

Minutes

1st HESEB - SESAME workshop (8-9 Sept. 2022)



Group photo(s) of (i) the workshop participants and (ii) workshop organizing team (Retrieved from [here](#). Photo: Başar Uzun, Istanbul University).

The 1st HESEB-SESAME workshop was held on 8-9th September 2022, hosted by the [Istanbul University](#). About 60 on-site and 30 online participants from 6 (out of 8) SESAME member countries and beyond took part to the workshop. Various scientific topics were presented during that workshop via dedicated talks and two poster sessions; the agenda of the workshop being accessible [here](#).

Welcome to the workshop: The workshop started with a nice opening of Suat Özkorucuklu from Istanbul University, who welcomed all workshop participants, and thanked them for their interest and participation to that event. The local organization committee from the Istanbul University Physics Club, the SESAME Scientific Director, Andrea Lausi, as well as the Helmholtz DESY and HZDR teams for HESEB were also warmly thanked. Frank Lehner (DESY) and Barbara Schramm (HZDR), on behalf of the HESEB project also welcomed and thanked all the participants for their interest and presence, emphasizing the crucial role played by the cooperation with SESAME for the science diplomacy and science bridging.

SESAME: co-operative brightness: Andrea Lausi (SESAME) presented the SESAME synchrotron user facility located in Jordan, the discovery, the main characteristics e.g. in terms of photon energy range, brightness, of the synchrotron radiation (SR) and gave an overview of the landscape of the today's existing SR user facilities worldwide. The SR user community, with more than 50 000 users, represents the largest scientific community in the world. SESAME which was developed under the auspices of UNESCO, is a cooperative venture. Thanks to fundamental financial support, SESAME was able to reach its today's status and to develop – 3 operational beamlines and more beamlines to come including BEATS, HESEB, and TXPES, a guesthouse, a solar power plant –. SESAME represents a fantastic place where scientists can meet to conduct experiments in various scientific fields such as material and physics science, life science, cultural heritage. Today, there already are 56 peer-reviewed articles published out of experiences conducted at SESAME.

The HESEB Project: an overview: Frank Lehner (DESY) described the Helmholtz Association and gave a detailed overview of the HESEB soft X-rays beamline project at SESAME, its goals and the status of the different activities developed and further planned within the project. This collaborative project mainly aims at contributing to international cooperation, to the science diplomacy goals at SESAME, and to capacity building in the region. It should act as an “anchor” to seed cooperation between German research institutions / universities and SESAME member communities.

Status report on the commissioning of HESEB: Mustafa Genişel (SESAME) explained the photon-in / photon-out (electron-out) processes evolving during the interaction of photons with matter. A detailed status and next steps of the commissioning phase of the HESEB beamline, as well as the extended capabilities of the beamline in terms soft X-rays radiation, the development of the end station and sample holder were presented.

Personal Reflections on utilization of XPS over 1/2 century: Şefik Süzer (Bilkent University) gave an overview of the X-ray Photoelectron Spectroscopy (XPS) surface-sensitive technique and its applications at synchrotron facilities over the last 50 years by showing a number of scientific highlights.

Introduction to the TXPES beamline project at SESAME: Emrah Özensoy (Bilkent University) described the Turkish soft X-ray photoelectron spectroscopy (XPS) beamline project at SESAME, a project coordinated by the Turkish Energy Nuclear and Mineral Research Agency (TENMAK). The status of the design of some X-ray optics and of the end station of the beamline is showed. Examples of collaborative science foreseen at TXPES are also presented. Some travel support, thanks to TENMAK, is foreseen to be available for user teams with granted beamtime(s).

Science with TXPES: X-ray Photoelectron Spectroscopy (XPS) on Catalytically Active Surfaces: Sarp Kaya (Koç University) presented several relevant examples of possible applications of XPS at TXPES for studies related to heterogeneous catalysis conversion, showing e.g. the ability of the XPS technique to identify surface species with different chemical environments thanks to XPS peak chemical shifts.

Aerosol surfaces to global climate models - the role of soft X-rays: Kamal Raj R (Oulu University) briefly presented the Center for Atmospheric Research (ATMOS) headed by Prof. Nønne Prisle and explained the capability of soft X-rays XPS measurements to study the surface of different atmospheric aerosols such as fatty acids and their salts, humic-like substances, and pollen kit. The dedicated liquid microjet setup used to conduct XPS measurements under ultra-high vacuum conditions was also described. It was also shown that the analysis of the shape, intensity, and position of XPS spectra can help in understanding the composition, formation, and characterization of surface layers of atmospherically relevant aqueous solutions, and deposited particles as well as the structure of free-flying clusters, under different physico-chemical conditions.

Perspectives for the use of HESEB in the United Arab Emirates: Piergiorgio Percipalle (New York University Abu Dhabi (NYUAD)) presented the scientific community in the United Arab Emirates (UAE), with a special focus on the development of the scientific publications, showing an exponential increase of the publication number over the last 30 years, including in the materials and synchrotron science subject area; the scientific community in the UAE being engaged in international collaborations. Mention was also made to the status of the today and planned synchrotron measurement campaigns of NYUAD teams and colleagues at lightsources worldwide, including SESAME. Related to the HESEB-SESAME beamline, researches in material science -especially in the field of sustainable construction materials (reactive magnesia cement)- as well as in biology, related to the study of the osteogenesis, are envisaged.

Surface Analysis of Thin Films for Cultural Heritage: Maram Naes (Technical University Berlin) gave a detailed overview of the surface analysis methods of thin films for cultural heritage. She also presented the challenges in analyzing surfaces (e.g. paintings) in terms of e.g. thickness variation of the top-most layers, surface discontinuity, composition heterogeneity, surface roughness. She explained the crucial need to conduct multiple spot analysis for a given sample. Several applications of the analysis of surface samples in cultural heritage science by mainly XPS, and NEXAFS, - e.g. the alteration of historical materials, the assessment of conservation materials and conservation interventions -were also presented. Mention was also made to a case study on the interfacial chemical mechanisms involved in the painting conservation/degradation processes, to be proposed at the HESEB beamline.

Soft X-ray absorption Study of Magnetic Materials: Sabreen Hammouda (FZ Jülich) gave an introduction of the X-ray magnetic circular dichroism (XMCD) and linear X-ray absorption spectra technique (LXAS) and showed the capability of Fe L_{2,3} XMCD measurements applied to layered LuFe₂O₄(LuFeO₃)_n (n=0 and 1) multiferroics material to get local iron spin and orbital magnetic properties in these materials. Mention was also made to a foreseen XMCD experiment on the topological Kagome metal GdMn₆Sn₆ to be possibly performed at the HESEB beamline in the future.

What X-ray absorption spectroscopy can tell us about the active state of earth-abundant electrocatalysts?: Marcel Risch (Helmholtz-Zentrum Berlin) showed how soft X-ray absorption spectroscopy (XAS) studies on manganese-oxide and manganese-cobalt oxide can be performed prior and during electrocatalysis in order to identify catalytic sites and their evolution.

Discussion and Wrap-Up: Andrea Lausi (SESAME) and Suat Özkorucuklu (Istanbul University) warmly acknowledged the participants for their interest and their presence to that successful workshop which is opening great opportunities for collaborative science to be done in the future. Andrea Lausi presented the general procedure on how to access the SESAME synchrotron; the access to SESAME being based on the submission of proposals for beamtime requests. Calls for proposals for the dedicated operational beamlines are opened twice a year. The main steps to be followed to submit a proposal were described as follows: (i) go to the [SESAME User Portal](#), (ii) [register](#) as a new user to get an user account, if applicable (iii) apply for proposal and submit your proposal. After proposal submission, the scientific content of the proposal is evaluated by the proposal review committee. 50 % of the submitted proposals are granted for beamtime; for the non-granted ones, comments on how to modify / improve it are made available to the applicants. Suggestions were made to pay particular attention to contact and to work together with the beamline scientists in order to ascertain the feasibility of the foreseen experiments and to agree on the proposal content, prior proposal submission. Possible funding support in terms of accommodation and travel for the users with granted beamtimes at SESAME were also described. Finally, Frank Lehner (DESY), in the name of the Helmholtz Association, warmly thanked the local organisation team of the Physics Club of the Istanbul University and all others who made it possible, as well as all participants, for a wonderful and successful workshop. The workshop ended with the visit of a couple of laboratories of the Physics Department of the Istanbul University.