products mainly include: precision measuring tools, granite precision mechanical components, granite precision mechanical components Integrated with other parts, and granite products specially customized. The company is located in the Innovation Industrial Park of Shanghe Demonstration Zone in Jiaozhou, Qingdao, with a workshop area of 3500 square meters.

ADDRESS:NO.60 Minjiang Road, Shanghe Demonstration Zone, Qingdao

Tel:+0086 18363985611

E-mail:cuizx@u-win.ltd

sales@u-win.ltd

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Booth No. : B12

Beijing He-Racing Technology Co., Ltd

北京高能锐新科技有限责任公司

Beijing HE-Racing Technology Co.,Ltd. (HERT) established in 2013, formerly known as Machine Shop(from 1973) of IHEP. HERT accumulates a great deal of experience in developing accelerator devices and equipment, can provide types of Magnets and Insertion Devices, Accelerator Structures, DTL, RFQ, Super Conductivity Cavity, High Power Couples, Microwave Devices and Linac unit.

More than 5000 magnets and 3000 Microwave, RF&SC devices had been used in many scientific facilities, such as BEPCI/BEPCII, SSRF, HLSII, CSNS, CiADS, HEPS-TF, HEPS, PAPS, CSNSII, SHINE, SXFEL, DCLS, PLS&PLSII, KEK Super B, PEP-II, SPEAR3, CLS, MAX-IV, E-XFEL, KIPT, NSLSII, etc.

北京大有科能科技有限公司

Beijing Dayou Keneng Science and Technology Co., Ltd., located in the Huairou Science City, Beijing, is a high-tech enterprise engaged in the research and manufacturing of high performance solid-state pulse modulators and other accelerator related equipment. The company has been serving scientific research, radiation therapy, industrial irradiation and other fields. The company has been also providing customized R&D and services for various users.

Booth No. : B06

BESTEC GmbH

Bestec offers innovative customized UHV systems for

- VUV, soft and hard X-ray illumination for synchrotron/XFEL radiation and soft X-ray laboratory sources,
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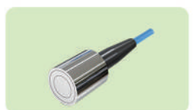
Sanying MotionControl Instruments Ltd

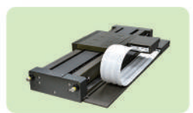
Sanying MotionControl Instruments Ltd. is specialized in the R&D and production of high-precision motion control system. The company provide motion control solution and integration service for scientific instruments and high-end equipment manufacturing.

Core Technology

The company' s core technology integrates technology in various fields, including precision sensing, precision driving, precision mechanical, precision control, and precision integration. The company's products cover nano- and sub-nanometer motion control platform, long-stroke high-precision motion platform, nano-displacement capacitive sensor.

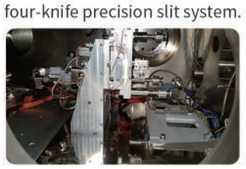
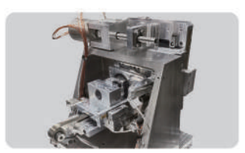
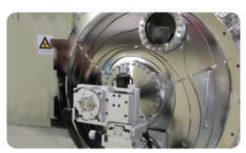
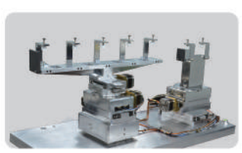






Application

The company' s motion control solutions have been used in high energy physics research applications including soft X-ray lithography and four-knife precision slit system.

TEL：022-29516025 WEB：www.symc-tec.com EMAIL：sales@symc-tec.com
ADD：Building C21, Venture Headquarter, Fuyuan Road, Wuqing District, Tianjin, P.R.China

北京玉研精密仪器有限公司是一家复杂超高真空系统的供应商。我们专注于超高真空精密运动系统、X射线光学实验系统以及多环境复杂原位实验系统的研究与开发。目前公司与中国科学院高能物理研究所、中国科学院上海应用物理研究所、中国科学技术大学国家同步辐射实验室、中国科学院物理研究所、清华大学、中国工程物理研究院等科研机构及院校均开展了广泛深入的合作。

Beijing Yuyan Precision Instrument Co., Ltd. is a supplier of complex ultra-high vacuum systems. We focus on the research and development of ultra-high vacuum precision motion systems, X-ray optical experimental systems and multi-environment complex in-situ experimental systems.At present, the company has carried out extensive and in-depth cooperation with the Institute of High Energy Physics of the Chinese Academy of Sciences, the Shanghai Institute of Applied Physics of the Chinese Academy of Sciences, the National Synchrotron Radiation Laboratory of the University of Science and Technology of China, the Institute of Physics of the Chinese Academy of Sciences, Tsinghua University, the Chinese Academy of Engineering Physics and other scientific research institutions and colleges.

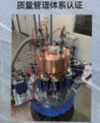
上海克林技术开发有限公司
Shanghai Kelin Technology Development CO.,LTD.


中核集团合格供应商

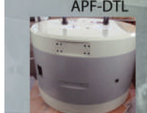
ISO13485-2016医疗产品质量管理体系认证

ISO9001-2015质量管理体系认证


APF-DTL

Buncher

Rhodotron

Coupler

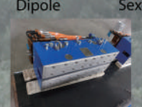
Quadruple

Cyclotron

Dipole

Sextuple

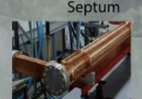
Soleniond

Corrector

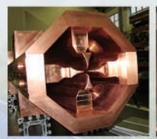
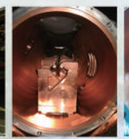
Kicker

Septum

Scanning

Octupole

Undulator And Wiggler

Accelerating tube

Bracket


RFQ

4Rod-RFQ

IH-DTL

IH-Buncher

Shanghai Kelin

Shanghai Kelin Technology Development CO., LTD. was established in May 1989. It is one of the member of China Particle Accelerator Association and a high-tech enterprise in Shanghai. Shanghai Kelin has undertaken several national torch program projects and Shanghai torch program projects,and had won the Shanghai science and technology achievement certificate and Shanghai municipal new product award for many times,Mainly engaged in the research and development, manufacturing,assembly and integration of particle accelerator equipment.The products involve the research and application of nuclear physics, particle accelerator, aerospace, nuclear medicine and other fields. The equipments supplied include electromagnet, RFQ , IH-DTL, APF-DTL, IH-Buncher, Buncher ,High frequency vacuum chamber, undulator and beam line experiments, etc.Shanghai Kelin unswervingly adheres to the "leading technology, quality first, customer satisfaction" business philosophy to become a world-famous high-end enterprise.

Shanghai Kelin Technology Development CO., LTD.
Address: 685 Hailong Road, Fengxian District , Shanghai, China
Tel: 13062776965/021-64634188 Email: kelin@chnkelin.com Website: www.chnkelin.com

GKINST

GKINST Co., LTD.
安徽国科仪器科技有限公司

0551-63868060

GKINST Co., LTD. is a high-tech enterprise which specializes in scientific instruments for structural characterizations, integrating R&D, production, sales and service. The company has successfully developed high-end analytical equipment such as HP-XRD, SAXS, DLS, and participated in major projects constructing national level facilities. It has gained well market recognition by establish-ing cooperations with well-known national sci-entific research institutes and listed companies. It is the core value of the company to provide cus-tomers with fully integrated, high added value, high-quality service, and it is also our vision and mission to help develop domestic high-end inst-ruments.


高压X射线衍射仪（HPXRD）

（可视）高压充气系统

动态加载装置

动态加载电阻测量系统

小角X射线散射仪(SAXS Focus 3.0)

激光小角散射仪(LaScater 1.0)

动态光散射仪(GK-DLS-01)

光学冷热台

光学冷热拉伸台

刮膜机（GK-TB01）

无散X射线束管器（RF-K24-HV-TC2）

微焦斑点光源（MFocus）

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MEDSI 2023
Beijing · China
The 12th International Conference on Mechanical Engineering Design of Synchrotron Radiation Equipment and Instrumentation

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MEMO

MEMO

AVS is an international company which aims at providing technology-based services to innovative and challenging projects. Strongly focused on the development of outstanding devices, instruments, mechanisms and structures, our expertise covers design, manufacturing, assembly, tests and supply under **ISO 9001 and EN 9100 certifications**, providing our customers all the way up from concept to turnkey projects.

AVS has crossed heritage on UHV compatible mechatronic devices, machine tools, beam diagnostics and instruments for synchrotrons, laser facilities, neutron sources, and fusion reactors, among others.

Large Vacuum Chambers

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e-mail: france@a-v-s.es

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KEYE

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www.ahkeye.com

科烨格言

忠诚、友善、勤奋、进取
您的每一件小事都是科烨的大事
制造最好的产品奉献给我们的客户

合肥科烨电物理设备制造有限公司 简介

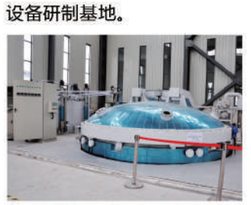
Hefei Keye Electrical Physical Equipment Manufacturing Co., Ltd.

合肥科烨电物理设备制造有限公司成立于2007年，主要从事电物理设备、微波和高频设备、加速器配套设备、低温工程、超导磁体技术、真空机械设备及各类通用机械设备的设计、制造及销售。

我公司拥有合肥市低温超导工程技术研究中心、合肥市市级工业设计中心、合肥市级企业技术中心。公司2011年、2014年、2017、2020年连续四届被认定为“**高新技术企业**”，获得了“**安徽市场质量信得过企业**”、“**安徽市场质量、诚信五星级企业**”、“**安徽省专精特新中小企业**”、“合肥高新区瞪羚企业”等殊荣。公司获得**76项国家专利**和软件著作权1项，并先后获得“安徽省科学技术进步一等奖”两项。

我公司深入参与东方超环全超导非圆截面托卡马克（EAST）核聚变实验装置建设，为装置的胜利建成做出了重要贡献；在国家重大科技基础设施中国散裂中子源工程（CSNS）建设中做出重大贡献；为当今世界规模最大、影响最深远的国际大科学工程“国际热核聚变实验堆（ITER）计划”提供了满足核工业级严苛技术要求的“中国制造”。公司同时参与中国聚变工程实验堆（CFETR）、聚变堆主机关键系统综合研究设施（CRAFT）、高能同步辐射光源（HEPS）、环形正负电子对撞机（CEPC）、准对称环仿星器（CFQS）、反场箍缩磁约束聚变实验装置（KTX）、空间环境地面模拟装置（SESRI）、J-TEXT托卡马克装置、合肥超导回旋质子加速器等国家重大技术装备、国家大科学工程项目。

公司凭借在机械设计、计算机模拟分析、低温和真空设备、焊接技术、超导磁体研制、计算机和电气控制系统、聚变工程和诊断仪器设计等领域的专业水平和先进技术，已经成为集科研、设计、加工、制造为一体的高新技术企业和国内外重要的电物理设备研制基地。

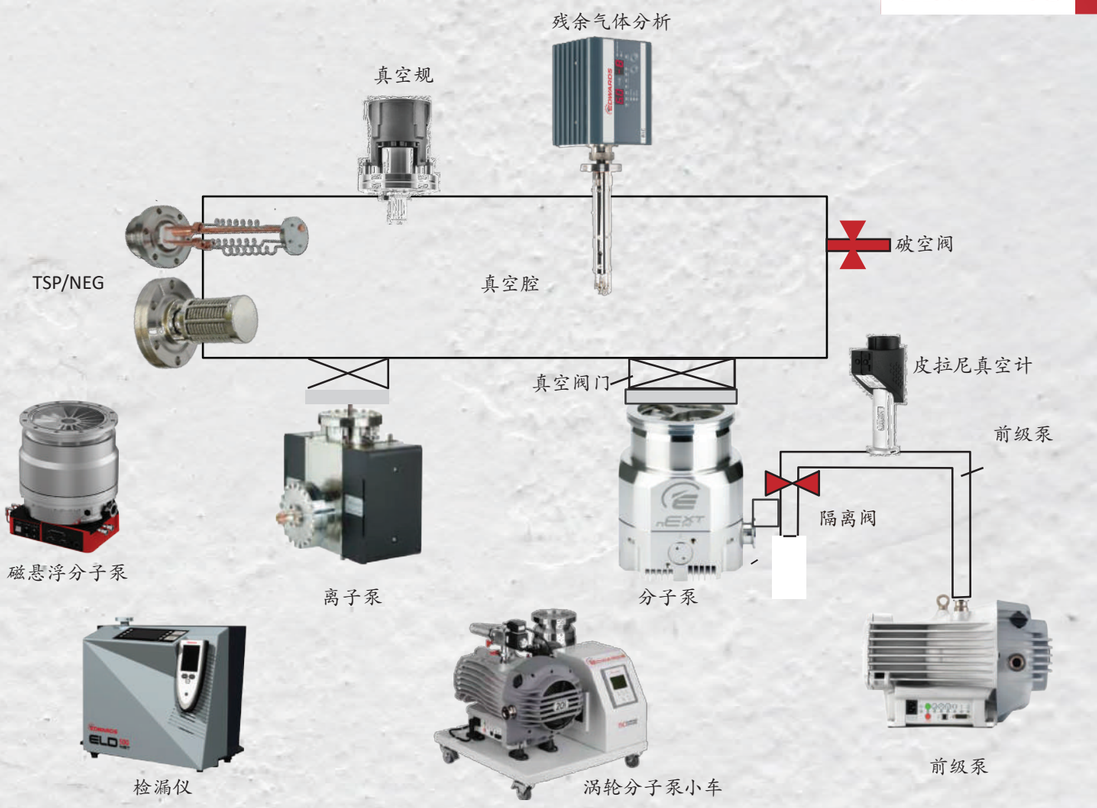


地址：合肥市高新区云飞路2号　　电话/传真：0551-62589637/62589599　　手机：13956016615　　网址：www.ahkeye.com

埃地沃兹贸易（上海）有限公司

edwardsvacuum.com

EDWARDS



前级泵:
- nXDS
- 峰值抽速:6.2~46 m^3/hr
- 极限真空: < 0.7 Pa
- 噪音: 低至47 dBA
- 变频驱动
- 超过20,000 小时平均维护周期

- nXRi/nXLi 多级罗茨
- 峰值抽速: 30 ~ 200 m^3/hr
- 极限真空: ~ 3 Pa
- 噪音:最低55 dBA
- 变频驱动
- 平均5年维护周期
- 紧凑体积

分子泵:
- nEXT 分子泵(复合轴承)
- 抽速: 47~1250l/s
- 超高压缩比
- 集成控制器
- 可现场维护

- STP 系列(磁悬浮轴承)
- 抽速: 300~4300l/s
- 低振动
- 无油
- 免维护

离子泵:
- 抽速: 0.2~1200 l/s，可定制
- 极限真空: < 1× 10^{-11} mbar
- 多种外形可选
- 可内置集成TSP&NEG

真空计:
- 多种主动和被动式真空计可选
- 电容薄膜规
- 被动式真空计
- 极限真空: 2 × 10^{-12} mbar
- 测试误差: 5 × 10^{-13} mbar

残余气体分析:
- 内置离子规，全压及分压测量
- 内置面板，可独立工作
- 最低检测极限10^{-13} Pa量级
- 离子源双灯丝结

地址：上海市申江路5005弄2号楼8楼

邮箱：chinamarketing@edwardsvacuum.com

电话：400 111 9618

网址：www.edwardsvacuum.cn

公司简介
COMPANY PROFILE

合肥聚能电物理高技术开发有限公司主要从事电物理装置的设计及研制，是国内外重要的电物理设备研制基地。公司拥有一批由博士、硕士组成的高水平的研发团队以及由高级工程师、技师、实验师组成的研制团队。凭借雄厚的技术研发实力和丰富的生产制造经验，聚能公司成功参与了EAST全超导托卡马克、北京正负电子对撞机、上海第三代同步辐射光源、稳态强磁场实验装置、同步辐射加速器、中国散裂中子源、欧洲X射线自由电子激光（EXFEL）波荡器、德国GSI加速器、美国普林斯顿大学Flux coil磁体等诸多电物理装置的研制，累计申请国家专利共计60余项，先后获得“国家高新技术企业”、“安徽省机械工程学会焊接专委会常务理事”、“安徽省真空学会常务理事单位”、“BEPCⅡ重大贡献参建单位”、“北京正负电子对撞机重大贡献奖”、“国家重大技术装备成果奖”、“国家科技进步特等奖”等多项荣誉。

As an important research and development base of electro physics device at domestic and abroad, Hefei Juneng Electro Physics High-tech Development Co., Ltd. is mainly engaged in design and development of electro physical devices. The company has has gradually formed a development team composed of doctors, masters , senior engineers, technicians and experimentalists. With strong R&D capability and rich manufacturing experience, Juneng Company has successfully participated in EAST superconducting Tokamak, BEPC Positron Collider of Beijing Institute of High Energy Physics, Shanghai Synchrotron Radiation Facility of Shanghai Institute of Modern Physics, Steady-State High Magnetic Field Experimental Device, Synchrotron Radiation Accelerator, China Spallation Neutron Source, European X-ray Free Electron Laser (EXFEL) Undulator, GSI accelerator of Germany, Flux Coil Magnet of Princeton University and various other electrio physics devices have been developed. Juneng Company has applied over 60 national patents in total and been awarded a number of honors such as National High-tech Enterprise, Standing Director of Welding Committee of Anhui Mechanical Engineering Society, Standing Director Unit of Anhui Vacuum Society, Construction Unit with Major Contribution of BEPCⅡ, Construction Unit with Major Contribution of Chinese Spallation Neutron Source, Major Contribution Award of BEPC, National Major Technical Equipment Achievement Award, and National Science and Technology Progress Special Award and so on.

Optique Peter

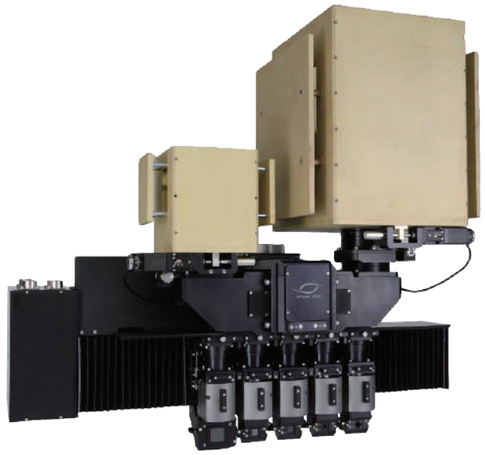
OPTICAL & MECHANICAL ENGINEERING

X-RAY IMAGING AND OPTICAL EQUIPMENT FOR SYNCHROTRONS
X-RAY BEAM DIAGNOSTIC

X射线成像和光学设备用于同步加速器X射线束线诊断

X-Ray imaging X射线成像

- Microscopes 微观显微镜
- Macroscopes 宏观显微镜
- Zoom systems 变焦系统
- High resolution optics 高分辨光学部件



X-Ray beam diagnostic X射线束线诊断

- In vacuum X-Ray beam imaging 真空内X射线成像
- Retractable scintillator 可伸缩闪烁体
- Single magnification systems 单放大系统
- Zoom systems on 2 motorized axis 2轴电动变焦系统

ESRF · SOLEIL · NEUTRONS FOR SCIENCE · HZB Helmholtz Zentrum Berlin · RWTH AACHEN UNIVERSITY · DESY. · KIT · Fraunhofer · European XFEL · EMBL · PAUL SCHERRER INSTITUT PSI · ALBA · Elettra Sincrotrone Trieste · MAX IV · SOLARIS NATIONAL SYNCHROTRON RADIATION CENTRE · diamond · UCL · NTNU · НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ ЦЕНТР «КУРЧАТОВСКИЙ ИНСТИТУТ» · SESAME · OAK RIDGE National Laboratory · BERKELEY LAB · SLAC NATIONAL ACCELERATOR LABORATORY · Brookhaven National Laboratory · Lawrence Livermore National Laboratory · Argonne · MIT Massachusetts Institute of Technology · LSU · Canadian Light Source · Centre canadien de rayonnement synchrotron · UBC THE UNIVERSITY OF BRITISH COLUMBIA · LNLS · Australian Synchrotron · DEAKIN UNIVERSITY · Siam Photon · PAL · SSRF · 中国科学院高能物理研究所 Institute of High Energy Physics Chinese Academy of Sciences

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+33 (0)4 78 47 78 74 / info@optiquepeter.com
www.optiquepeter.com

Beijing Sunrise Technology Co.; Ltd

北京欣瑞拓科技有限公司

VAT Vakuumventile AG Authorized Agent

VAT PASSION. PRECISION. PURITY.

北京欣瑞拓科技有限公司成立于 2017 年 2 月，是专门经营真空相关产品的高科技企业。公司作为瑞士 VAT 公司授权经销商，为客户提供 1000 多种高真空、超高真空阀门，包括插板阀， 角阀，蝶阀，摆阀，控制阀以及专用阀门等。公司自成立以来，一直专业致力于阀门及其它真空设备的销售与技术维护；始终坚持"诚信、创新、沟通"的企业宗旨，并以"技术、服务"作为立业之本。

• The company has established good and stable cooperative relations with many domestic and foreign units, providing high-quality vacuum products and services for universities, scientific research institutes, electronics, aerospace, aviation, high-tech enterprises, etc.

• 电话/Tel: 010-64790821
• 网址/Web: www.xrt-vacuum.com

BEIJING SUNRISE TECHNOLOGY CO.;LTD

摩科斯电子科技（苏州）有限公司

——高性能陶瓷馈通/高功率电真空器件解决方案专家

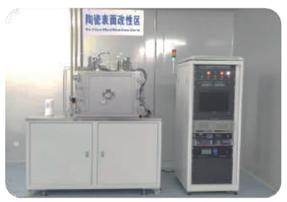
摩科斯电子科技（苏州）有限公司坐落于苏州高新区医疗器械产业园，**厂房面积 3000m²，其中包含了 500 m² 的万级洁净车间，50 m² 的百级洁净车间和 800 m² 的电真空产品生产车间**，主要为粒子加速器、半导体、激光、航空航天、医疗领域提供精密的真空产品和真空器件。

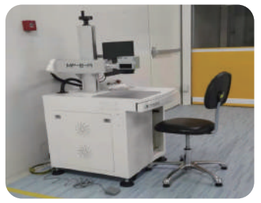


以质量为根本、以客户为中心、以技术为核心、以产品为体现是公司的企业文化和立足根本。公司在高能物理粒子加速器和电真空领域长期耕耘投入，具备**超高真空钎焊、陶瓷表面处理及金属化、PVD 镀膜、电镀铜膜、钨极氩弧焊、高功率锻炼、洁净清洗组装等生产制造能力，**以及**氦质谱气密性测试、安规测试、磁导率测试、金相分析、冷热冲击、耐水压测试等测试能力，**也可以完成包括**陶瓷镀 TiN 膜层后二次电子发射系数测试、镀铜层结合力及 RRR 值测试**等性能测试和**电子束焊接**的工艺。



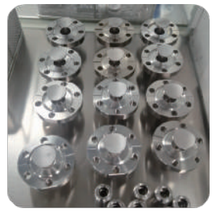


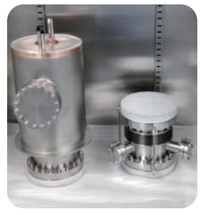





公司在粒子加速器领域先后为**强流重离子加速器装置（HIAF）和加速器驱动嬗变研究装置(CiADS)提供可靠的高功率输入耦合器、高功率测试台、BPM 和高性能陶瓷馈通产品，**拥有从**产品设计改进、生产加工和检验测试的全套设备和技术。**











NGYC

宁港永磁简介
Introduction of NGYC

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邮箱：sales02@ngyc.com
地址：宁波市鄞州区投资创业中心启明路 505 号

宁波宁港永磁材料有限公司专业从事开发与生产烧结钐钴磁性材料三十多年，是资深的磁性材料一站式解决方案制造商，可提供从设计到研发至量产的任何与磁铁相关的应用服务，包括钐钴磁铁、各类磁性组件、注塑件和软磁材料。
公司建有独立的组件车间，配置有无磁装配区、洁净室，并且具备多种复杂磁性组件的装配能力，包括高精度、高均匀性的波荡器磁性组件以及磁悬浮转子组件等。

NGYC is an experienced one-stop solution manufacturer for magnetic materials, which can provide any magnet-related application services from simulation to R&D to mass production, including samarium cobalt magnets, various magnetic components, injection molded parts and soft magnetic materials.
NGYC has built an independent component workshop, equipped with a non-magnetic assembly area and a clean room, and has the ability to assemble a variety of complex magnetic components, including high-precision, high-uniformity undulator magnetic components and magnetic suspension rotor components.

荣誉成就和资质认证

专精特新“小巨人”企业
国家高新技术企业
浙江省高新技术研究开发中心
宁波市企业研究所
宁波市制造业单项冠军示范企业

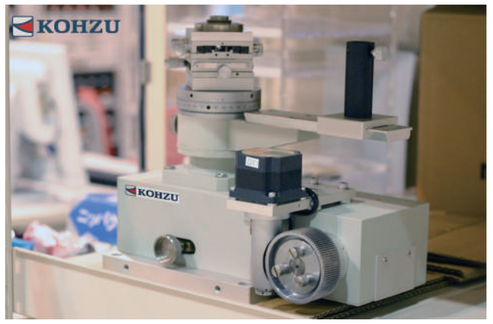
Honors and Certifications

Specialized and New "Little Giant" Enterprise
National High-Tech Enterprise
Zhejiang High-tech R&D Center
Ningbo Enterprise Research Institute
Ningbo Manufacturing Individual Champion Demonstration Enterprise

上海津微光电科技有限公司
Shanghai Kingway Optech Co.,Ltd

公司致力于把先进性与创新性的光电技术与可靠产品带给客户，为前沿的科研与工业领域提供优质的产品与服务！

The company is committed to bringing progressiveness and innovative photoelectric technology and reliable products to customers, and providing high-quality products and services for cutting-edge scientific research and industrial fields!



我们所涉足的领域涵盖了材料加工、光通讯、生物医疗、科学研究与国防等。

The fields we are involved in include material processing, optical communication, biomedicine, scientific research, and national defense.

近年来，我们也专注于前沿的细分市场，为量子光学、生物显微、物联传感、精密加工、先进激光制造等领域的客户提供系统解决方案。

In recent years, we have also focused on cutting-edge segmented markets, providing system solutions for customers in fields such as quantum optics, biomicroscopy, IoT sensing, precision machining, and advanced laser manufacturing.

主办：中国科学院高能物理研究所，
中国核学会核电子学与核探测技术分会
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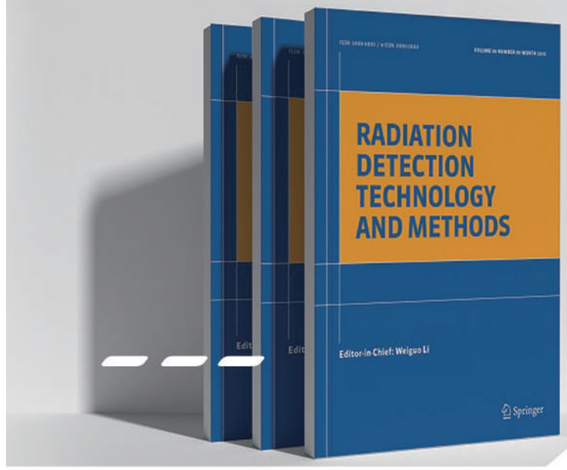

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The journal offers rapid review and publication of articles.

Scope

Detection technology and methods | Computer technology applications | Particle acceleration technology | Electronics and system design | Synchrotron-radiation based techniques and methods | Astroparticle technology

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Mechanical Engineering Design of Synchrotron Radiation Equipment and Instrumentation

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