ISSUE #1

QUARTERLY
Newsletter

SESAME COMMUNICATIONS &
PUBLIC RELATIONS OFFICE

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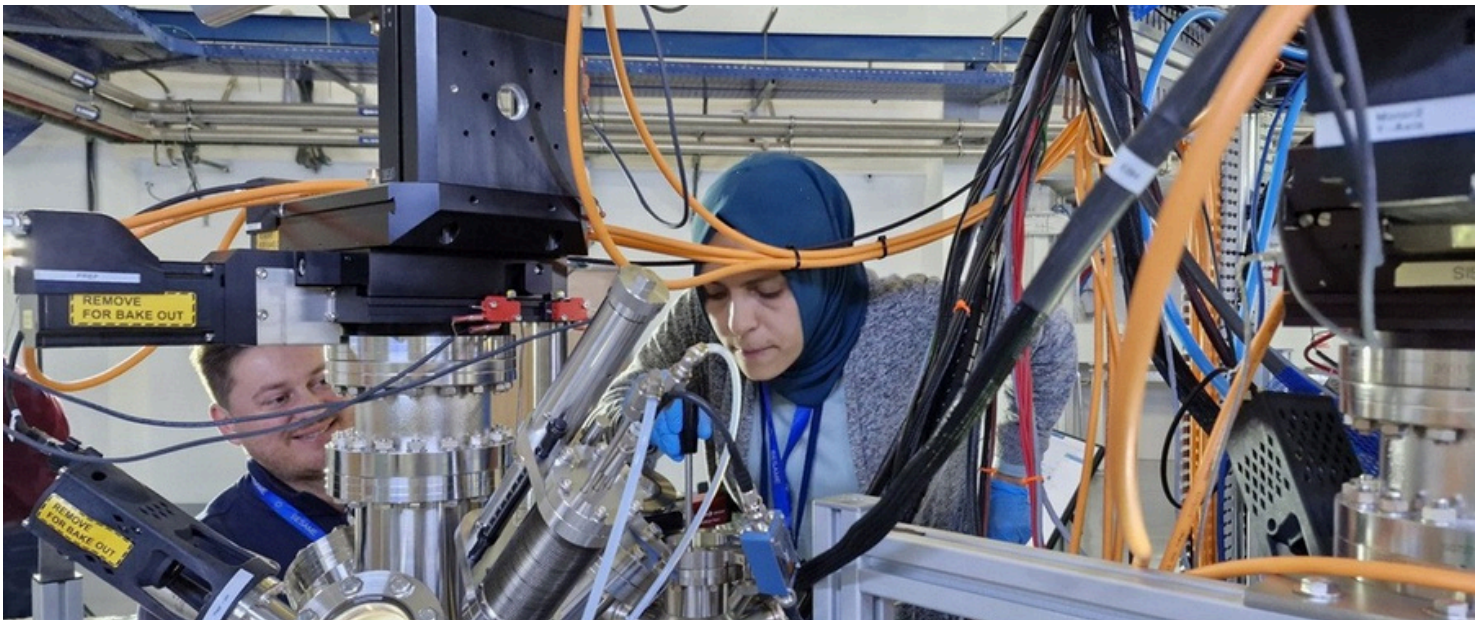


Here's what has happened in the last three months at SESAME and what's to come!

Welcome to our quarterly Newsletter!

We are thrilled to share with you the latest developments in our mission to make a positive impact in our community as a scientific endeavor.

Firstly, we would like to express our gratitude to all of our partners who have continued to support us during these times.
Their generosity and dedication have allowed us to keep our activities running smoothly and effectively.

Enjoy our newsletter!

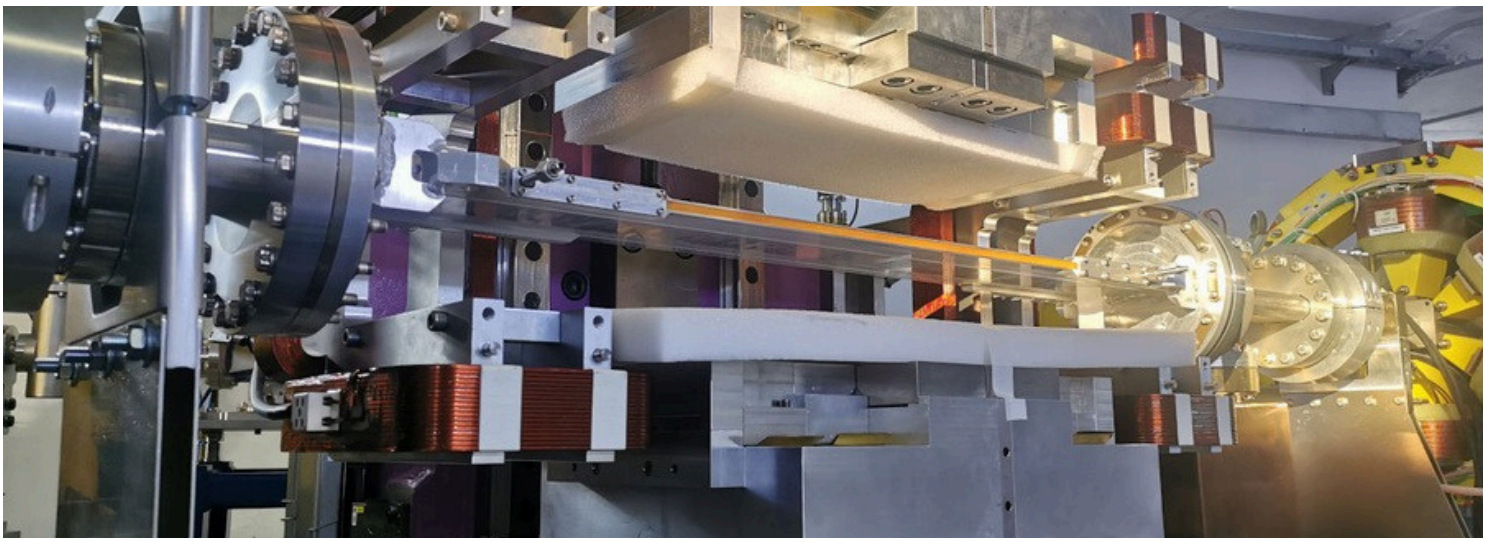
SESAME is expected to expand its experimental capabilities with the Turkish ID11R-X-ray PhotoElectron Spectroscopy (TXPES) beamline, a state-of-the-art facility designed for surface and interface analysis using synchrotron-based photoelectron spectroscopy.

The site acceptance tests of the end station were conducted in December 2024 using its dual anode sources (Al and Mg) that provide reliable performance and precise calibration.

TXPES is the first beamline to be constructed by a SESAME Member, Türkiye, marking a major milestone in regional scientific collaboration.

The project is led by TENMAK (Turkish Energy, Nuclear, and Mineral Research Agency), with contributions from Bilkent University, Koç University, and TARLA (Turkish Accelerator and Radiation Laboratory).

In this Newsletter you can expect:



Highlights from BEATS!

Non-destructive study of ancient glass and other vitreous materials from Southwest Asia: Using synchrotron X-ray computed tomography at SESAME's ID10-BEATS beamline.

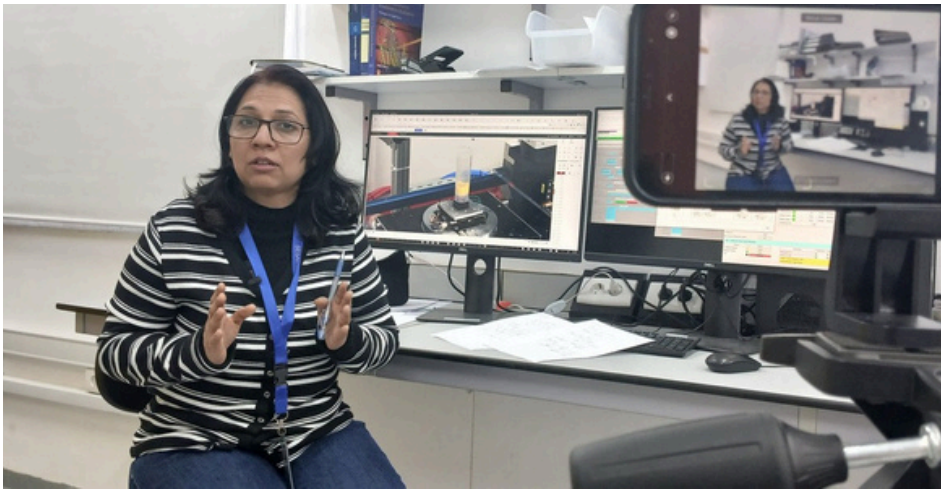
The availability of a SXCT (Synchrotron X-ray Computed Tomography) facility at the heart of Southwest Asia facilitates and enhances the non-destructive examination and conservation of ancient vitreous materials of the region, proving the relevance of the technique for archaeologists, museums, and cultural heritage specialists.

In recent measurements at SESAME's ID10-BEATS beamline, users from Italy, Jordan, Palestine, Switzerland and Türkiye joined SESAME's beamline scientists, Gianluca Iori, Latif Ullah Khan and Philipp Hans, in the application of Synchrotron X-ray Computed Tomography (SXCT) for the non-destructive analysis of ancient glass, faience, and several other vitreous materials. The results of their work have been published in the Journal of Cultural Heritage.

The international and multidisciplinary composition of this team demonstrates not only the wide-ranging applications of synchrotron techniques, but also the collaborative spirit fostered by the facility.

This highlights how SXCT serves as a versatile tool for cultural heritage research across different geographical and academic contexts, and shows its potential to address varied scientific and conservation challenges.

The analysis of archaeological objects poses a set of challenges arising from the fragility and uniqueness of the materials, and requires special non-invasive techniques.

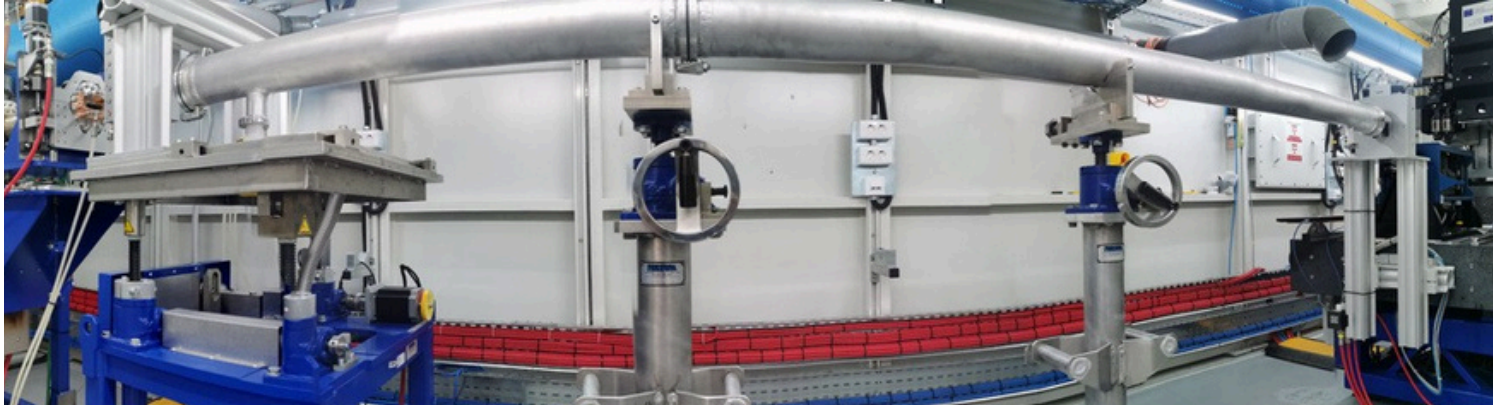


SXCT brings the solution to this as it provides high-resolution 3D X-ray images which, with no invasive techniques likely to damage the objects, permits the understanding of the structure and chemical composition of ancient artifacts. It also reveals details not detectable by conventional techniques.Thanks to SXCT, researchers are able to examine fragile artifacts, and so understand how they were produced. It also provides information on their aging process, and how they are to be conserved for future generations, and this irrespective of the size of the objects.

Southwest Asia is a region particularly rich in archaeological objects. This makes SESAME's facility of major importance since it is the only one in the region that enables archaeologists, museums, and cultural heritage specialists to examine these very valuable, but fragile, historical objects to the depth feasible with SCXT, and to preserve them for future generations.

As highlighted by SESAME's current ID10-BEATS beamline scientist, Fareeha Hameed, the beamline offers cutting-edge research in advanced 3D imaging capabilities, such as absorption/transmission tomography, phase-contrast microtomography, and edge-sensitive imaging.

In her words, *"The ID10–BEATS beamline is a revolutionary tool that opens up new frontiers in 3D imaging for a wide array of disciplines. From archaeology to materials science, life sciences, and environmental studies, the ability to conduct in situ dynamic experiments is invaluable. The beamline enables real-time imaging of processes such as battery charging and discharging, fluid flow in geological materials, and temperature-related phenomena in materials under stress. With the current ability to deliver both qualitative and quantitative results, the ID10-BEATS beamline is poised to attract a great variety of users from multiple fields and industries."*



Cooling SESAME: How a Technical Upgrade Boosts Accelerator Stability.

SESAME's cooling system gets a major upgrade: Another step towards increased efficiency.

SESAME has installed a cutting-edge Programmable Logic Controller (PLC)-based system for controlling the cooling system of its accelerator in replacement of the Building Management System (BMS) that was in place, which presented a number of weaknesses, amongst which impossibility to be integrated with SESAME's EPICS (Experimental Physics and Industrial Control System) machine control system. Six months on, it is reaping the benefits of a more stable and efficient performance of its accelerator, a greatly reduced number of maintenance calls, and fewer interruptions to the users' experiments.

This major upgrade to the cooling system was carried out by the Technical Sector in August 2024, and the new system is now fully integrated with the EPICS system, giving the machine operators a seamless control interface, and making it much easier to control the temperature in the accelerator and experiment areas. It was made possible thanks to the generous financial support from the Istituto Nazionale di Fisica Nucleare (INFN),. The cooling system circulates cooled water through various parts of the accelerator, ensuring that critical components stay within temperature limitations. It also controls the air temperature in the accelerator's tunnel and in the experimental hall to ensure thermal stability of the machine and equipment. In other words, it is critical for preserving stability in the accelerator's temperature.

One of the most notable aspects of the upgrade was the implementation of a single Graphical User Interface (GUI), which centralizes monitoring of the different parameters, such as temperature, water pressure, and flow rates, making troubleshooting easier and generating real-time alerts and displays.

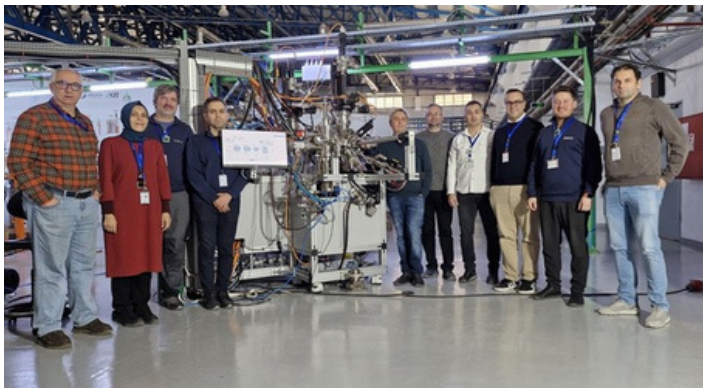
It translates the PLC signals received from the different parts of the cooling system into a user-friendly display, simplifying parameter monitoring and control. This new interface fits the architecture of SESAME's other systems, thereby providing the machine operators with an intuitive and familiar working environment.

The new PLC-based system was created with future scalability in mind. Indeed, it allows SESAME's control team to have full control over it, meaning that it is able to carry out maintenance works on it, to modify it to meet requirements whenever necessary, or to upgrade it, thereby assuring its long-term viability and enhancing the facility's ability to rapidly adapt to new issues. The control team has good experience in this new system.

"This upgrade constitutes a significant milestone for SESAME", said the Technical Director, Maher Attal *"as it not only improves the efficiency and reliability of our cooling system and, consequently, of our machine, but also ensures that we are prepared for the future." "The integration of the new PLC-based control system with EPICS is a game-changer, streamlining the cooling system's operations and making it easier for our team to manage its complex processes," he said.*

"We are very grateful for the support from INFN as this upgrade reinforces SESAME's commitment to maintaining the highest standards in accelerator technology," he added.

This upgrade marks a significant milestone for SESAME, strengthening the accelerator's infrastructure and propelling its goals to deliver state-of-the-art research. It will allow the SESAME machine to function more efficiently, reliably, and sustainably for the coming years.



Community News!

SESAME and Arab States Research and Education Network (ASREN) are collaborating with Global Access Fund (GAF) on a transformative initiative to enhance the accessibility, management, and sharing of research data to its user community.

The GAF is part of the DataCite Global Access Program (GAP) made possible by a grant from the Chan Zuckerberg Initiative.

The scope of the project is to create a scalable infrastructure that enhances data discoverability, citation, and accessibility, advancing Open Science and international collaboration. SESAME's role in this initiative underscores its commitment to scientific progress and global partnerships.

In addition to SESAME's efforts, ASREN plays a vital role by providing the technical infrastructure needed for Open Science initiatives in the Middle East and Africa.

True to its mission to implement, manage, and extend sustainable pan-Arab e-infrastructures dedicated to the use of research and education communities, ASREN will facilitate data sharing among research institutions through high-capacity networks.

Visit Spotlights

Representatives of Sohar University in Oman recently paid a working visit to SESAME to explore the facility's capabilities and explore the potential for future collaboration.

The visit allowed the representatives to gain a deeper understanding of SESAME's research infrastructure. This is yet a further constructive step in strengthening relationships between SESAME and academic institutions in the region.

ANNOUNCEMENT FOR USERS

The 19th SESAME Users' Meeting is back on the Center's premises for yet another engaging user meeting. This will be an in-person meeting that takes place from **Tuesday to Thursday, 17th to 19th June 2025.** Here's how to apply:

- Connect to SESAME Users Portal (SUP)
- Click the "YOUR EVENTS" section and apply
- Submit a short, text-based CV
- Submit an abstract or project proposal if you wish to apply for SUNSTONE seed funding.
- Contact SESAME's Users Office: roa.alnatour@sesame.org.jo.

King's Academy

Students from King's Academy in Jordan toured SESAME, obtaining insight into the cutting-edge regional scientific institution.

Dr. Khalid Toukan, the Director of SESAME, together with the Scientific, Technical, and Administrative Directors, received the students and provided them with an overview of the facility's operations, explaining how it helps to develop scientific research in the Middle East and beyond.

Jordan University

Jordan University students paid a field visit to SESAME to learn about the science that is carried out at the synchrotron facility.

The over 40 students were interested in learning about research and training reactors. The Technical and Scientific Directors of SESAME, Maher Attal and Andrea Lausi respectively, guided the students through the machine protocols and the scientific use of the five beamlines.

Amman Baccalaureate school

Thirty Amman Baccalaureate students visited SESAME to learn about the synchrotron facility.
The students were from physics and chemistry classes at the school.

The Technical and Scientific Directors of SESAME received the students, and after introducing them to the working of the accelerators, took them on a tour of the facility.

Staff Profile Highlights

Jessica Ahedor is SESAME's first communications officer. Her appointment reflects SESAME's commitment to enhancing public engagement and amplifying its mission of fostering scientific collaboration in the region and beyond.

Jessica's background in journalism and science communication is set to play a key role in improving how SESAME's research and contributions are communicated to a wider audience.

Science and Diplomacy Lecture Series—SESAME's Gihan Kamel touts SESAME's role in bridging science and peace

Gihan Kamel, Principal Beamline Scientist of the BM02-IR (Infrared) spectromicroscopy beamline at SESAME, was among the distinguished speakers for the CECAM MARVEL Mary Ann Mansigh Science and Diplomacy Lecture Series on February 28, 2025.

Gihan's promotion of science as a means for peace, along with her participation in the creation of the first African Light Source, highlights her large contribution to the utilization of science to encourage regional and international collaboration and shared understanding, which is one of the missions of SESAME.

She possesses extensive research experience in utilizing IR microspectroscopy in basic and applied science such as materials science, medicine, the environment, and cultural heritage, among others.

SUNSTONE HAS A MESSAGE FOR YOU!

WHAT IS SUNSTONE? SESAME'S UPGRADING NETWORK FOR SCIENTIFIC USER TRAINING AND OUTREACH INTO THE NEXT ERA.

This project involves eight key European and Middle Eastern research infrastructures and organizations, with the Paul Scherrer Institut as an associate participant. The main goal of SUNSTONE is to ensure the sustained consolidation of SESAME, a pivotal research infrastructure serving eight Members—Cyprus, Egypt, Iran, Israel, Jordan, Pakistan, Palestine, and Türkiye, along with other nations in the Middle East and beyond. SUNSTONE has an extended focus towards Africa.

The project aims to enhance SESAME's scientific capabilities, service provision, and standing as an international hub of research and excellence.

The SUNSTONE Project officially commenced with its first General Assembly (GA) on 5 July 2024, that brought together key partners and stakeholders to launch this ambitious initiative. Building on previous achievements and existing partnerships, SUNSTONE aims to consolidate and expand the strong ties between European facilities, SESAME, and their respective user communities.

As an associate of the League of European Accelerator-based Photon Sources (LEAPS), SESAME maintains robust connections with Europe.

Through its membership of SESAME, Egypt assists in outreach to Africa and ongoing collaborations with African entities, aimed at advancing scientific growth and capacity enhancement there.

During the GA, participants outlined the project's goals, strategies, and timelines, emphasizing collaboration and innovation.

This initial meeting set a solid ground for implementation of the project, ensuring all partners were aligned and ready to tackle the ambitious targets ahead.

SUNSTONE Training: Online Lectures on Synchrotron Radiation (April 2025)

In a bid to advance scientific research, the SUNSTONE Project is launching a free online training program starting in April 2025. This program is a series of General Online Lectures, designed to provide researchers with in-depth knowledge of synchrotron radiation techniques, which are vital in a wide range of scientific disciplines.

Synchrotron radiation is a tool in modern science, widely used for applications spanning from cultural heritage preservation to environmental research and materials science.

By offering this free training, the SUNSTONE Project aims to provide scientists with the theoretical foundation they need to utilize synchrotron radiation in their research, enabling them to tap into its potential across various fields.

The first series of SUNSTONE online lectures will take place on four days during the period 8-29th April 2025, with each day dedicated to a unique research theme.

On the first day (8 April), participants will be introduced to the basics of synchrotron radiation and its role in scientific research. The following days will delve into specific thematic areas.

Day two (16 April) will focus on Archaeology & Cultural Heritage Using X-ray Computed Tomography, where participants will learn how synchrotron radiation aids in the analysis and preservation of historical artifacts.

This non-destructive approach allows researchers to examine artifacts in 3D, revealing hidden layers and assessing material compositions without damaging the objects.

On day three (21 April), the program will shift to environmental science using soft X-rays. This session will cover advanced spectroscopic techniques, including X-ray Absorption Spectroscopy (XAS), which are used to study environmental samples, analyze pollutants, and develop sustainable materials.

The final day (29 April) of the training will explore science in operando conditions using X-ray absorption spectroscopy. This session will showcase how XAS can be applied to study materials under real-world conditions, such as those used in batteries, catalysts, and industrial processes.

The program is open to researchers and scientists from all fields and is completely free of charge. This initiative presents an opportunity for those looking to enhance their understanding of synchrotron radiation and stay at the forefront of scientific advancements in this cutting-edge field.

Interested participants can register for the SUNSTONE Training by visiting the official registration page at link.

For more details and registration information, visit Link to registration page.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Stories of Impact: A Milestone in Scientific Collaboration: The ID11L-HESEB Beamline at SESAME.

In the pursuit of SESAME's ongoing efforts to drive cutting-edge scientific research, the ID11L-HElmholtz-SESAME Beamline (HESEB) has become a cornerstone of innovation in the field of soft X-ray analysis.

It is SESAME's first soft X-ray beamline, and heralds a significant advancement for researchers delving into the essential electronic structure of materials.

This beamline employs advanced technologies, including an Apple II-type undulator to generate photons with energies ranging from 70 eV to 1800 eV, alongside a Plane Grating Monochromator (PGM) to disperse them effectively.

What makes the ID11L-HESEB beamline so impactful is its versatility and sensitivity. Soft X-ray analysis techniques, which focus on understanding the electronic structure and chemical environment of atoms, are particularly suited for examining light elements, including carbon, nitrogen, and oxygen.

These elements are crucial in a wide range of scientific fields, including life sciences, materials research, and environmental studies.

The ID11L-HESEB beamline's surface-sensitive nature and its ability to work with low atomic number elements gives it a distinct advantage over traditional hard X-ray techniques.

The ID11L-HESEB beamline has paved the way for novel inquiries, enabling global researchers to scrutinize materials at atomic and molecular scales with remarkable accuracy.

The implications reach far beyond mere scientific progress. The project embodies the strength of global cooperation, uniting world-class experts from around the world to address some of the most urgent issues in the realm of science.

SESAME is very grateful to the Helmholtz Association for having constructed the ID11L-HESEB Beamline at SESAME.

On the occasion of the 30th Anniversary of the Helmholtz Association, in January 2025, the Director of SESAME, Khaled Toukan, congratulated the Association for its journey through three decades of remarkable science!

"The contributions that you have made to the advancement of scientific knowledge, innovation, and international cooperation," he said *"are truly outstanding. In my capacity as Director of SESAME, I should like to express my admiration for your leadership in developing research that addresses global concerns and for your dedication to achieving perfection within the scientific community."*

Thank you for reading!

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