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EDITORIAL

Top research can only be carried out with state-of-the-art technology. An important milestone in this respect has recently been reached in Hamburg: In the beginning of September, the Centre for Structural Systems Biology (CSSB) celebrated its topping-out ceremony on the DESY Campus. In 2017 the CSSB will conduct research on bacterial and viral infections. The novel light sources at DESY and the cryo-electron microscopes in the future CSSB building will be used for this purpose.

Another significant project is in the making too: Three steps remain to be delivered before the completion of the XBI bio lab, an integrated biology infrastructure in life sciences located at the European XFEL in Schenefeld. The aim of the XBI project is to provide an integrated user facility for the biological exploitation of XFEL. Janos Hajdu, recipient of Röntgen-Ångström-Cluster funding, expects the facility to be up and running by 2017.

Yet more highlights are waiting on the horizon: the German and Swedish governments have given the go-ahead for more funding in the context of the Röntgen-Ångström-Cluster. As a result, eight German-Swedish projects, selected this year, will kick off in 2016 and run for three to four years. You will find a first overview below. More details are to follow.

But the Röntgen-Ångström-Cluster is also committed to supporting scientists who find themselves at the beginning of their career. This year, two events were aimed at young scientists. It is exciting to listen to the comments of the participants of the Summer Schools RACIRI and MAT-RAC 1. What makes a good event for young talents? And what impressions did the participants take home?

By the way, the next conference of the Röntgen-Ångström-Cluster is proposed for spring 2016. Up-to-date information regarding this can be found at www.rontgen-angstrom.eu.

The editors

NEWS

CSSB CELEBRATES THE TOPPING-OUT OF ITS NEW RESEARCH BUILDING IN HAMBURG

In the beginning of September, the Centre for Structural Systems Biology (CSSB) celebrated its topping-out ceremony on the DESY Campus in Hamburg. Hamburg's Scientific Senator, Katharina Fegebank, Dr. Karl Eugen Huthmacher from the German federal government, Schleswig-Holstein's Scientific Minister, Kristin Alheit, Professor Helmut Dosch, Chairman of the DESY Board of Directors, and other representatives of CSSB's nine partners joined Professor Matthias Wilmanns, CSSB Scientific Director. In 2017, using a unique and interdisciplinary approach, the CSSB will start to conduct research on bacterial and viral infections. The novel light sources at DESY and the cryo-electron microscopes in the future CSSB building will be used for this purpose. In their welcome addresses, Hamburg's Scientific Senator, Katharina Fegebank, and Schleswig-Holstein Minister, Kristin Alheit, highlighted the important role CSSB plays in fostering interdisciplinary scientific cooperation in northern Germany.

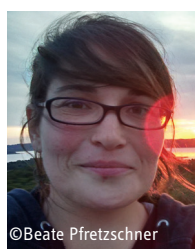


Witnessed the topping-out of the CSSB building (from left): Matthias Wilmanns, Karl Eugen Huthmacher, Kristin Alheit, Helmut Dosch and Katharina Fegebank.
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RACIRI SUMMER SCHOOL REFLECTIONS: RAIN STORMS AND BRAIN STORMING ON THE ISLAND OF RÜGEN



© Claas Abraham



©Beate Pfretzschner

Launched in 2013, the RACIRI initiative is based on two bilateral cooperation platforms, the German-Swedish Röntgen-Ångström-Cluster RÅC (www.rontgen-angstrom.eu) and the German-Russian Ioffe-Röntgen Institute IRI (www.ioffe-roentgen.org). This year was the first time that the summer school took place in Germany. Two participants look back on their experiences.

Beate Pfretzschner, 33 years old, **graduate engineer** at the **Federal Institute for Materials Research and Testing**, investigates hydrogen in steel and steel welds using neutrons and synchrotron radiation.

"I am glad I was not asked to pick only one personal highlight of RACIRI summer school 2015, since it would have turned into an impossible mission. The organization committee chose a very suitable place for us to learn and to connect with the lecturers and fellow students. We were spoiled with excellent food and a very short distance to the beach.

Already the first evening, with the welcome address and dinner, gave us a chance to meet and get to know some students from different institutions in a very relaxing atmosphere. Throughout the whole week we had opportunities for social gathering, be it the BBQ or the excursions. Especially the poster session on the first lecture day gave me the chance to purposefully address students which are working in my field or facing similar scientific problems. Of course, not every lecture suited my field of research or level of knowledge, but the given variety of topics and number of outstanding lecturers made this summer school a very valuable experience. We were even given the opportunity to ask questions directly and discuss with each lecturer separately in one-hour tutorials.

All together, it was a perfectly organised and very well-balanced summer school. I made new friends with whom I do not necessarily share the same field of research but the fascination for sun rises, early morning swimming and midnight rain storms and beer. And I connected to and befriended other PhD students within my research field which may contribute further to my work, and I may contribute to theirs in the future. We are in regular contact. Thanks a lot to the organisers from DESY!"



©Sebastian Ekeröth

Sebastian Ekeröth, 27 years old, is working on his **PhD** at the department of Physics, Chemistry and Biology at **Linköping University**. His field of study is Material Physics and his main project is to synthesize nanoparticles by hollow cathode sputtering using a high-power plasma source (HiPIMS).

"For me, there were a number of highlights during the RACIRI summer school. The first one that comes to my mind are the tutorials where I was able to discuss my own research with the lecturers and got a deeper understanding on how I could connect my work with what they lectured about. This also led to personal connections with areas of research that are new to me, and that will hopefully lead to good collaborations in the near future.

Another highlight was of course the keynote lecture from the Nobel Laureate Ada E. Yonath. It was very inspiring and motivating to hear her talk about her research and how she got to where she is. In my mind, the coolest thing about her talk was how she kept working towards her goal even though so many prominent researchers told her it's hopeless. It would also be impossible to summarize the RACIRI 2015 without mentioning the amazing setting of the island of Rügen. The barbecue and social event down at the beach will stay in my memory for a long time. But possibly most important of all are the new people I met and new friends I have made, from all of the participating countries. Some of these have already led to collaboration on the scientific level, for example with a German group that I didn't even know about before the summer school. And even if not all of these new connections lead to work-related partnership, I still have a big group of new people I consider my friends."



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Ada E. Yonath

MATRAC I – “A UNIQUE OPPORTUNITY FOR INTERNATIONAL STUDENTS”

This year's Summer School MATRAC I (September 21 to 25) provided a systematic overview of the application of neutrons and synchrotron radiation to the structural analysis of engineering materials. Students and young scientists from research and industry from all of Europe interested in this field were welcome to participate. Three participants of MATRAC I report about their experiences:



**Fang Liu, Assistant Professor,
Materials Microstructure, Department of
Applied Physics at Chalmers University**

“I think it was a great learning opportunity for me to attend this summer school. I really learned a lot on synchrotron and neutron radiation in a systematic way:

from source generation to diffraction and scattering techniques to data analysis.

Both – the theoretical and the practical part – were sharply focused on engineering materials, which I appreciated a lot. Lecturers were either active users in synchrotron and neutron facilities or beamline scientists. They were available for in-depth discussions.

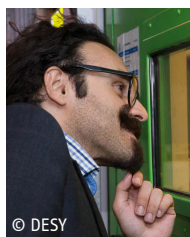
I was very lucky and got help from Dr. Peter Staron, a scientist from HZG and one of the organizers of MATRAC I. He promised to make a test run with my steel samples at DESY. In addition, there were around 60 fellow students who came from different countries with a wide spectrum of research backgrounds. All in all, it was a fruitful week with new knowledge, new contacts, and a lot of inspiration. I would definitely recommend this summer school to students and other researchers that work with engineering materials.”



**Edvin Lundgren, Professor at Synchrotron
Radiation Research, Lund University**

“I had the pleasure to participate in the MATRAC I summer school 2015 in ‘Haus am Schüberg’ in Ammersbek just outside Hamburg, organized by the Helmholtz-Zentrum Geesthacht in a magnificent way.

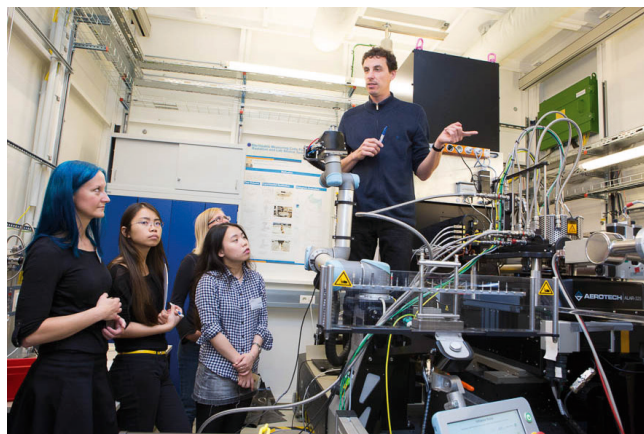
The location of the three first days was perfectly suited for a summer school, since the ‘Haus am Schüberg’ is located far from any distracting environments enabling students and teachers to interact undisturbed. In addition to providing the fundamentals in photon and neutron based diffraction, the summer school also included the latest developments in synchrotron radiation and neutron-related science with a focus on applications of materials in engineering. Leading scientists from large scale facilities, universities and research institutions in Germany and Sweden revealed enthusiastically their latest results. The final two days of the summer school took place in Hamburg, involving practical use of relevant instrumentation at DESY, providing real ‘hands-on’ training for the participants. A spectacular highlight of the summer school was the conference dinner, which took place on a boat on the Elbe river in the beautiful evening settings of the shores of Hamburg.”



**Milad Ghadami Yazdi, PhD student, Mate-
rials and Nanophysics, Lund University**

“MATRAC I summer school 2015 provided me with a great opportunity to familiarize myself with various state-of-the-art material characterization techniques. This would not be possible without thorough

and informative seminars given by the scholars experienced in each method. However, the school practicals performed at PETRA III in the area of synchrotron radiation at DESY were of importance since one would fully digest the basics of each technique step by step. In addition, the school provided a unique opportunity for international students to get to know each other and the projects they are working on, which will consequently lead to further friendship as well as scientific collaborations.”



Young scientists got the chance to experience and receive some practical training.
© DESY



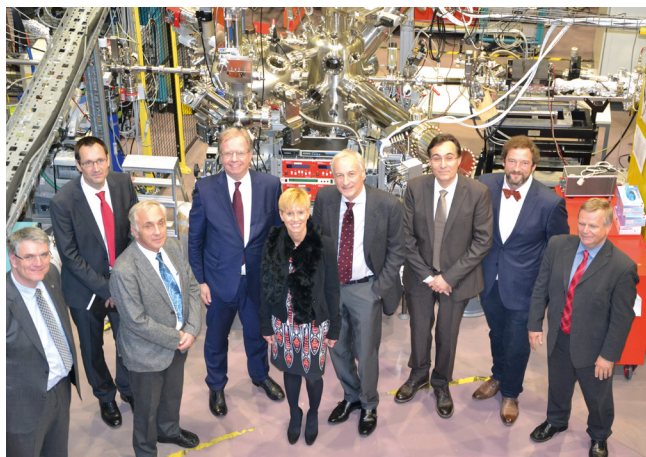
A total of 60 students participated in the five-day-event in Hamburg/Geesthacht. Small sized groups helped to ensure that the lecturers could give each participant sufficient attention. © DESY

INAUGURATION OF THE UPPSALA-BERLIN JOINT LAB: “OUR WILLINGNESS TO COOPERATE IS OUR STRENGTH”

The Swedish Ambassador to Germany, Dr. Lars Danielsson, has officially inaugurated the new Uppsala-Berlin Joint Laboratory (UBjL) in a ceremony at the Helmholtz-Zentrum Berlin (HZB) in November. The UBjL is headed by Professor Dr. Nils Mårtensson of the University of Uppsala and Professor Dr. Alexander Föhlisch, Head of the HZB Institute “Methods and Instrumentation in Synchrotron Radiation Research”, and boasts unique features for examining functional materials.

“Many parts of the world are currently regarded as more dynamic than Europe,” Lars Danielsson said in his opening speech: “But we have great strengths – namely our skill and our willingness to cooperate.” These strengths, the ambassador continued, can be seen clearly in the UBjL: “Such excellent joint research projects lead to results that will bring great benefits to society, our children and our grandchildren.” Danielsson then gave the symbolic start signal for two experimental stations that will be supervised by the Swedish-German workgroup belonging to the UBjL.

“We are very proud that Professor Mårtensson has invested resources from this ERC Advanced Grant in the UBjL,” HZB Scientific Director Prof. Dr. Anke Kayser-Pyzalla said at the opening. This funding, co-financed by the HZB, has allowed the development of worldwide unique study methods for functional materials. The methods are based on angle-resolved time-of-flight electron spectroscopy (ARTOF) and MHz pulse extraction at BESSY II. The ARTOF instruments were developed in Sweden by the University of Uppsala and the company Scienta-Omicron in close collaboration with the HZB. “The synchrotron source BESSY II delivers pulses with the most suitable time structure worldwide for optimally using the instruments,” said Professor Svante Svensson, who is part of the UBjL team at BESSY II in Berlin. At the UBjL, the researchers can study the state of functional materials at the lowest possible X-ray dosage. Further methods allow detailed detection of the electronic structure of materials.



Celebrating the inauguration of the UBjL (from left to right): Andreas Jankowiak, Olof Karis, Svante Svensson, Lars Danielsson, Anke Kayser-Pyzalla, Nils Martensen, Alexander Föhlisch, Torsten Leitner, Thomas Frederking.
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XBI BIO LAB IN THE MAKING – THREE PHASES BEFORE COMPLETION IN 2017

Janos Hajdu, recipient of RÅC funding, has been one of the masterminds behind the proposed XBI bio lab together with Victor Lamzin of the European Molecular Biology Laboratory (EMBL). The XBI bio lab is an integrated biology infrastructure in Life Sciences located at the European XFEL in Schenefeld, and it is currently in the process of being set up. Hajdu, Professor at the Laboratory of Molecular Biophysics at Uppsala University, expects the facility to be up and running by 2017.

The project will proceed through three phases:

1. PHASE 1, lasting from mid 2015 to mid 2016, has the aim to create a basic BioLab with core instruments and a core support personnel (2-3 people). This lab should be up and running by April 2016 to enable on-site testing of new SPB/SFX instruments (SPB/SFX: Single Particles, clusters, and Biomolecules and Serial Femtosecond Crystallography) before they are installed at the SPB/SFX beamline under the Bio-Lab. The aim of XBI-PP in PHASE 1 is to help the integration of SPB/SFX-specific instruments with other components of the beamline. Cost of PHASE 1 is estimated to be 2,005,090 EUR for instrumentation, 100,000 EUR for chemicals and consumables, and 3 FTEs.
2. PHASE 2, planned from mid 2016 to January 2017, has the aim to create a fully functional user laboratory with a total of 6 FTEs. The Phase 2 (or full) XBI BioLab should be available for XFEL by December 2016, i.e. just before the delivery of the 1st beam from the European XFEL. The cost of Phase 2 is estimated to be 2,259,900 EUR in form of additional instruments and personnel. Most of the funding required for PHASE 2 still needs to be secured.
3. Commissioning and full user operation is intended from January 2017 onwards. The XBI BioLab should be running as a full-fledged user facility for XFEL during the commissioning period of the SPB/SFX instruments at the beamline. Running costs in PHASE 3 include (i) personnel costs (6 FTE with 600,000 EUR/year) and (ii) consumables of 150,000 EUR/year.

The completed XBI infrastructure will offer a platform for biological sample preparation and for handling, testing and scoring samples prior to experiments. The aim of the XBI project is to provide such an integrated user facility for the biological exploitation of XFEL. The stability of biological samples is limited. Key biological transformations happen on time scales shorter than some minutes, and optimal use of the XFEL beam requires a support laboratory in the immediate vicinity of the experimental stations. The recent RÅC funding awarded to Hajdu, together with Christian Betzel from Hamburg University, will allow them to develop new methods and instrumentation for sample preparation and scoring at the European XFEL and in the XBI bio lab. According to Hajdu, the science of the European XFEL will critically depend on three main factors: the performance of the X-ray laser, the samples that will be placed into the X-ray beam and on great ideas. The proposed project and infrastructure will create a platform for sample preparation, handling, testing and scoring to enable world-leading new science from the first day of operation of the European XFEL.

PROJECTS

NEW RÅC PROJECTS FUNDED FROM 2016 TO 2019

The recipients of funding awarded by the German and Swedish governments for research projects carried out in the context of the Röntgen-Ångström-Cluster have been announced. Please find below a short overview of projects, scientists and institutes involved.

Magnus Borgström, Lund University, and **Tim Salditt**, Georg-August-University Göttingen: X-Ray characterization of nanowire solar cells (nanosolar).

Janos Hajdu, Uppsala University, and **Christian Betzel**, Hamburg University: Sample preparation and scoring at XFEL and XBI: From living cells to nanocrystals (BioXFEL).

Hans Hertz, KTH Royal Institute of Technology, and **Gerd Schneider**, Helmholtz-Zentrum Berlin: Towards 10-nm-resolution 3D biological soft X-Ray imaging (Nano-3D-X-Ray).

Fredrik Höök, Chalmers University of Technology, and **Emanuel Schneck**, Max Planck Institute of Colloids and Interfaces: A planar three phase interaction apparatus for Neutron Reflectometry (3PhaseNR).

Gergely Katona, University of Gothenburg, and **Manfred Rößle**, Lübeck University of Applied Sciences: Non-equilibrium thermodynamics of biology studied by time resolved small angle X-Ray and neutron scattering (TT-SAS).

Jörgen Larsson, Lund University, and **Stefan Eisebitt**, Max-Born-Institut Berlin: Controlling ultrafast phase-transitions of polarization by selective excitations of phonons, magnons and polaritons (Femto-THz-X).

Edvin Lundgren, Lund University, and **Herbert Over**, Justus-Liebig-University Gießen: In-situ High Energy X-Ray diffraction from electrochemical interfaces (HEXCHEM).

Ann Wennerberg, Malmö University, and **Regine Willumeit-Römer**, Helmholtz-Zentrum Geesthacht: Failure in biodegradable metal implants (SynchroLoad).

ANNOUNCEMENTS

RÅC CONFERENCE IN SPRING 2016

Next year, the first major RÅC conference is planned to be held. Up-to-date information regarding the conference can be found at www.rontgen-angstrom.eu.

The OTHER News

SCIENCE AND A FRESHLY TAPPED BEER WORK WELL TOGETHER

Taps on for new science communication project in Hamburg

In October, Hamburg's bars opened their taps for a new science communication project. About 30 pubs participated in the project to literally slake the thirst of the general public for knowledge. Various scientists invited to "Science on Tap". In a sociable atmosphere, questions around accelerators, laser, black holes, nanoparticles, proteins, dark matter or Higgs and quarks were answered in an intelligible way. And what about science in our day to day life? Why do Basic Research? How is life as a scientist?

The idea behind "Science on Tap" is to bring together specialist knowledge with people in everyday situations of life, and the event is an initiative of DESY and the University of Hamburg. University professor Jan Louis first encountered the concept at the Weizmann institute of science in Tel Aviv where "Science on Tap" has been successful and is now firmly established in the city's calendar of events.

"With this event, we engage people in sciences in an open and relaxed atmosphere – and at the same time we can demonstrate, how fascinating and also important research is", says Jan Louis. "Science is part of our culture, just like an evening in the theatre or a sociable night at the bar."

After a great premiere, „Science on Tap“ in Hamburg will follow Tel Aviv's example and continue in the years to come. Prost! Cheers! Skål!



IMPRINT

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