NEWSLETTER 14/15 | JULI 2017

Röntgen Ångström Cluster

First Laser Light at the European XFEL, recorded by an X-ray detector at the end of the tunnel © DESY

EDITORIAL

Despite unsettling news reports over recent months (such as the possible collapse of the European Union after Brexit), in the world of science, the good news never stops. In Hamburg earlier this year, the first-ever bright light that emerged from the world's largest X-ray laser was met with sheer enthusiasm by scientists across the globe. Now the world class facility European XFEL in Hamburg is gearing up for its grand opening in September 2017, in budget and on time, a feat rarely achieved by projects corresponding in size and significance in the "real" world. The good news from Hamburg doesn't stop there: high ranking officials, including Helmut Dosch, DESY's CEO, have literally „taken up their spades" to break the ground for a new Photo Science Building on the Hamburg campus. Over in Berlin, colleagues have started operations at the new Energy Mate-rials In-situ Laboratory, an extension to BESSY II. And wait, there's more: Sweden also has exciting developments to share: the first user experiment at MAX IV was a success. Wow, now that's an uplifting read. But don't get the impression that progress in science is strictly dependent on new buildings. For Christian Betzel, the opposite is true. After wandering through a maze of construction sites at DESY, we finally found him in the basement of a rather unimpressive looking "small, grey house". It is here that Betzel has created the nerve centre of his revolutionary science in the field of structural biology. And that brings us to our final point: people. Great projects require great women and men leading them, and John Womersley is one of these great people, at least judging by the enthusiasm of those concerned by his appointment as the new Director General at the European Spallation Source (ESS). He's determined to "keep the momentum", taking the ESS to new realms of excellence. In order to create a permanent reminder of the brilliance of some scientific minds, decision makers at DESY have decided to name the new PETRA III hall after Ada Yonath and Paul Peter Ewald. The EU might collapse and unsettling news headlines will certainly continue. How reassuring then, that we can expect ever more great news from the world of science. So sit back, relax and enjoy reading.

The Editors

NEWS

BIGGEST X-RAY LASER IN THE WORLD GENERATES ITS FIRST LASER LIGHT

In the metropolitan region of Hamburg, the European XFEL (the biggest X-ray laser in the world) has reached the last major milestone before the official opening in September. In May, the 3.4 km long facility, most of which is located in underground tunnels, generated its first X-ray laser light. The X-ray light has a wavelength of 0.8 nm, about 500 times shorter than that of visible light. At first lasing, the laser had a repetition rate of one pulse per second, which will later increase to 27,000 per second. European XFEL Managing Director Prof. Robert Feidenhans'l said, „This is an important moment that our partners and we have worked towards for many years. The European XFEL has generated its first X-ray laser light. The facility, to which many countries around the world contributed know-how and components, has passed its first big test with flying colours. The colleagues involved at European XFEL, DESY, and our international partners have accomplished outstanding work." Helmut Dosch, Chairman of the DESY Directorate, commented, „The first laser light produced today with the most advanced and most powerful linear accelerator in the world marks the beginning of a new era of research in Europe. This worldwide-unique high-tech facility was built in record time and within budget. This is an amazing science success story." The 3.4 km long European XFEL is the largest and most powerful of the five X-ray lasers worldwide.

DESY scientist Winfried Decking explaining the operations in the accelerator control room at a press meeting in May 2017 Credit: DESY/Dirk Nölle

NEW PETRA III HALLS AT DESY NAMED AFTER ADA YONATH AND PAUL PETER EWALD

Inaugurated in a ceremonial opening in September last year, the two new experimental halls at the X-ray light source PETRA III at DESY in Hamburg have now been named after the famous scientists Ada Yonath and Paul Peter Ewald. According to Shakespeare, „A rose by any other name would smell as sweet"; however, what might be true in poetry doesn't always translate into reality. Like Shakespeare, many people assume that a person's characteristics and his or her name are two interdependent aspects. Though according to recent research by the team around Yonat Zwebner from the Hebrew University of Jerusalem, the two are, in fact, well-connected. Giving participants five choices, the scientists asked test participants to assign names to photos of unknown people. The scores surprised the scientists, reports the team in the „Journal of Personality and Social Psychology". The test participants managed to choose the correct name in up to 40 percent of the cases. The conclusion: human beings grow into their names and turn them into what can be referred to as a social label. Perhaps what is true for people can be transferred to buildings. Then the name of the building will have an effect on what is going on inside it and vice versa. Naturally, bearing in mind this theory, any naming of a building is significant. As names for a building, professional Oikodonym (gr. Oikodomé „building" and ónyma „name") are common: names referred to the location, for example "Elbe Philharmonic Concert Hall" named after the river that flows through Hamburg, referred to their function such as "office of health" or to the builder like "Hundertwasserhaus", appreciations like the "John-Lennon-Wall" or building descriptions, for example the "Pentagon".
The new DESY-buildings are named after two distinguished scientists. Ada Yonath and Paul Peter Ewald represent key research areas of PETRA III. Ewald (1888-1985) created the dynamical theory of X-ray diffraction and is a forerunner of the research pursued today at DESY. Ada Yonath's (born 1939) work on DESY's light sources decisively contributed to the decoding of the extremely complex structure of ribosomes, for which she received the Nobel Prize in Chemistry in 2009. Both scientists symbolise progress achieved in X-ray diffraction over the years. The researchers currently working in these halls will have every opportunity to follow in their footsteps, and perhaps these names will impact what goes on inside the buildings.

Nobel laureate Ada Yonath in front of ‚her' PETRA III experimental hall © DESY/G. Born

NEW DIRECTOR GENERAL AT ESS JOHN WOMERSLEY HAS GOTTEN STARTED

Appointed in mid-2016, John Womersley entered into service as Director General of the European Spallation Source in early November 2016.
„John has great experience as a scientist, a leader of large research infrastructure organisations, and is also a key person in the development of the European Research Area (ERA)," said European Spallation Source ERIC Council Chair Lars Börjesson. „All the member countries are convinced that this is a great match and that he will continue the excellent work of Jim Yeck to lead the construction and delivery of a world-class facility for future scientific breakthroughs."

Before coming to Lund, Sweden, Womersley was the CEO of the UK's Science and Technology Facilities Council (STFC), leading one of Europe's largest multidisciplinary research organisations since 2011. He has been very familiar with ESS for a long time, as he was directly involved in the UK's decision to join in 2014. Womersley is also a leading figure in European science policy as the current chair of the European Strategy Forum on Research Infrastructures (ESFRI), the leading forum for prioritizing strategic investment in research infrastructure in Europe.

„I'm excited to join ESS. It's one of Europe's largest and most visible new research projects. Scientists, staff, partner institutions and countries across Europe have come together to build what will be the world's leading neutron source for research on materials and life sciences," says John Womersley, a professor and a scientist with a PhD in Experimental Physics. "The impressive progress at ESS can be seen on the construction site in Lund, and I am determined to keep up the momentum." On the day of the transition, the outgoing Director General Jim Yeck delivered a message of heartfelt gratitude to the ESS staff, management team, and governance at a staff meeting. Yeck is now returning to the United States. The change in leadership came at an important time for ESS, as the project is more than one-fifth complete and ramping up its activities quickly. Almost 400 staff and hundreds of construction workers are working in Lund, Sweden. More than 40 institutions from 15 countries are participating in the construction.

European Spallation Source ERIC Director General John Womersley. © ESS

SC-MEMBER ANKE KAYSSER-PYZALLA NEW PRESIDENT OF THE TECHNICAL UNIVERSITY OF BRAUNSCHWEIG

On 1 May 2017, Prof. Dr. Anke Kaysser-Pyzalla became president of the Technical University of Braunschweig.
For the past nine years, she has worked as scientific director at the HZB and developed it into a globally-recognized research centre.

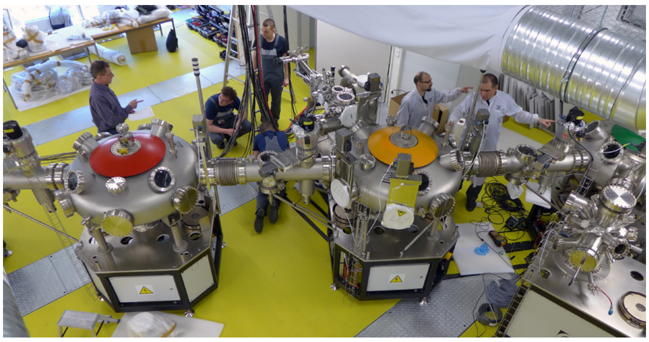
© TU Braunschweig

FIRST USER EXPERIMENT AT MAX IV

NanoMAX, the hard X-ray nanoprobe of Max IV, have had their first successful user experiment. They achieved full ptychographic reconstruction and a resolution of < 50 nm. Everything looks very promising; the machine and beamline are performing stable and well. Ulrich Vogt from KTH's Department of Applied Physics is one of the first external users at MAX IV and says, "It worked really well from the first day, so we are very impressed that is was possible to already get these nice images on the first try." The next steps are the improvement of microscope and optics, which are planned to be achieved towards the summer, and, according to Vogt, there will be even better options for many researchers in the future.

NEW EMIL GIVES ENORMOUS OPPORTUNITIES FOR ENERGY MATERIAL RESEARCH BUILT AS AN EXTENSION TO THE BESSY II -BUILDING

Together with the Max Planck Society (MPG), the Helmholtz Center Berlin has established EMIL, a unique laboratory at the synchrotron source BESSY II. EMIL stands for Energy Materials In-Situ Laboratory and includes two laboratory complexes with different scientific orientations: Sissy (Solar Energy Material In-situ Spectroscopy at the Synchrotron) is used by the HZB for research on energy materials and the Fritz-Haber-Institute of the MPG is responsible for the construction of the CAT lab (Catalysis Research for Sustainable Energy Supply). There, (photo-) catalytic processes are investigated. EMIL started operations at the end of 2016.



Ultra-high vacuum system in the EMIL laboratory © Kerstin Hoppenhaus/HZB

BREAKING GROUND FOR NEW THE PHOTON SCIENCE BUILDING AT DESY-CAMPUS

Politicians and scientists have broken the ground for a new laboratory and office building at DESY's site in Hamburg-Bahrenfeld. The new Photon Science Building is to become a research facility for scientists from Helmholtz Centre Geesthacht (HZG), Christian Albrechts University in Kiel (CAU) and DESY. The new building will have direct access to DESY's light sources and this, along with its close connections to research groups on campus, will provide ideal conditions for photon research and nanoscience. The budget for the Photon Science Building is 14.1 million euros, and it is scheduled to be finished in spring 2019.

Joint first ground-breaking: (from left) DESY Director Helmut Dosch, HZG Director Wolfgang Kaysser, Hamburg State Secretary Eva Gümbel, Schleswig-Holstein Research Minister Kristin Alheit, CAU President Lutz Kipp, DESY´s Director of Administration Christian Harringa and Head of the DESY NanoLab Prof. Andreas Stierle (© DESY, Lars Berg)

THE INSTITUT LAUE-LANGEVIN (ILL) CELEBRATES 50 YEARS OF SCIENTIFIC EXCELLENCE

The ILL was founded 50 years ago, in January 1967, with the signing of an agreement between the governments of the French Republic and the Federal Republic of Germany. The aim was to create an intense, continuous source of neutrons devoted exclusively to civil fundamental research. In 1971, the first neutron beams were produced and two years later the UK joined the partnership as the third associate member country. Since then, the ILL has taken on a further international dimension with the signing of scientific membership agreements with now 10 countries: Spain, Switzerland, Austria, Italy, the Czech Republic, Sweden, Belgium, Slovakia, Denmark and Poland. "The unique research conducted at the ILL is essential to solving some of the major challenges facing modern society," says Professor Helmut Schober, Director of the ILL.

50 years of excellence were celebrated at the ILL in Grenoble © ILL.eu

IN VIVO CRYSTALLIZATION: FINDING THE RIGHT KEY

Christian Betzel calls the small, grey house in the middle of the spacious DESY campus in Hamburg his outstation. To get there, you have to find your way through construction sites, huge building complexes and the parking lots of the research centre until you come upon the two-storey building on a little hill. In this house, Betzel and his postdoctoral researchers, PhD students and interns work on the new revolution of structural biology: in vivo crystallization.

Postdoc Theresa Nuguid explains what all the excitement is about, “In vivo crystallization is a spontaneous event inside cells. It can be prepared in such a way that distinct proteins (when the cells are over-expressing these proteins of interest) start to crystallize directly inside the cells.“ Despite only having started her postdoc in March, Nuguid is already all in when it comes to the method that Betzel and his team have been working on for the last seven years.

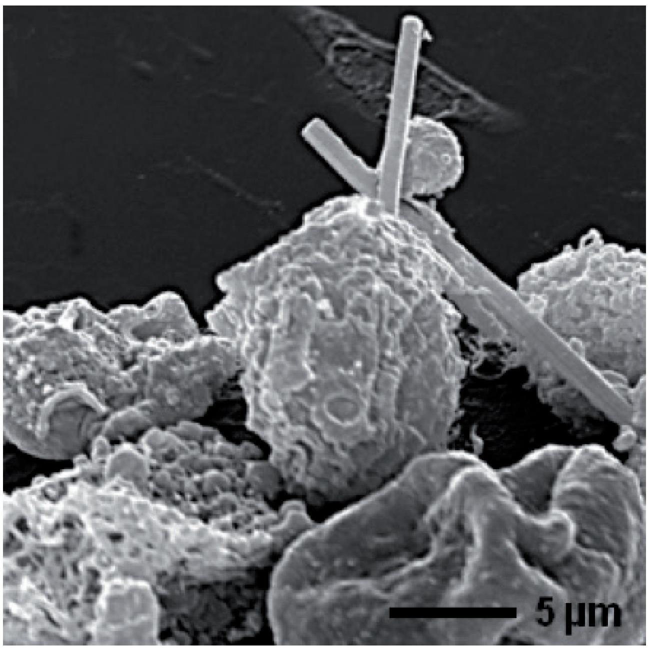
The desk in the professor’s office, which sits in the basement of the building, is overcrowded with folders, papers, pens and multiple computers. The researchers switch between work spaces at the research centre and the University of Hamburg. “I have one laptop for lectures only, otherwise I get confused,“ says Betzel. He boots up the lecture laptop and shows a presentation where you can see crystals in all shapes and formations as they grow out of cells. “First of all, the condition for all kinds of crystallization is that the protein material has to be very pure, homogeneous in solution and the protein needs to be properly folded,“ says the professor. He and his research team need proteins to be arranged in a certain way for their work. “For protein crystallography (our field of research), you need crystals which can be exposed to X-rays, meaning the structure of proteins that are not arranged in crystalline form can’t be determined.”

Christian Betzel in the X-ray room of his laboratory in Hamburg. © Britta v. Heintze/DESY

Betzel is referring to Bragg‘s law which is only applicable when the proteins in the crystal are highly ordered. The X-rays then produce a diffraction pattern behind the crystal, which today is detected with CCD-detectors or pixel-detectors. The researchers combine the intensity together with the phases to obtain all the necessary information, and with that they can calculate the electron density within the protein. “That’s the way to figure out, on an atomic level, the structure of the proteins of interest. And that’s what makes our job really exciting,“ says Betzel.

Aside from pure scientific interest, there is another reason for research in structural biology: drug design requires atomic resolution of the structure of the protein you are targeting. These are mainly enzymes or membrane proteins which are essential for a parasite, bacterium or virus. “And that’s why our research is so important. If you have the structure at high resolution, or more precisely atomic resolution, you can first

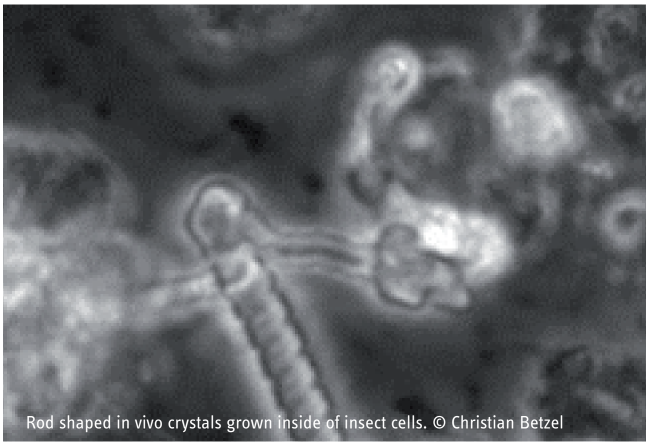
Laboratory of Christian Betzel and team on the DESY campus in Hamburg.
© Christian Betzel



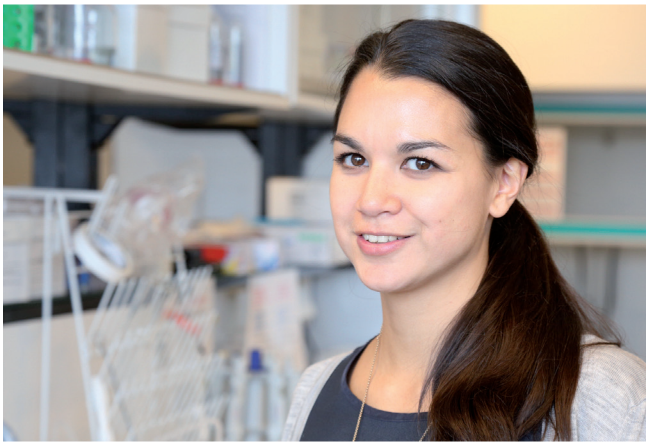
Rod shaped in vivo crystals grown inside of insect cells.
© Christian Betzel

understand how the parasite works, and then you can design a drug which fits perfectly into the active site of the drug target. That can be an appropriate compound which blocks the active site of the enzyme of the parasite or bacterium,“ explains Betzel.

That method is called “lock-key-principle“, but sometimes there are also other rather unfortunate interactions of the drug with molecules of the organism. That’s what we know as side effects. “If you have an enzyme which is present in humans and in the bacteria, you can kill the bacteria, but you may also kill the human host cells. So today we try to find enzymes that are present in the drug target, but not in the human, which minimizes side effects,“ says Christian Betzel.


Rod shaped in vivo crystals grown inside of insect cells. © Christian Betzel

Just recently, the researchers discovered a previously unknown protein of a parasite. “It was a big surprise, as there is no information about that protein in any database,“ says the professor. The parasite can hide in the human brain for seven to nine years, tricking the immune system of the human. But these times will soon be over, at least if Christian Betzel gets his way. “We have the first in vivo crystals of it and so we will try to determine the structure. And then, if we figure that out, we can find compounds that block the active site of the protein and render the parasite harmless.”


Theresa Nuguid at work in the laboratory on the DESY campus. © Britta v. Heintze/DESY

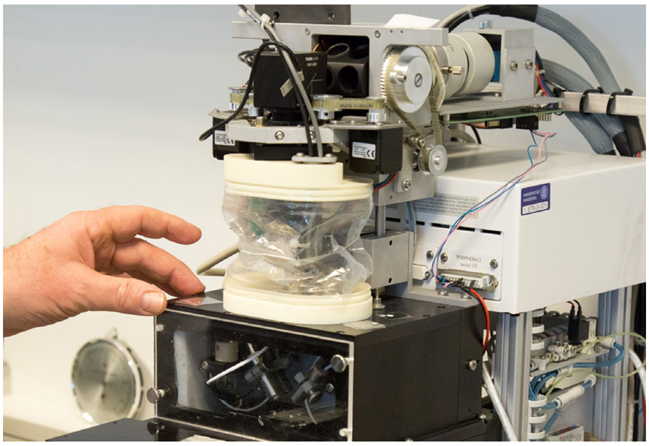
As good as it sounds, the beginning wasn’t always easy. Christian Betzel recalls the times of his diploma thesis, “My early years were at a time when the first protein structures were being solved. It was a spirit of optimism, and laboratory heads were mainly looking for physicists, as the experiments in structural biology were pretty physics-heavy. Sometimes there weren’t even any software solutions for the research, and we had to write programs ourselves. Unlike today, when everything works semi-automatically.”

“You can interrupt me if I am wrong,“ says Betzel to his postdoc Nuguid, who is sitting across the crowded desk. The young woman smiles, and then starts talking about her work in Betzel’s team, “Even if the crystallization happens spontaneously inside the cells, the required preparations are not automatic and take a lot of sensitivity.
You have to start with a monolayer of the cells and infect them with the virus. From this virus the cells know which protein to express and then they start expressing it. After that, the crystals can grow directly inside the cells. That‘s actually my topic at the moment,“ says Nuguid.

And Betzel chimes in, „Such a preparation, until the crystallization process starts, is half a PhD thesis. Producing crystals


Researchers preparing the right conditions for in vivo growth at robots in the laboratory upstairs. © Britta v. Heintze/DESY


Microscopic picture of the growing crystals displayed on the big screen. © Britta v. Heintze/DESY



Betzel explains the functions of the XtalController, an instrument he constructed himself to produce protein crystals. © Britta v. Heintze/DESY

can be very laborious, and on this I‘m sure she agrees with me.“ The professor laughs and Nuguid starts nodding her head. Then she goes on, „But during my former PhD project, I worked with the conventional method for crystallization. There you have to isolate your protein of interest and purify it. Then you need to find the right conditions to crystallize it. That can be awfully difficult and might take forever. And here again, you have the advantage of the in vivo method: you don’t need all these steps, because the crystallization can start spontaneously on its own, right inside the cell.”

“And even better, nowadays, you can analyse the crystal right inside the cell it was growing in. You don’t even have to extract it,“ says Betzel and jumps out of his chair, “Come on, let me show you!” As you step into the basement laboratory you see the steam of the nitrogen used to cool the cells down to minus 80 degrees Celsius. “At room temperature, the X-rays destroy crystals rather fast,“ says Betzel, “but with the cooling, the cells can resist the intense radiation much longer.”

While leaving the cooling area Betzel refers to another fancy method he and his team have developed: serial crystallography, which is a distinct preparation of nanosized crystals for further research. The researchers need tiny crystals to spray into the X-ray-beam, in order to collect the diffraction pattern from each one of them. Here they don’t require cooling, but they do need a huge amount of crystals. The scientist continues the house tour, leading to the other laboratory on the second floor of the small building where the mass production of crystals takes place. “We have to produce not one crystal, not a few crystals, but several thousands of them. And that’s why the in vivo crystallization comes in handy, because you can handle this in the laboratory nicely,“ says Betzel.

Meanwhile upstairs, Nuguid has just started doing her preparation work again. She is wearing a white coat, just like the handful of other researchers who are filling the room with an intense working atmosphere. There are devices on the tables, called robots, which fill different kinds of liquids in 24-well plates. Then the researchers seal the plates and put them in a huge fridge. Theresa Nuguid says, “These liquids include the cells and viruses we need for the crystallization process. In the fridge, the sealed plates have to sit for several days in peace, as the crystal growth can be very sensitive to temperature and concussions.”

Nuguid continues, “After let’s say five days, you can have a look to see if the conditions have been set properly and if the crystallization process has started.” With the various microscopes on the tables some researchers are looking at tiny glass tubes which seem empty, but when you look through the microscope, you see tubular- or cube-shaped objects, shimmering in rainbow colours. “The colour effect of the crystals is caused by a filter,“ says the postdoc, just before the author can get too excited. But Nuguid is smiling again, because the crystals are evidence that they chose the right conditions for the process. The in vivo crystallization has happened once again. (by Nora Kusche)

In the basement laboratory the researchers analyse protein crystals which are cooled down to minus 80 degree centigrade. © Britta v. Heintze/DESY

NEW CALL

A new call within the framework of the Swedish-German collaboration in materials science and structural biology using neutrons and synchrotron radiation is expected to open in fall 2017. Please check online for the latest information at www.rontgen-angstrom.eu/

WORKSHOPS ON FUTURE PERSPECTIVES OF THE RÖNTGEN-ÅNGSTRÖM CLUSTER

The advent of new, outstanding and truly exceptional research facilities such as the European XFEL, MAX IV and soon the ESS will substantially boost the scientific capabilities in the region to unprecedented levels. These drivers of change make strategic discussions on the long-term trends and future perspectives of RÅC inevitable. We will organize two strongly interconnected scientific workshops (the Photon Science Workshop on 9 June 2017 in Hamburg and the Neutron Science Workshop on 28 June 2017 in Lund) to discuss the future perspectives of RÅC beyond 2020. The workshops will bring together key stakeholders from various scientific fields and associated research communities to discuss and identify the most promising scientific directions and arrive at a long-term strategic view of how the RÅC collaborative framework could be pushed further and developed to new levels.

THE NEXT RACIRI SUMMER SCHOOL IN AUGUST 2017 IN RONNEBY, SWEDEN ON „GRAND CHALLENGES AND OPPORTUNITIES WITH THE BEST X-RAY AND NEUTRON SOURCES“

The RACIRI Summer School is a joint initiative by Russia, Sweden and Germany in the collaborative framework of the Röntgen-Ångström-Cluster (RÅC) and the Ioffe-Röntgen-Institute (IRI).

The RACIRI Summer School is held every year under a special focus theme, and this year‘s event will take place in Ronneby, Sweden from 19 - 26 August 2017 on the topic of „Grand Challenges and Opportunities with the Best X-ray and Neutron Sources“. Welcome to the future of Materials Sciences! Visit us at rontgen-angstrom.eu to get more information or click at raciri.org to apply.

MATRAC 1 SCHOOL 2018:
APPLICATION OF NEUTRONS AND SYNCHROTRON RADIATION IN ENGINEERING MATERIALS SCIENCE

The Autumn School MATRAC 1 will take place in Ammersbek (near Hamburg) and at GEMS/DESY in Hamburg. The date for the next school has not yet been determined. The school will provide a systematic overview of the application of neutrons and synchrotron radiation to the structural analysis of engineering materials. The first three days cover all relevant experimental methods using neutrons and synchrotron radiation in materials science, followed by two days of practice (on various diffractometers and tomography stations available at DESY). A social event will also be organised. Further information can be found on:
https://www.hzg.de/ms/summerschool/058651/index.php.en

MATRAC 2: COMBINING SCIENCE AND SOCIALISING

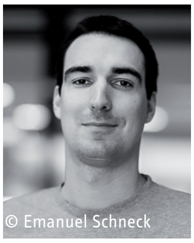
Alexandra Amherd Hidalgo (from Spain), PhD Student, Industrial Engineer graduated in 2012 from the Universidad Carlos III de Madrid: “What I like most here is exchanging opinions with the people attending from different cultures and other countries. And I also like to know about all the new neutron scattering possibilities that offer to get information about the material.”

Philipp Baur (from Germany), research assistant at Heinz Maier-Leibnitz Zentrum, “I really liked meeting students from all over the world that are working in the same area as I am.”
Top-quality research, practical training and a multicultural environment: this is what awaited these two students and the other 42 young scientists during MATRAC 2, which took place in Utting and at the Ammersee from 26 Feb to 3 March, 2017.

The lectures given by 16 experts from Swedish and German universities, research centers and the Heinz Maier-Leibnitz Zentrum (MLZ) ranged from the fundamentals of elastic and inelastic scattering of neutrons and X-rays over details of experimental techniques to modern functional materials and biomaterials. The school provided a systematic overview of the application of neutrons and synchrotron radiation for the structural and dynamical analysis of materials and focused on neutron scattering and imaging experiments. Among the speakers were Andreas Schreyer (Director for Science at ESS, Lund), Eberhard Lehmann (Leader of the Neutron Imaging and Activation Group at the Paul Scherrer Institut, Switzerland) and Prof. Björgvin Hjörvarsson (Head of the Department of Physics and Astronomy, Materials Physics at Uppsala University, Sweden). More information about is available under https://www.hzg.de/ms/summerschool/058653/index.php.en.
This focus was further enhanced by a two-day practical course with hands-on experiments with the instruments at MLZ in Garching. During the final feedback session of the school, participants‘ highlights included having had the opportunity to each use four different instruments during the practical course and the dedication of the MLZ instrument scientists. The fairly remote school location (outside the village of Utting) fostered many scientific discussions and the social cohesion (and sometimes even friendship) among the young scientists.

Great view – The participants in front of the Ammersee © Philipp Baur, TUM

3PHASENR: DEVELOPMENT OF A PLANAR 3-PHASE-INTERACTION APPARATUS FOR NEUTRON REFLECTOMETRY

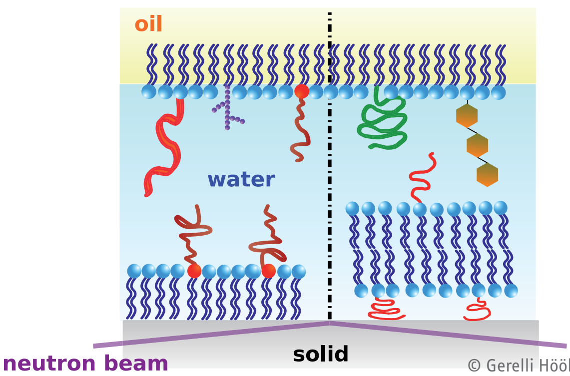

© Emanuel Schneck


© Yuri Gerelli


© Fredrik Höök

Emanuel Schneck (Max Planck Institute of Colloids and Interfaces in Potsdam, Germany) and Fredrik Höök (Chalmers University in Gothenburg, Sweden) together with their collaboration partner Yuri Gerelli (Institut Laue-Langevin in Grenoble, France) have been awarded funding within the Röntgen-Ångström-Cluster framework. In 2016, they started working on their project „3PhaseNR: Development of a planar 3-phase-interaction apparatus for neutron reflectometry", which is outlined below.

The project is devoted to the design and development of a novel sample environment for neutron reflectometry (NR), which would allow for the structural investigation of soft-matter interfaces under controlled interaction conditions. The strategy is to bring an amphiphilic molecular layer at an oil/water interface into contact with a functionalized solid substrate via hydraulic control. This architecture combines the strengths of NR (molecular-scale resolution, access to buried interfaces, and contrast variation) with the unique advantage of perfectly aligned interfaces, thereby creating tunable, homogeneous interaction distances over the entire face of the solid substrate. This development is primarily motivated by membrane biophysics, where interactions between membrane surfaces play important roles in biological processes like cell adhesion, biofilm formation, and membrane fusion processes, but are difficult to structurally characterize in the z-dimension. Indeed, the ability to resolve the structural reorganization of both carbohydrates and proteins on the cell surface as a function of the controlled approach of an interacting surface offers an elegant solution to provide the research community with previously unattainable information about the dynamic processes occurring on the surfaces of cells. Within the first year, these collaborators have managed to build a beta version of the proposed sample environment and used it to study the interactions of lipid monolayers of varied compositions. Additionally, the structure and composition of near-native supported lipid bilayers have been investigated using NR. These initial studies provide a sturdy foundation to continue to build towards the overall goals of this RÅC project. This RÅC project exemplifies the synergy of combining partners with distinct research profiles: Schneck's team brings experience in applying NR to the study of polymer and carbohydrate structures, as well as in the development of the novel sample environment; Höök's team provides experience in developing near-native solid-supported lipid bilayers and the study of cell surface interactions; Gerelli contributes expertise in modeling NR data of solid-supported lipid bilayers and in supervision at ILL, where most NR experiments are performed. Together, these collaborators will provide the NR community with the hardware and methodology needed to expand investigations on cell membrane interactions.



© Gerelli Höök Schneck

The OTHER News

WHY ARE WE LEFT- OR RIGHT-HANDED?

Contrary to popular belief, the answer does not seem to be in the brain. It's in the spinal cord! This conclusion is based on the results of an analysis of biopsychologists at the Ruhr-University Bochum, in collaboration with colleagues from the Netherlands and South Africa. It showed that gene activity in the spinal cord is already asymmetric in the mother's body. A preference for left or right hand could be due to this asymmetry. "The results fundamentally change our understanding of the origin of hemispherical asymmetry," concluded the authors, led by Professors Ocklenburg, Schmitz and Güntürkün. The team reports on the study in the journal „E-Life".

IMPRINT
Editors: PT-DESY,
Nora Kusche
Dr. Claudia Schneider
Dr. Caroline Toeche-Mittler
editor@rontgen-angstrom.eu
www.rontgen-angstrom.eu
Notkestrasse 85, 22607 Hamburg, Germany
Editorial staff: Birgitta Schoch (coordinator),
Silke Schumann, Katharina Strobel
Design and Layout: Britta von Heintze