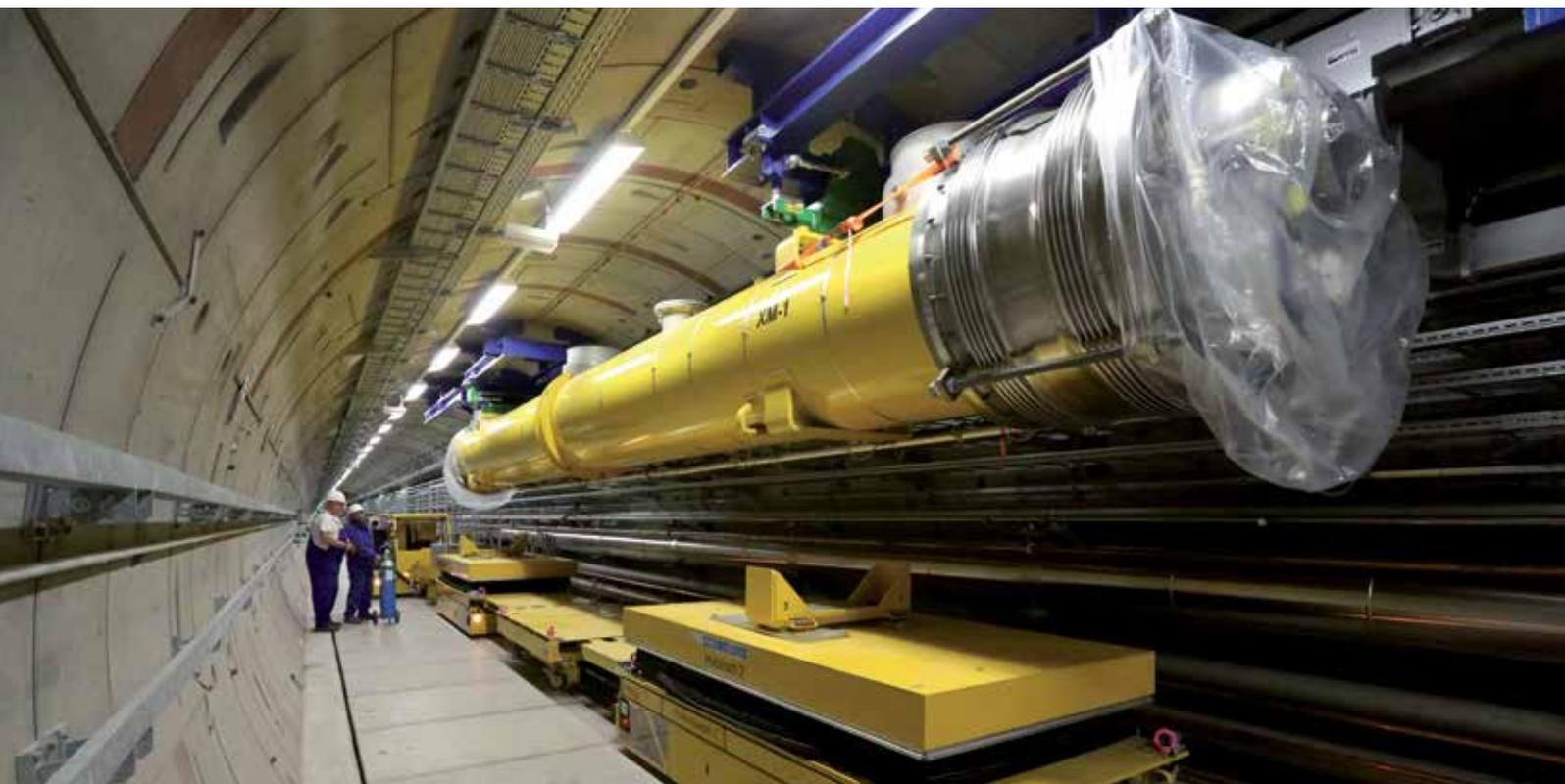


## First accelerator module in the XFEL tunnel

Module XM-1 marks the beginning of the European XFEL X-ray laser accelerator line



“Next, please”: Module XM-1 hanging in place, waiting for connection. (Photo: Dirk Nölle/DESY)

Put to the test and approved: Today, the first of a total of 101 modules – which make up the 1500-metre-long accelerator of the European XFEL X-ray laser – left the test facility in the AMTF hall and was brought into the first tunnel section on the DESY campus. It took barely half an hour, using the transport vehicle, to lift and mount the 12-metre-long, 8-tonne module to the tunnel ceiling. In fact, Module XM-1 is not the first one in the tunnel – its predecessor, the pre-series module XM-2, had already been mounted to the tunnel ceiling for test purposes – however, it is the first completely finished and tested module and marks the beginning of the accelerator line assembly.

A far greater challenge than the mounting of the modules to the tunnel ceiling is

the connection between them. The already complex connection of the about one dozen helium supply pipes, the beam pipe and the insulation shields is made even more difficult by having to work at two to three metres height. Moreover, there are very high safety requirements for welding seams and the whole structure. The reason for making the effort of building a hanging accelerator is to use the free space on the tunnel floor for the installation of RF stations and control electronics.

The next milestone for the almost 250 DESY experts involved in the accelerator construction will be reached when four modules will be coupled together in the tunnel. At that stage, it will be possible to create an insulation vacuum that protects the delicate high-tech components inside

<b>Building a future</b>	<b>4</b>
New buildings on the Hamburg campus	
<b>SINBAD</b>	<b>10</b>
Facility for accelerator research	
<b>Anniversary</b>	<b>16</b>
10 years of DESY school lab in Zeuthen	

from harmful effects of the tunnel air. In addition, RF stations will then supply power to the four modules. This will already allow “warm” operation for testing purposes, i.e. without helium-cooled superconductivity. Later on, things will get even busier. “We hope that we will have



Dear Colleagues,

At the European XFEL project, serial production of the superconducting accelerator modules has now started, all test stands in the AMTF hall are operating and the first module have already been installed in the XTL tunnel. However, this positive progress was only made after overcoming a number of technical and organisational challenges, which was only possible thanks to the extraordinary commitment of all members of the DESY-XFEL project team, together with our French project partners in Saclay and Orsay.

The test results of the first pre-series and serial modules are encouraging and it is to be expected that the planned performance of the facility will at least be achieved, if not surpassed. Due to the delayed start of the module assembly, the completion date of the European XFEL accelerator had to be postponed to mid-2016. Ongoing high commitment of all those involved will be needed to further accelerate module assembly, testing and installation – further delaying the accelerator's completion is no option.

At FLASH, the commissioning of the new FLASH2 beamline has started and first beam for users is planned for 2015. Also in 2015, PETRA III will resume user operation; currently, the extension programme for the new photon beamlines in the north and east sections is well under way.

The review of the Helmholtz Association's new Accelerator Research and Development (ARD) programme, in which DESY is centrally involved, yielded a very satisfactory result. This allows us to look forward to fascinating new activities in the third period of the Programme-oriented Funding, starting in 2015.

Yours,  
Reinhard Brinkmann

installed a total of 16 modules in the accelerator tunnel by the end of the year," says DESY physicist Winfried Decking, one of the accelerator construction project leaders.

The production of accelerator modules entails enormous technological challenges. This starts with the manufacturing of the superconducting cavities – eight of them in one module – and continues with the assembly of the numerous high-tech components. Industrial serial production too requires highest precision and quality to ensure the future acceleration of the electron beam to design energies.

"Today, we can produce cavities and modules around 30 times faster than before," Decking points out. Whereas in the preparatory phase of the TESLA linear collider and for the construction of FLASH, one module per year was on average produced by DESY and its international TESLA collaboration partners, serial production now runs with one module per week. In spite of the increased speed and the globally networked production, the expert teams were able to actually increase the quality and, thus, the performance of the cavities.

"For the operation of the European XFEL, the cavities must reach a mean accelerating gradient of 23.6 megavolts per metre," says DESY project leader Hans Weise. "Zanon and Research Instruments deliver cavities of high quality. Some of these cavities possibly need follow-up treatment at DESY. On average, we thus reach an accelerating gradient of nearly 30 megavolts per metre, which is significantly more than required." For the accelerator, this means higher performance thanks to higher energy. "With the follow-up treatment of individual cavities at DESY, the European XFEL accelerator will provide additional energy, on top of the design value, as high as the one currently delivered by FLASH," says Weise. This is seven percent more than the envisioned 17.5 billion electronvolts, which will allow the generation of even shorter wavelengths. The short-wave X-ray laser flashes of the European XFEL will open up completely new research fields. They will allow scientists to decode atomic details of viruses and cells, take three-dimensional pictures of the nanocosm, film chemical reactions and investigate processes like those in the interior of planets. (uw)

INFO



femto – The DESY research magazine is now available in English.

The new DESY research magazine femto can now also be obtained in English. You will find the English version in the femto magazine racks and at PR (foyer, building 1). We will continue to deliver DESY inForm to your office mail box. The femto research magazine can be obtained on request. Subscribe to femto free of charge! Either online: [www.desy.de/femto](http://www.desy.de/femto) or by telephone: 8998-3613

# 310 042 767 steps



Numerous participants at the DESY walking competition "Mount Everbest"



By Natascha Peleikis

DESY colleagues are fit, and they are team players – this was shown at the DESY walking competition. In May and June, almost half the employees checked their physical activity for 40 days and benefitted in every respect: they gained insights about themselves and their habits; they were more active, more fit and had a lot of fun together with their colleagues. 73 of 78 teams reached the virtual "Mount Everbest" goal with an average of 7000 steps per day, and many of those who did not or only nearly reached the goal were still motivated to continue to exercise more in their daily life.

More than 1000 persons had registered until 22 May, the starting day of this initiative. 879 of them used a step counter to record their daily steps and also participated in the virtual ascent to the Everbest. They formed teams, they documented their daily achievements in the online portal and, little by little, changed their physical activity in everyday life. Until 30 June, two-thirds of the participants reached the Everbest summit with 280 000 steps and altogether they walked 310 042 767 steps.

"This is a very good result as regards participation, team building, persistence and individual performance in these 40 days," acknowledged organiser Patrick Stäuble from Fit im Job AG. At the award ceremony on Health Day on 8 July, not only single runners and teams that walked the highest number of steps were honoured but also those who made the strongest effort or showed the best team performance.

Moreover, on Health Day, there was the opportunity to follow up physical activity and fitness themes by having a cardiovascular check-up and gathering in-



Trying out balance and power training

formation about running shoes, the newest trends in fitness training and bike saddle ergonomics. The programme also included in-house sports activities and education as well as health management. There were also many possibilities to perform activities such as hand strength measurements, football playing and balancing exercises.



Presentation of the DESY karate sports club

The day ended with a lecture of Professor Michael Braumann from the University of Hamburg. He stressed the importance of an active and energetic way of life to age in good health and to better cope with diseases.



"Some stretching always helps." Professor Braumann suggests to exercise more. (Photos: Marta Mayer/DESY)

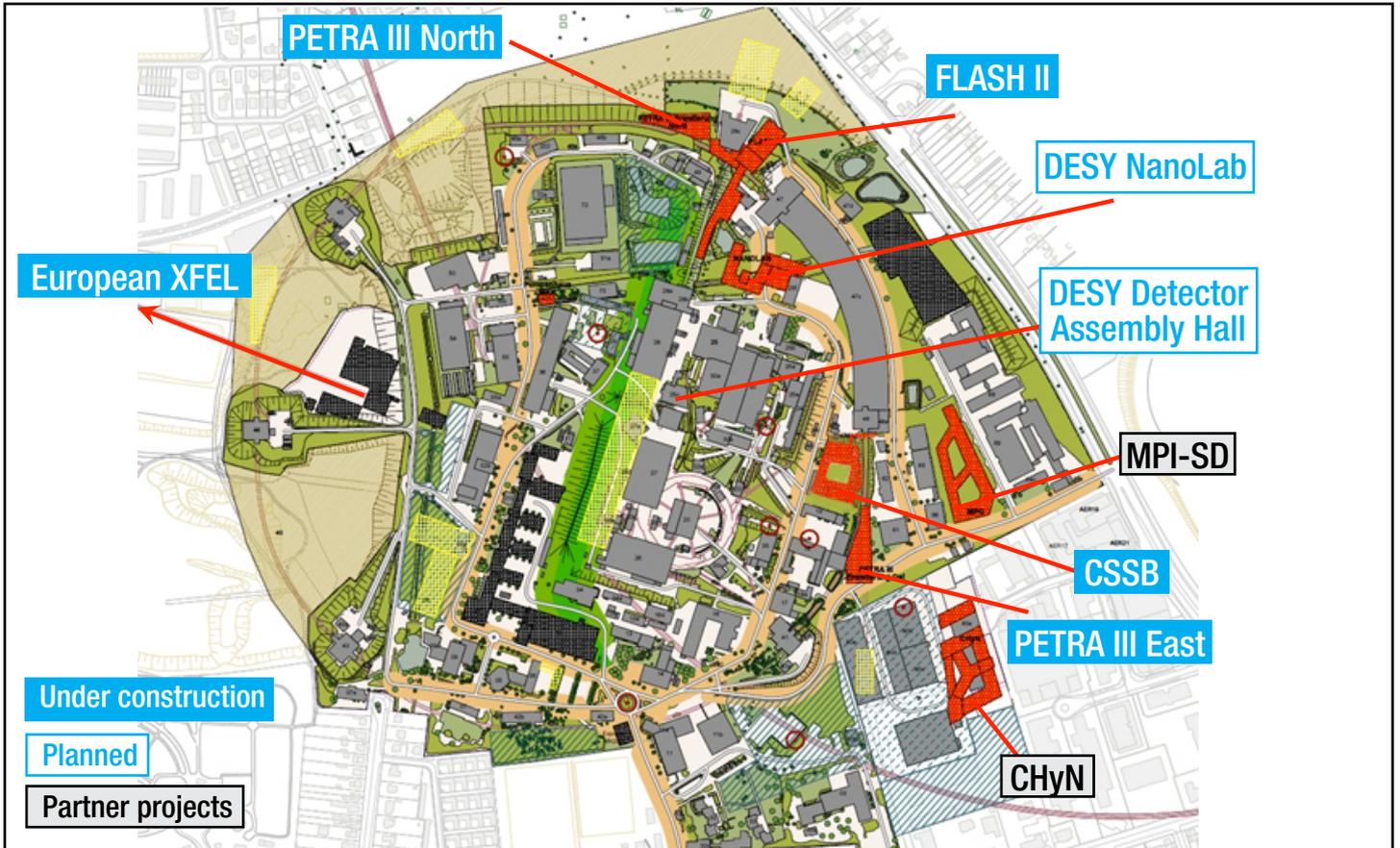
The enthusiasm triggered by the walking competition was acted on by the DESY health management after the summer holidays. The exercise break and in-house-training offers such as yoga and spinal gymnastics will be continued and complemented with Nordic walking & balance courses supported by the Techniker Krankenkasse health insurance.

## INFO

More physical activity opportunities at DESY  
<http://gesund.desy.de> (in German only)  
<http://fortbildung.desy.de/> (in German only)  
<http://sport.desy.de/> (in German only)

# Building a future

New research institutes emerge on the DESY campus in Hamburg



Construction is in full swing at DESY. For the employees on the Hamburg research campus, this is impossible to ignore. Many colleagues have to take completely new routes to work because roads are temporarily closed or well-known paths are suddenly no longer accessible. However, it is worth the effort and restrictions: With new collaborations, institutions and facilities, DESY is further expanding its leading position in international research and preparing to become fit for the future. Currently, there are eight projects on the campus under construction or in the planning phase:

## Construction of the European XFEL X-ray laser

The European XFEL X-ray laser offers unique research possibilities for the natural sciences – ranging from astroparticle physics to materials science and molecular biology. The 3.4-kilometre-long facility is being installed in underground tunnels. It begins at the DESY site in Hamburg-Bahrenfeld, stretches in the northwestern direction and ends just across the Schleswig-Holstein border in a large experimental hall. By now, all underground

structures and tunnel accesses at DESY, Osdorfer Born and Schenefeld have been completed; this is also true for the buildings above ground at DESY and for most of the buildings at Osdorfer Born. In Schenefeld the above-ground buildings are currently being erected.

The tunnels with a length of altogether 5.7 kilometres have for the most part been equipped with the technical infrastructure (electricity, water, gases) and installation of accelerator components has begun (see page 1).

The electron source was installed as well and, already in December 2013, was operated with RF pulses for test purposes. Additional tests and first electron production will follow this summer. After completion of the installation in the injector building in spring 2015, the next step will be the commissioning of the injector; this will take one year in total. Starting in summer 2016, the electron beam is to be injected into the main linear accelerator.

## Extension of the free-electron laser FLASH

Measuring time at the free-electron laser FLASH is extremely in demand. This is why the facility is being extended with six additional measuring stations in a new experimental hall. Existing and new experiments will use the same accelerator but different beamlines generating the intensive X-ray laser light.

The new experimental hall is already completed and the technical infrastructure installed. The electron beam pipe, the vacuum system and the undulators have been mounted as well. Already in February 2014, FLASH started user operation again. In May, the electron beam was safely “threaded” through the beamline of the FLASH extension from the source to the electron absorber. In the second half of this year, the generation of X-ray flashes will be tested in the FLASH extension. The first experiments are planned for 2015. The inauguration and the naming ceremony of the hall will take place in spring 2015.

### Extension of the X-ray source PETRA III

Demand for beamtime at the brilliant X-ray light source PETRA III is also much higher than supply. Therefore, PETRA III will be extended with two new experimental halls, each with five measuring stations.

In March, the PETRA III tunnel was completely torn down at the sites of the new halls, north and east. The floor panels of both the tunnel and the two new experimental halls were cast as monoliths – as was done in the large experimental hall – to prevent disturbing vibrations during measurements. The topping out ceremony for the new experimental halls will take place on 15 September 2014. There will be a break of PETRA III user experiments until end of March 2015, when PETRA III will take up operation again. The inauguration and naming of hall north will take place in September 2015; in spring 2016, this is planned for hall east.

### Centre for Structural Systems Biology CSSB

CSSB – a cooperation of nine universities and research institutions in Northern Germany – is dedicated to research in structural and systems biology with a special focus on infectious diseases.

The newly established CSSB groups of the partner institutions are already working at their home institutes and at DESY, waiting for the completion of the CSSB building on the DESY campus with about 6000 square metres for laboratories and offices. Construction began in spring 2014. Following the first stone laying ceremony end of August, the topping out ceremony is scheduled for July 2015. The building was designed in such a way as to enable a close and productive cooperation among the numerous research groups. It will be ready for occupancy in 2017.

### New laboratory for nano samples (NanoLab)

The DESY NanoLab will be built on the campus right next to the DESY X-ray sources to provide the complete infrastructure needed to prepare, process and analyse the often delicate nano samples from various research fields. First planning with Helmholtz-Zentrum Geesthacht, the second major user, has now been concluded. Already today,



The new FLASH experimental hall (Photo: Edgar Weckert/DESY)

NanoLab offers limited services in building 3, providing access to an ultra-high-vacuum facility with a growth chamber, infrared spectroscopy under UHV conditions and an X-ray photoelectron spectrometer, also including an atomic force microscope for investigations in air and, in the near future, two laboratory instruments for structural analysis by X-ray diffraction. The commissioning of a high-resolution scanning electron microscope is planned for the end of 2014.

### Planning of the detector assembly hall

With the purpose to significantly contribute to the upgrade of the two LHC detectors CMS and ATLAS, DESY plans to build the detector assembly hall, a complex of buildings to be used to assemble and test detector components.

Building 25c will be equipped for the assembly of the detector components. CMS and ATLAS will be outfitted with new silicon tracking detectors, which will be constructed by DESY and other institutes. Adjacent to building 25c, a new two-storey building will be erected, with about 300 square metres including cleanrooms for the assembly of the individual detector components from silicon elements. A complete detector unit consists of 5000 silicon elements.

Construction will start in 2016. Presumably at the beginning of 2017, the building will be ready for occupancy. The detectors are to be completed until the end of 2022. After additional tests at CERN,

the detectors will be built into CMS and ATLAS in 2023.

### New building for the Max Planck Institute for the Structure and Dynamics of Matter

At the beginning of 2013, the Max Planck Society established a new Institute for the Structure and Dynamics of Matter (MPI-SD) on the DESY campus. Currently, the group is working in the premises of the CFEL building. In addition to the existing rooms, the Max Planck Society is planning a new building for the group.

### New Center for Hybrid Nanostructures (CHyN)

The University of Hamburg established the Center for Hybrid Nanostructures on the campus in Bahrenfeld. This institute develops and investigates hybrid nanostructures of solids and biological materials. A new building is planned for the Center, equipped with cleanrooms for lithography, deposition and nanostructure technology as well as bio-cleanrooms.

At the beginning of August, the construction company Sprinkenhof AG tore down the old storage building 80a to prepare the erection of the new building, the first stone laying will probably take place in October. The topping out ceremony is scheduled for the turn of the year 2015/16. In 2017, the building will be ready for occupancy. (hw)

**DESY Golden Pin of Honour for Peter Stähelin**

On the occasion of his 90th birthday, former DESY research director Peter Stähelin was awarded the DESY Golden Pin of Honour in May. Stähelin was honoured for his great service to the research centre, and in particular for his pioneering spirit in the exploration and use of synchrotron radiation at DESY. "It is thanks to the pioneering spirit and vision of Peter Stähelin that DESY was one of the cradles of the global success story of research with synchrotron radiation and that we can celebrate 50 years of synchrotron radiation at DESY in 2014, the International Year of Crystallography," said Professor Helmut Dosch, Chairman of the DESY Board of Directors.

**DFG extends support for collaborative research centre Structure of Matter and Space-Time**

The German Research Foundation (DFG) has announced that it will fund the Collaborative Research Centre (Sonderforschungsbereich, SFB) 676 "Particles, strings and the early universe – structure of matter and space-time" for another four years. After eight years of funding the SFB, the new funding period marks the third round of support by the DFG. The departments of physics and mathematics of the University of Hamburg and DESY are strongly involved in the SFB, which will receive about two million euro per year from 1 July 2014 to 30 June 2018. University and departments will provide an additional 925 000 euro for the entire duration.

**Brandenburg Minister President visits DESY**

Dietmar Woidke, Minister President of Brandenburg, visited DESY Zeuthen in August to inform himself about current projects. "DESY is well known worldwide for its top-class research," said Woidke during the visit. "For many years, it has been doing pioneering work, and it is also regarded as a talent factory." The federal state of Brandenburg supports DESY in Zeuthen especially on its path to become Germany's centre for astroparticle physics.



Brandenburg Minister President Dietmar Woidke (l.) and the head of DESY in Zeuthen, Christian Stegmann, in the school laboratory

# Training 2.0

## New perspectives for IT trainees

With the purpose to further promote trainees in the IT sector and to improve the training quality of IT specialists in system integration and application development, DESY contracted a cooperation agreement with the globally operating company Dimension Data. The two partners aim to support qualified young people, also by finding new approaches for this aim. Two third-year apprentices participate in the IT training of the partner institution for a period of four to six weeks. The DESY training programme focuses on application development, Dimension Data specialises on system integration in the field of network technology.

application for industrial customers at Dimension Data in Oberursel. This also included service-providing at a client firm of Dimension Data in Munich. "Decent clothing and a friendly manner towards customers were compulsory," says Sönke Michalk. Both apprentices also learned that client service often required one or several extra hours. However, it was worth the effort. Both made a lot of contacts. "You have the opportunity to get to know another employer during training. This is a good preparation for career entry, and a higher level of qualification creates a competitive advantage," says Tobias Tegeler.



Sönke Michalk and Tobias Tegeler discuss the newly developed app. (Photo: Heiner Westermann/DESY)

Two Dimension Data apprentices came to DESY already last year. In cooperation with the DESY trainees Sönke Michalk and Tobias Tegeler, they developed an app for devices running with an Android operating system. With this app, any user can easily find all services of the DESY IT department, a DESY ground plan, the canteen catering services, the calendar of events, the telephone directory and DESY news.

From this recently launched cooperation, DESY and Dimension Data drew a positive conclusion. Both training supervisors – Karin Strupp from Dimension Data and Martin Gloris from DESY – agree: The quality and attractiveness of IT training were further increased in both institutions and cooperation should be continued. Again in June, two DESY apprentices went to Dimension Data and in autumn, DESY will welcome apprentices of the IT firm. (hw)

In return, at the beginning of this year, Sönke Michalk and Tobias Tegeler had the opportunity to expand their knowledge in the field of network technology

# READi 2014

## New interdisciplinary formats for doctoral students



Participants of the Research and Discovery Workshop 2014 (READi) (Photo: Marta Mayer/DESY)

By *Mirko Siemssen*

Training for doctoral students at DESY and the University of Hamburg will have new international and interdisciplinary priorities. The process was initiated with the Research and Discovery Workshop 2014 (READi) of the scholarship holders of the Joachim Herz Foundation, who graduate within the PIER Helmholtz Graduate School.

At the Center for Free-Electron Laser Science (CFEL), more than 50 young doctoral students presented and discussed their research projects in the fields of particle and astroparticle physics, nano-sciences, photon science as well as infection and structural biology. Moreover, five invited speakers, Herbert K. Dreiner (University of Bonn), Harrison B. Prosper (Florida State University), Wolfgang Hansen (University of Hamburg), Robin Santra (University of Hamburg and DESY) and Markus Perbandt (University of Hamburg), held introductory lectures in their corresponding fields of research.

The graduates' presentations in particular were followed by many questions and lively discussions. Frederike Ahr, doctoral student at CFEL, especially liked this workshop format lasting several days: "It was interesting for me to meet doctoral students outside of my direct research context. I think this exchange

was very inspiring." The READi organisers Hong-Guang Duan, Nele Müller, Özgür Sahin, Matthias Schlaffer, Clemens Wieck and Alena Wiegandt were happy to see that the workshop format was so well accepted by their colleagues. "We also learned that organising such a conference entails both effort and fun," says Nele Müller. "We very much hope that next year's Herz scholarship holders will continue this format."

The next interdisciplinary forum for doctoral students will follow already in October. During the PIER Graduate Week 2014 (6-9 October), a four-day workshop and lecture week, national and international speakers will present a series of introductory and advanced courses in the PIER research fields. "Our aim is that our doctoral students will specialise in interdisciplinary fields. This is mandatory for a comprehensive education of the highest international standard. We want to compete with the world's best educational institutions," says Robin Santra, speaker of the PIER Helmholtz Graduate School.

### INFO

<http://readi2014.desy.de>  
[www.pier-campus.de/graduateweek2014](http://www.pier-campus.de/graduateweek2014)  
Contact: [mirko.siemssen@pier-campus.de](mailto:mirko.siemssen@pier-campus.de)

### Helmholtz funds two DESY spin-offs

Two start-up companies initiated by DESY scientists will be funded by the Helmholtz Association's "Helmholtz Enterprise" support programme: X-Spectrum, which is entering the market with a high-technology X-ray detector, will receive 100 000 euro. Class 5 Photonics will build very flexible femtosecond lasers generating short pulses with high power. The joint spin-off of DESY and the Helmholtz Institute Jena will be financed with nearly 130 000 euro.

The company X-Spectrum was founded in July by five members of the DESY detector development group (FS-DS), with DESY being the sixth shareholder of the new firm. The scientists developed an X-ray area detector called LAMBDA, which offers an extremely high spatial resolution and a high recording rate. LAMBDA stands for Large Area Medipix Based Detector Array. The large active area of the LAMBDA detector, with a size of about nine by three centimetres, features 750 000 pixels and takes up to 2000 images per second.

The second spin-off funded by Helmholtz Enterprise is the company Class 5 Photonics, which is currently being founded and which will offer tunable high-power femtosecond lasers with a high pulse rate. With this concept, the future entrepreneurs recently won the Start-up Challenge prize of the German Competence Networks for Optical Technologies OptecNet.

### Russian Ambassador visits DESY and European XFEL

DESY's cooperation with Russian institutes has a long tradition and is very fruitful, today especially at the European XFEL and the German-Russian beamline at PETRA III. The Ambassador of the Russian Federation to Germany, Vladimir M. Grinin, witnessed the extent of this cooperation during his DESY visit at the end of April. Since 2013, the German-Russian cooperation on the development and application of large-scale research facilities has been concentrated under the roof of the Ioffe Röntgen Institute (IRI), which is being coordinated by DESY and the Kurchatov Institute.



Ambassador Vladimir Grinin (l.) with DESY physicist Wolfgang Drube at PETRA III



### DESY welcomes record number of summer students

This year, DESY welcomes a record number of 117 summer students at its two locations in Hamburg and Zeuthen. During eight weeks, the junior researchers from 28 nations will get a practical insight into research at Germany's largest accelerator centre. DESY offers one of the most comprehensive and inter-

national summer schools throughout Germany. The students will be integrated into the workgroups of DESY's research divisions particle and astroparticle physics, accelerator physics and photon science, where they will experience everyday life in science first hand. A series of lectures complements the practical

experience with the necessary theoretical background.

DESY Director Helmut Dosch points out that the education of highly qualified junior scientists is one of DESY's major goals, and that the research centre also benefits. "Junior researchers provide new momentum and new ideas to science," says

Dosch. "The students learn at and from DESY, and we learn from them."

(Photo: Dae Seon Seo/DESY)

# Who or what is SINBAD?

DESY plans a facility exclusively for accelerator research

When experimental physicists are forced to build up their facility – whether accelerator or detector – in an already existing hall, this is usually too small. The scientists then have to plan and optimise until the facility somehow fits into it. Insofar, the group headed by accelerator physicist Ralph Aßmann currently has a luxury problem. In search for a site to explore future accelerator concepts, they found a location which at first sight leaves nothing to be desired: The DORIS accelerator with its central experimental hall covers an area of about 50 by 70 metres. Here, in addition to being able to use the conventional infrastructure, the scientists find additional advantages. “All radiation protection mechanisms are designed for an energy up to 6 giga-electronvolts (GeV), because the particles at DORIS had these energies,” says Aßmann. “Moreover, all the other parameters at the site are future-proof for accelerator research.” This is very much in line with the physicists’ requirements for their ambitious goals.

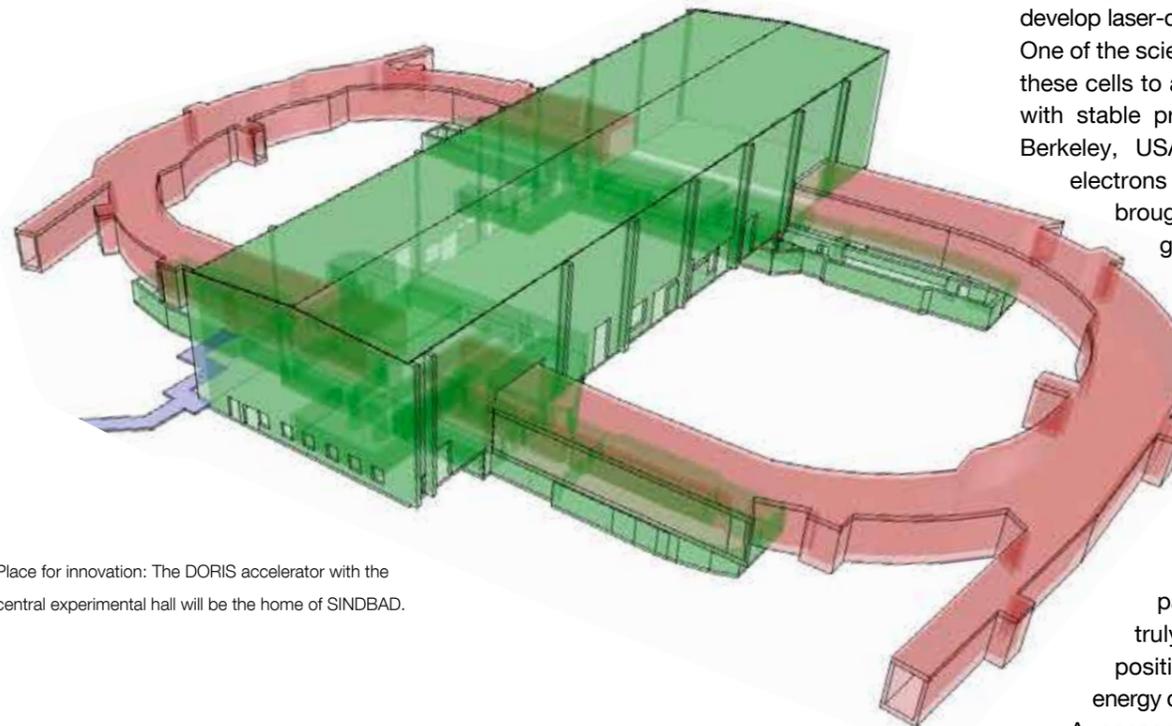
SINBAD stands for „Short Innovative Bunches and Accelerators at DESY“. What at first sight sounds like an Arabian Nights’ story, is the plan to combine conventional accelerator technology with innovative ideas. “With SINBAD, we want to build a multipurpose facility to explore future accelerator techniques,”

says Aßmann. For example, the scientists aim to produce ultrashort particle bunches that are shorter than femtoseconds, i.e. billionths of a second. To this end, they are setting up a small particle accelerator bringing electron bunches to an energy of 100 mega-electronvolts. These bunches are then injected into different experimental zones to either compress the bunches, use them for FEL tests or further accelerate them, e.g. in a plasma cell.

Altogether, four experimental zones can be installed within the two straight sections of the former DORIS accelerator. In the centre of the accelerator laboratory, the former DORIS experimental hall, the scientists plan to build central infrastructure, like a laser laboratory and feedback measuring systems, to be used by all experimental stations.

The new facility is part of a concerted action to fathom the potential of new accelerator technologies. Within the Helmholtz Accelerator Research and Development (ARD) programme, possibilities to study such technologies will be created over different Helmholtz centres. For example, in the context of the LAOLA collaboration with the University of Hamburg, the REGAE and PITZ facilities are being used at DESY, and the FLASH electron beam will be made available for accelerator research

in the FLASH Forward project. “However, we learned that a dedicated facility is required to bring new technologies to maturity,” says Aßmann. “Our TESLA test facility, which later became FLASH, is a good example showing that such an integrated test facility may even become world-class in a technology.”



Place for innovation: The DORIS accelerator with the central experimental hall will be the home of SINBAD.

The SINBAD project will mainly be funded within the framework of the Helmholtz ARD initiative. However, a part of the programme named AXSIS will be financed by a European Research Council grant worth about 14 million euro, which Aßmann, together with his colleagues Franz Kärtner, Petra Fromme and Henry Chapman, has already secured. AXSIS will generate X-ray flashes of only attoseconds, i.e. billionths of billionths of a second, and the scientists want to generate these light pulses with the help of new and more compact accelerator technologies.

With SINBAD, the scientists intend to concentrate the costly infrastructure required for such test facilities in one place and exploit synergies with existing laboratories. For example, the DESY laser laboratory is located in the immediate vicinity of the new SINBAD facility, and the old DORIS accelerator

can also be put to good use. “We can use part of the old DORIS ring to study the behaviour of the particle bunches in a curve,” says Aßmann. The scientists also discuss the possibility to inject electrons from the existing DESY

As of 2017, installation will begin with the moving of a 200 terawatt laser from the REGAE site to the SINBAD test area; this laser was once jointly acquired by the University of Hamburg and DESY. The linear accelerator and the first experiments will also be mounted, including two plasma cells used to further develop laser-driven plasma acceleration. One of the scientists’ first goals is to use these cells to accelerate particle beams with stable properties. Experiments in Berkeley, USA, already showed that electrons in plasma cells could be brought to energies of a few giga-electronvolts; however, the particle beams suffered from substantial instabilities. “In the SINBAD plasma cells, we want to accelerate 100 MeV electrons emitted by our linac to perhaps one GeV and obtain really usable particle bunches with a truly stable and calculable position, transversal size and energy distribution,” says Aßmann. A cascaded acceleration in both plasma cells in succession will appear only much later on the scientists’ wish list.

accelerators. The many existing tunnels between the individual accelerators will be of help here. “We even think of injecting positrons from PIA into our test area. This will make DESY one of the few sites in the world where plasma accelerators can be tested with positrons as well.”

The scientists are currently planning the design of the linear accelerator and the first two experiments. In 2016, the researchers will start to empty the DORIS tunnel in order to install their first instruments. Parts that do not have to be removed – undulators and deflecting magnets – will remain for the time being. Perhaps later on, it will be possible to send a plasma-accelerated particle beam through a DORIS undulator.

## AWARDS

Gay-Lussac Humboldt Research Award for Emilian Dudas

The internationally renowned physicist Emilian Dudas from École Polytechnique, Palaiseau, France, will use his Gay-Lussac Humboldt Research Award to spend two extended research visits at DESY. At DESY, Dudas will pursue his work on supersymmetric theories and the interplay of particle physics, string theory and cosmology.



Helmut Schwarz, President of the Humboldt Foundation (l.), hands over the award certificate to Emilian Dudas. (Photo: Humboldt Foundation/Albrecht G.W. Barthel)

“Emilian Dudas combines a broad theoretical knowledge and outstanding mathematical skills with a strong interest in new experimental developments in high-energy physics,” says Wilfried Buchmüller (DESY), who nominated Dudas.



IUPAP Young Scientist Prize in Particle Physics for Kerstin Tackmann

DESY physicist Kerstin Tackmann was awarded the Young Scientist Prize in Particle Physics 2014 by the International Union of Pure and Applied Physics (IUPAP). She received the prize at the International Conference on High Energy Physics ICHEP in July in Valencia, Spain. “It is a pleasure for us to honour Kerstin Tackmann for her outstanding contributions to current elementary particle physics, especially to the discovery of the Higgs boson through the analysis of its photon-photon decay in the ATLAS experiment,” said Hiro Aihara, Chairman of the IUPAP Commission “Particles and Fields”.

Matthew Wing wins Humboldt Foundation's Bessel Research Award

British particle physicist Matthew Wing was awarded a Friedrich Wilhelm Bessel Research Award by the Humboldt Foundation. Wing will use the award for a one-year stay at DESY to further research in the field of data analysis, as well as linear collider and plasma accelerator development, together with DESY experts. Matthew Wing is well known to DESY. He is currently the spokesperson of the ZEUS experiment at HERA.



The DORIS accelerator (Photo: Reimo Schaaf/DESY)

# New faces

## Four leading scientists reinforce the DESY team

The multifaceted research opportunities at DESY continue to attract excellent scientists to the research centre. Only recently, DESY in cooperation with universities appointed top-class women and men who have now started their jobs as leading scientists, a position on the same level as university professors.

In June, **Marek Kowalski** officially took up office as a leading scientist in the IceCube group in Zeuthen. He graduated there in 2004 within IceCube's predecessor project, AMANDA, and is thus an old hand at DESY. After his professorships at Lawrence Berkeley Laboratory in the USA, Humboldt-Universität (HU) zu Berlin and his W3 professorship at the University of Bonn, he now assumes a joint professorship at HU Berlin and DESY. His focus is on the future expansion of IceCube at the geographic South Pole. Apart from his research in neutrino astronomy and



Marek Kowalski

observational cosmology, Kowalski will bring an ambitious new project to DESY: With the Zwicky-Transient-Facility (ZTF) – planned in cooperation with Caltech (USA), the Oscar-Klein-Center (Sweden) and the Weizmann Institute (Israel) for an all-sky survey with a novel 1.6 Gigapixel camera – Kowalski will take data allowing pioneering observations in supernova cosmology, also important for neutrino astronomy.

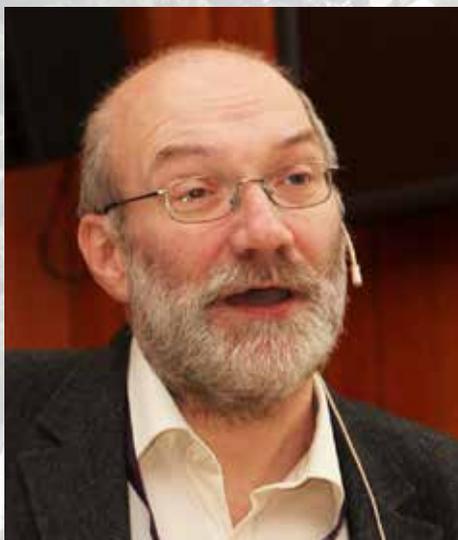
**Christian Schroer** takes over the scientific leadership of the synchrotron radiation source PETRA III. Previously, he was professor at Technische Universität (TU) Dresden, and after a joint appointment procedure of the University of Hamburg and DESY, he now assumes a professor-



Christian Schroer

ship in Hamburg. Initially, he worked in the field of theoretical physics; after his graduation, Schroer specialised in nano research and the development of X-ray optics. He too has a professional past at DESY: Before he was appointed at TU Dresden, he worked as a scientist at DESY from 2004 to 2006. As new scientific head of PETRA III, Schroer will advance the scientific programme and considerably increase the portfolio of experimental techniques. Moreover, he and his new workgroup will further develop X-ray microscopy at synchrotron radiation sources and X-ray free-electron lasers.

**Wilfried Wurth** is also a long-standing friend and user of our facilities: He has been professor at the University of Hamburg since 2000 and has now been appointed leading scientist at DESY as well. He will assume the scientific leadership of the free-electron laser FLASH. Wurth is an expert in X-ray spectroscopy and focuses on the investigation of ultrafast processes, such as the real-time observation of chemical reactions at surfaces and the dynamics of electrons in solids and at interfaces.



Wilfried Wurth

For a long time, Wurth has been one of the most prominent researchers at FLASH and, from 2007 to 2013, he was also spokesperson of the BMBF priority programme FLASH. This first priority programme in the field of condensed matter was created to bundle research at the free-electron laser within the framework of collaborative project funding. In his new position, Wurth particularly aims to maintain the status of FLASH as pioneering free-electron laser facility in the X-ray range and to make sure that FLASH will continue to be one of the world's leading facilities for research at free-electron lasers.

Since July of last year already, **Simone Techert** has been head of the Structural Dynamics in Chemical Systems (FS-SCS) group at DESY. She is also professor for ultrafast X-ray physics at the University of Göttingen. Techert works on the development and application of methods for time-resolved X-ray experiments with the prospect to film chemical reactions in real time. The goal of



Simone Techert

her research is a broader understanding of energy conversion processes in complex chemical systems and to explore how energy conversion influences the movement of the reacting molecules. Her workgroup carries out experiments at extremely brilliant X-ray sources such as PETRA III, the European synchrotron radiation source ESRF in Grenoble or the Advanced Photon Source (APS) in the USA. X-ray experiments at the technical limit of temporal resolution are done in various collaborations at free-electron lasers such as FLASH and the Linac Coherent Light Source (LCLS) at the US accelerator centre SLAC in California. The measurements are complemented by experiments using smaller light sources such as table-top pulsed X-ray sources.

Another new face is already in sight: In autumn, Christian Schwanenberger from the University of Manchester will assume office at DESY as a leading scientist. So far, he worked in the H1 Collaboration at HERA and at other particle physics experiments at Fermilab and CERN. In autumn, he will reinforce the CMS group at DESY. (tz)



(Photo: Marta Mayer/DESY)

The first children's clothes and toys sale on 16 May took place under very good weather conditions, so that all the tables arranged in the foyer of the auditorium were taken to the outside, where there soon was a colourful hustle and bustle. The sale was reserved exclusively for DESY employees.

There were bargains for young and older children: toys in all sizes, including Haba toys, books, sun and rain umbrellas, bicycles, safety car seats for children and a huge garden tractor with a shovel. Lovely child garments for every age group were offered at reasonable prices.

On their way back from the canteen or before going home early on this Friday afternoon, many colleagues rummaged for bargains for their own children, grandchildren or friends. The sale is to be repeated.

*By Inna Henning und Sylvie Faverot-Spengler*

## To the heart of the matter

### First International Summer School of Crystallography

In May, 38 students from 24 nations came to the Center for Free-Electron Laser Science (CFEL) for the first International Summer School of Crystallography. During the week-long event, participants learned the basics of crystallography, one of the most important tools to explore the inner structure of materials. CFEL is a joint enterprise of DESY, the University of Hamburg and the Max Planck Society.

“Ranging from rock layers and materials science to the investigation of proteins or medications – crystallography is extremely prevalent,” says summer school organiser Cornelius Gati from the group of Henry Chapman at CFEL. “Crystallography has a tremendous impact on our everyday life; however, the general public is hardly aware of this technology. This is why UNESCO declared 2014 the International Year of Crystallography.”

Financial and organisational support came from the PIER Helmholtz Graduate



An intensive week of study: participants of ISSC 14 (Photo: Marta Mayer/DESY)

School of DESY and the University of Hamburg, the Hamburg Center for Ultrafast Imaging (CUI), CFEL, the International Max Planck Research School (IMPRS) for Ultrafast Imaging and Structural Dynamics, European XFEL and DESY. <http://conferences.cfel.de/issc14>

#### INFO

<http://conferences.cfel.de/issc14>

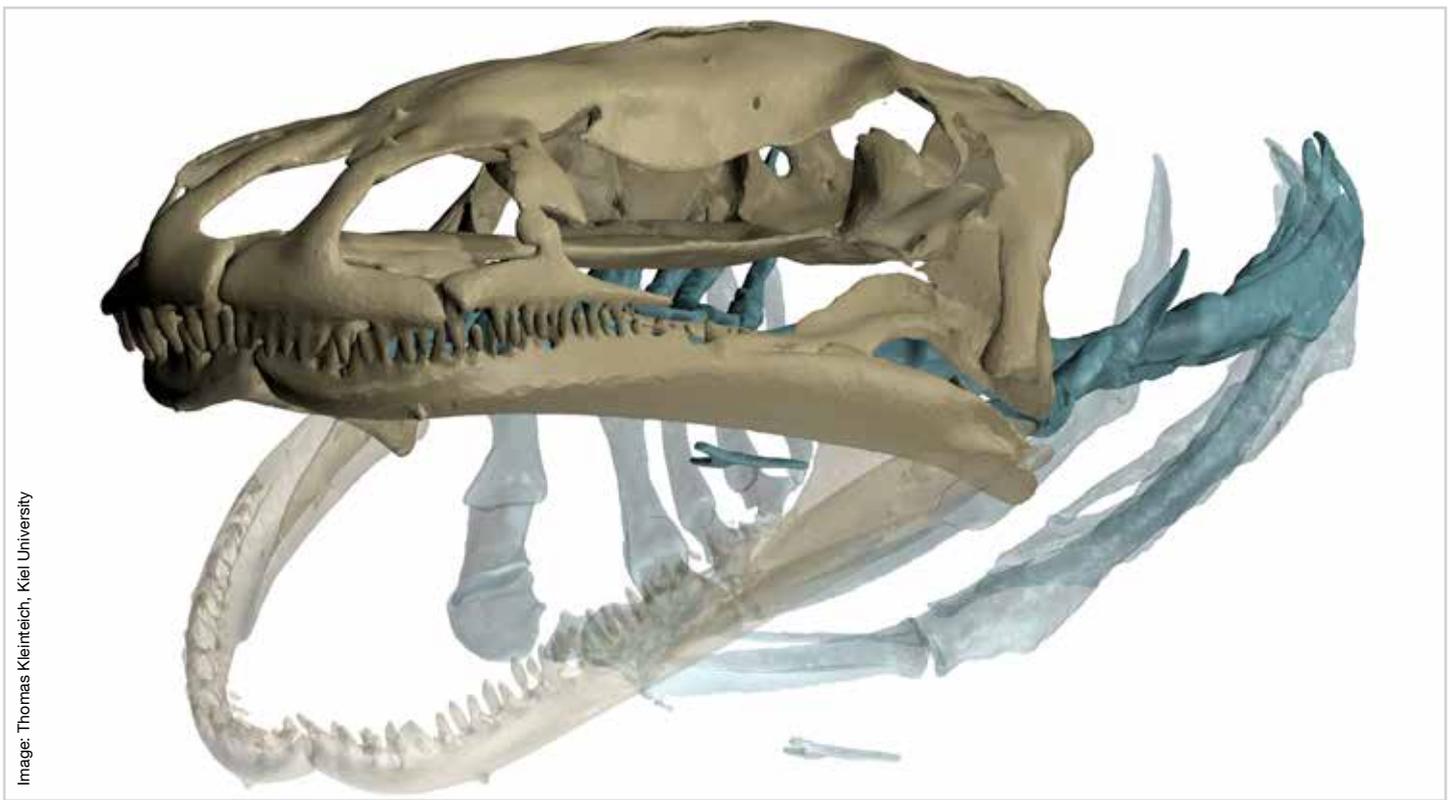


Image: Thomas Kleinteich, Kiel University

Science3D is a joint project of the European Open-Data-Initiative PaNdata ODI, DESY and Helmholtz-Zentrum Geesthacht (HZG). The aim is to present imaging experiments and the corresponding data and models in a comprehensible way and make them available to the general public. X-ray tomography is a particularly suitable investigation method to study both biological organisms and various materials in detail. Accordingly, it is one of the main applications of the Science3D project.

The picture shows the skull of a larva of the Pacific salamander (*Dicamptodon ensatus*). The bones are depicted in brown and the cartilaginous gill basket in blue. When feeding, the gill basket is simultaneously widened with the opening of the lower jaw, thus causing an underpressure that sucks the prey into the mouth.

In June, DESY and HZG jointly organised the first Science3D workshop. About 50 participants came to DESY to discuss their recent micro-

tomography results, covering multifaceted themes ranging from cosmetic dentistry to fossil dinosaur eggs. A number of teachers also followed the invitation to the workshop and took home valuable ideas from the easily comprehensible presentations for their natural sciences lessons.

*By Frank Schlünzen*

#### INFO

[www.science3d.org](http://www.science3d.org)

## Sustainability mission

### Projects for responsible use of resources are gaining momentum

Not merely on paper but also in practice, DESY follows the principle of sustainability in the use of resources. The practical implementation of this important issue of the future, which is defined in the DESY guiding principles, will fall under the responsibility of a specially appointed sustainability team with members of different expert sectors, e.g. D5, V1, PR, MKK and BAU. Since the term “sustainability” and possible measures are broadly defined, DESY will start with individual, concrete projects that are manageable and will function as starting points for a more comprehensive

engagement. For example, DESY now offers an electrically powered car, which has been leased for two years to test whether it is economically and ecologically reasonable to use these cars on the campus in the future.

Moreover, the computer centres 1 and 2 are currently being energetically optimised, meaning that air cooling is replaced by water cooling, which saves a lot of energy. Furthermore, there is financial support available for such measures. “We made an application to the Hamburg investment and development

bank, and we hope to obtain support of about 250 000 euro,” says DESY sustainability officer Andreas Hoppe.

Other projects are the extraction of heat from the cryogenic processing plant for internal use and the optimisation of the current energy data management system. All this is far from a complete sustainability concept, but it marks the beginning of additional measures and projects. Another important goal is to integrate the issue of sustainability into the different work processes, if possible already in the planning phase. (uw)

## Scientists trace the navigation of baby turtles

Freshly hatched, young sea turtles immediately race into the safe water. To satisfy their hunger, some populations stay near their birthplace during their whole lifetime. Other turtles settle in a distance of up to 3000 kilometres and only return to their birthplace temporarily for egg deposition. So far, it was unknown why the animals preferred certain feeding grounds. Now, scientists from the GEOMAR Helmholtz Centre for Ocean Research Kiel, together with British and Australian colleagues, have discovered that sea turtles usually return to the place where ocean currents took them as young animals.

The current study is based on migration patterns of adult sea turtles, which are well researched thanks to satellite surveillance, and also includes data of the oceans' surface currents. The scientists simulated the navigation of the baby turtles on the computer: "Since freshly hatched marine organisms are not strong enough to swim against the current, we simulated them as drifting bodies in our model," says GEOMAR scientist Rebecca Scott. Scott and her colleagues compared the satellite data of adult animals with the model drift routes of young animals, thereby discovering the correlation of migration and prevailing currents. However, there seems to be a distance limit: If breeding and feeding grounds are separated by more than 3000 kilometres, the animals cannot manage the outward and return journey.

[www.helmholtz.de/perspektiven](http://www.helmholtz.de/perspektiven)



Stella Nova's physics show inspired with experiments on everyday phenomena. (Photo: DESY)

## Experiment – explore – experience

### DESY school lab in Zeuthen celebrates its 10th anniversary

By *Ulrike Behrens*

At the DESY school lab in Zeuthen, more than 25 000 young people have already gained a lively insight into the fascinating world of physics. For ten years, the "physik.begreifen" school lab in Zeuthen has been offering pupils the opportunity not only to do their own experiments, but also to experience day-to-day research in all its facets.

At the 10th anniversary celebration ceremony, with numerous guests and in the presence of Martina Münch, Minister of Education of the German federal state of Brandenburg, DESY Director Helmut Dosch acknowledged the school lab's many years of commitment: „With physik.begreifen, DESY builds an important bridge between science and schools. The Zeuthen school lab is now an inherent part of the region's natural science education landscape. I'd like to thank all parties involved for this great success." The crowning conclusion of the day was a physics show by Stella Nova, with experiments based on everyday phenomena that fascinated adults and children alike.

The Zeuthen school lab was founded in 2004 as the second DESY school lab location (after Hamburg). With topics such as air pressure and vacuum, and measurement of cosmic particles, the Zeuthen school lab invites young people to fascinating experiment days and project weeks, thereby promoting both general and specific education. "With its school labs, DESY aims to convey the fascination of physics and generate competences. We see this as a positive supplement to school teaching," says Adelheid Sommer, who built up and manages the vacuum school lab in Zeuthen.

Through the intensive cooperation with children and youths, the student tutors and doctoral students gain extensive practical knowledge in science communication. Their engagement is rewarded by the enthusiasm of the pupils. "This positive feedback clearly influenced my plans for the future," says Carolin Schwerdt, who after many years as a tutor at the vacuum lab decided to write her Master's thesis on a CosmicLab topic and today scientifically mentors and coordinates the CosmicLab.

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**Contact**  
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telephone +49/40/8998-3613  
[www.desy.de/inform](http://www.desy.de/inform)  
(online version + newsletter subscription)

**Editors**  
Till Mundzek (editor-in-chief)  
Heiner Westermann  
Ute Wilhelmsen  
Thomas Zoufal

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