DESY inFORM.

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Newsletter of the
Research Centre DESY

Building scientific bridges

How the strategic partnership between DESY und SLAC creates first-class innovation

The Stanford linear collider. Photo: SLAC

By Manuel Gnida

DESY and its U.S. counterpart SLAC quite obviously have a special relationship. Much like siblings, both laboratories share a similar history and comparable developments. DESY and SLAC were founded as particle physics laboratories in 1959 and 1962, respectively. Over the years, however, research in photon science has increasingly become more important at both institutes. Despite occasional sibling rivalry, DESY and SLAC have continuously been united in their support for one another. Partnerships between the two labs lay the groundwork for unparalleled scientific innovation. Three prime examples currently illustrate the value of this distinctive friendship.

Particle physicists Mikael Berggren (DESY) and Timothy Barklow (SLAC) have teamed up with their colleague Akiya Miyamoto (KEK, Japan) to study possible physics at the International Linear Collider (ILC). This next-generation particle accelerator is presently being discussed as a future "Higgs factory". A few months ago, researchers at the Large Hadron Collider (LHC, CERN, Switzerland) announced the discovery of a new particle, which appears to be the Higgs boson. This groundbreaking result will be studied in detail at LHC to explore the nature of the particle and the underlying theory. For that matter, researchers have called for a "Higgs factory", a collider that would produce Higgs particles essentially without background and increase the precision of measurements. With such a machine, scientists could fully establish the role of the new particle and also search for new physics.

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DESY on board of the "Polarstern"

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DIRECTOR'S CORNER

Dear colleagues,

a hundred years ago, two important findings changed the scientific world: Max von Laue's discovery of X-ray diffraction by crystals and Victor Franz Hess's first measurements of cosmic rays. Both physicists were pioneers in their field of research. Whereas the investigation of cosmic rays stimulated the developments in particle and astroparticle physics, and this year, allowed celebrating the discovery of the Higgs boson at CERN as another scientific highlight; the epochal discovery of X-ray diffraction opened a completely new gate to the world of molecules and atoms.

The DESY X-ray light sources PETRA III and FLASH and the European XFEL as well are the most modern X-ray research facilities in the world that take the legacy of Max von Laue into the future. They allow top-level research in physics, chemistry, biology, materials and life sciences and promote application-oriented research for the major challenges of our society – in the field of energy and environment, in key technologies and health.

PETRA III is the most brilliant synchrotron radiation source in the world available to the national and international community of scientists. The number of research proposals for the valuable beam time increases exponentially, and already now, many outstanding results are achieved. In honour of this centennial epochal X-ray diffraction discovery, we recently named the PETRA III experimental hall "Max von Laue" in a festive event with Chancellor Angela Merkel, Hamburg's First Mayor Olaf Scholz and Nobel laureate Ada Yonath.

Currently, the research centre is fully engaged with the construction of the European XFEL and the PETRA III and FLASH extension buildings – a task that goes to the limits of capacity of our whole institute. Without the relentless dedication and the commitment of our colleagues, this effort would be impossible to manage.

In October, DORIS III concluded user operation as a synchrotron radiation source. Until the end of the year, the OLYMPUS experiment still runs at DORIS, afterwards the facility will be shut down. DORIS was a unique large-scale research facility on our campus: a workhorse for research with synchrotron radiation and with significant particle physics experiments. Over the operation period of almost four decades, an enormous scientific output was produced. DORIS opened up new research possibilities, experimental techniques and methods, and allowed the development of new technologies including industrial applications. From the research policy perspective, it is important to present the far-reaching impact and the relevance of these large-scale research facilities in science, economy and society to our political decision-makers. Therefore, we will prepare a survey on the socio-economic effects of DORIS.

DESY plans to increase cooperation with German universities. We are the lynchpin of two Helmholtz Alliances in particle and astroparticle physics and thus coordinate an active cooperation network of all important German universities and Helmholtz centres which are working in this field. This strengthens the role we play at the LHC at CERN or in the IceCube experiment at the South Pole. The future importance of DESY at the LHC will vitally depend on our role in the LHC detector extension programme – a challenge which we are ready to meet.

In October, we launched the new PIER Helmholtz Graduate School, strongly supported by the Helmholtz Association and the Joachim Herz Foundation. With the close cooperation of our partner universities, ten especially promoted young scientists groups work at DESY. Four of them are headed by women, including Kerstin Tackmann who recently won the Hertha Sponer Prize 2013 of the German Physical Society (DPG) for her contribution to the discovery of the Higgs-like boson at the LHC.

All our success and progress is made possible with the help of all colleagues – from the technical or administrative sector, the scientists, in Hamburg and in Zeuthen. My special thanks to you for that. Now, you will have to find the necessary recreation time to regenerate your forces to carry on with renewed energy. Hopefully, the holidays at the turn of the year offer a good opportunity to do this. I wish you and your family and friends a Merry Christmas, time to relax, and good health, joy and happiness for the New Year.

Yours, Helmut Dosch

Model for success

New MPI on the DESY campus

The Max Planck society (MPG) establishes a new Institute for the Structure and Dynamics of Matter on the DESY campus in Hamburg. It emerges from the highly successful MPG Research Group for Structural Dynamics at the University of Hamburg. The City of Hamburg will provide special funding in the amount of 37 million euros for a new building as the MPG in Munich informed.

“I am really looking forward to seeing that this internationally highly-renowned and fruitful joint venture between Deutsches Elektronen-Synchrotron (DESY), the University of Hamburg and the MPG at the Center for Free-Electron Laser Science (CFEL) is further intensified in the field of next-generation light sources”, said MPG President Peter Gruss.

The new Max Planck Institute will consist of five departments, four of them experimental and one with a theoretical orientation, along with an MPG Research Group. It is planned that there will be about 120 permanent staff positions at the new Institute, with Dwayne Miller and Andrea Cavalleri from CFEL as founding directors.According to MPG, Hamburg was the only candidate site for the new institute, mainly because there is already a long history of close collaboration with the University of Hamburg and DESY within the framework of CFEL in the areas of photonics and structural clarification. Moreover, the institute’s special mission needs extremely intense light sources which in Germany are currently only available in Hamburg with the free-electron lasers FLASH and the European XFEL, the synchrotron light source PETRA III and the relativistic electron gun REGAE. *(tim)*

Cosmic bullets

Cherenkov array will open new window to the cosmos

Computer graphics of a HiSCORE detector. Picture: Ulrich Einhaus

By Moritz Habermehl

A hundred years after Victor Hess’s discovery, physicists still do not know much about the origin of cosmic radiation. In the future, a gigantic detector field could help to trace the sources of the energy-rich particles from outer space: in its final stage, the proposed HiSCORE (Hundred*i Square km Cosmic Origin Explorer) project would cover an area of several hundreds of square kilometres, and its sensitivity will start where most of the gamma telescopes like CTA, H.E.S.S., VERITAS and MAGIC have their limits. Its detectors will identify cosmic particles with energies above 10 Tera-electronvolts (TeV). Currently, a Helmholtz-Russia Joint Research Group (HRJRG) under the leadership of DESY is carrying out a pilot study in Siberia testing the feasibility of such an observatory. Earth’s atmosphere is impenetrable for high-energy particles; this makes direct observation impossible. But when a high-energy cosmic particle hits the outer atmosphere, it produces a cascade of new elementary particles, a so-called air shower. These secondary particles are very fast – their velocity even exceeds the local speed of light in the atmosphere. This generates a light flash, the so-called Cherenkov radiation, which can be measured with special telescopes and facilities as HiSCORE.

In order to measure as many high-energy showers as possible, the detector field must be very large. HiSCORE requires the installation of up to 1000 detectors, with a distance of some hundred meters between them. This, indeed, needs enough space. Moreover, disturbing city lights exclude any location in Central Europe. The Argentine Pampa would be a possible site. At first, the technology will be tested at the location of the Tunka detector in Siberia, where this year the first HiSCORE prototype was installed. In the next two years, within the framework of HRJRG, a detector field covering an area of one square kilometre will start operation. Possibly, it could be used not only to establish the detector technology but also to find first hints of cosmic ray sources.

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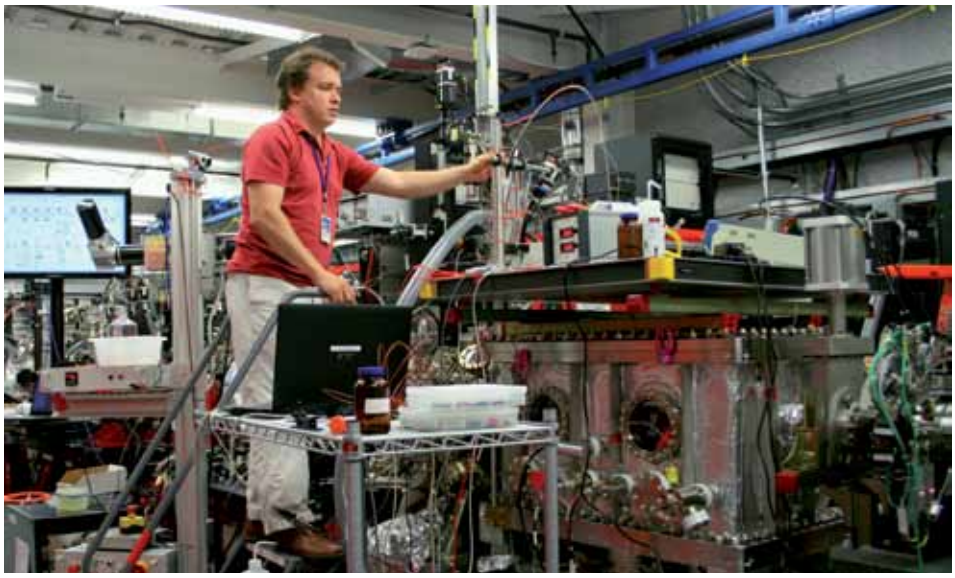
Barklow and Berggren aim at predicting the performance of a future ILC. "Starting with the technical design, we model how the two beams in the ILC interact with each other," Berggren says. "We then simulate the physics of the collision products and the response of the detectors." DESY and SLAC are involved in two different detector concepts, which will cross-check results. Teamwork plays a large role in this project. "There are many physics processes to consider in a particle collision," says Barklow. "We are trying to simulate them all. We divide them up between our teams and share our results." Beyond sharing the workload, the benefits of the collaboration lie within a diversity of perspectives. "Cultures differ between institutes and people think differently," Berggren says.

Mark Hogan, an accelerator physicist at SLAC, calls this type of interaction "intellectual cross-pollination." "The best ideas develop if you bounce them off other people," he says. Together with DESY scientist Eckhard Elsen and others, Hogan develops a method called plasma wakefield acceleration. While traveling through a highly ionised gas, or plasma, a bunch of fast electrons (or a laser) creates a charge wave, or wake. "A second electron bunch injected into the plasma can ride the wave like a Hawaiian surfer," says Elsen. In this process, the surfing electron bunch gains more and more energy.

Conventional accelerators use radio-frequency fields to bring particles to speed. These machines have an upper limit for their acceleration power of approximately thirty-million volts per meter. Therefore, linear accelerators must be very long in order to achieve high particle energies. The length of the planned ILC, for example, is thirty kilometers. "The electric fields in plasma accelerators can be a thousand times stronger than in conventional accelerators," says Hogan. "With such machines we would achieve higher energies than before and, at the same time, shrink the size and lower the costs of accelerators."



DESY researcher Daniel Deponte in an experiment of Henry Chapmans group at the CXI beamline at LCLS.

DESY and SLAC have joined forces with other partners to apply the technology to the electron beam of DESY's FLASH facility. "We are currently planning the first key experiments at FLASH," Elsen says. "Plasma wakefield acceleration will also be very useful for future free-electron lasers."

With regard to free-electron laser science, "DESY and SLAC are joint explorers of a new frontier," says former SLAC director Persis Drell (see interview on page 5). X-ray free-electron lasers are particle accelerators that produce extremely powerful light flashes used in a wide range of research fields. SLAC operates the world's first hard X-ray free-electron laser LCLS. DESY, in turn, runs FLASH and is the main shareholder of the European XFEL project in Hamburg. Currently under construction, European XFEL will become the world's most powerful X-ray laser and is scheduled to go online in 2015. Until then, DESY researchers travel frequently to SLAC for experiments at LCLS.

DESY scientist Henry Chapman, for example, uses LCLS to study protein crystals smaller than one-thousandths of a millimeter – a size too small to be studied at other light sources. From the laser's interactions with the crystals, Chapman's group determines the structure of proteins, which are key players in all living organisms.

"SLAC is heavily involved in all aspects of our experiments," Chapman says. "We have worked together from the first conceptual designs of the coherent X-ray imaging beamline, which grew out of our work together at FLASH. This beamline, and a special detector that SLAC built for it, have been absolutely key to the success of our experiments."

At LCLS, the dialogue between users and beamline scientists is more crucial than at other light sources. "Our users have specific requirements for each of their individual experiments," says LCLS deputy director Uwe Bergmann. "Sometimes they spend an entire month at our facility, and it can take several months in order to assemble and break down their setups."

As it is with most scientific innovation, competition between the two research centres is just as important as collaboration. "Competition validates your concepts," says LCLS researcher Jerry Hastings. "It is the best recommendation for your project if another institute wants to do the same thing as you." However, there is one competition that SLAC wins easily: the weather in California is simply better!

INFO

ILC – www.linearcollider.org
LCLS – http://lcls.slac.stanford.edu
SLAC – www.slac.stanford.edu

DESY and SLAC are joint explorers of a new frontier

Former SLAC director Persis Drell on the relation of the two labs

Professor Persis Drell, the former director of SLAC National Accelerator Laboratory (Menlo Park, USA), is currently visiting the Center for Free-Electron Laser Science (CFEL) as a Helmholtz International Fellow (Photo Credit: Linda A. Cicero/Stanford News Service).

By Manuel Gnida

Former SLAC director Persis Drell has temporarily joined DESY as a Helmholtz International Fellow until March 2013. Drell, who led SLAC from September 2007 to October 2012, speaks of the similarities of the two labs.

Welcome to Hamburg, Persis. You have recently stepped down as SLAC director to return to your position as a faculty member and to find more time for research and teaching. What brings you to DESY?

The first thing I wanted to do after stepping down was to temporarily leave SLAC, get out of town, and let the new director take over without my ghost lingering around. It was important for me to step away and go to a different location. Coming to DESY is a great opportunity for me to learn new things without having the responsibilities and deliverables of a SLAC director. My husband and I have many colleagues at DESY. We feel at home here.

Your research has been concentrating on high-energy physics and particle astrophysics. What are you planning to do at CFEL, a photon science institute?

I am here to learn new science and to enjoy myself. In the last five years at SLAC, I have been following the developments in free-electron laser science very closely. It is one of the most exciting research fields of our times. CFEL is a wonderful place to learn about this new science. Many of the leaders in the field work here, and I constantly meet interesting people. I also find the time to read a lot of papers and indulge myself in science.

DESY and SLAC have been closely collaborating for several decades. How would you describe this successful partnership?

DESY and SLAC share a similar arc of history. They both started out as particle physics laboratories and have been broadening their mission over the years. Experimental high-energy physics is currently centered at the LHC (Large Hadron Collider, Geneva, Switzerland), an outside lab. Therefore, DESY and SLAC have been moving more and more into the field of X-ray science. With the free-electron lasers LCLS at SLAC, FLASH at DESY, and the future European XFEL in Hamburg, both institutes are joint explorers of a new frontier. Of course, there is a healthy competition between the two research centers, but it is outweighed by the numerous collaborations, which run extremely deep on so many levels.

Do you have any examples?

There is people exchange, for instance, with postdocs at one institute later becoming scientists at the other. The scientific exchange is profound, too. Take the method of hard X-ray self-seeding for X-ray free-electron lasers, for example, which had been invented by DESY scientists and has recently been demonstrated at SLAC. I also remember when CFEL scientist Henry Chapman came over to LCLS for the first time to pursue his exciting research on nanocrystals, and I went to the beamline to watch his work. The two institutes also give each other strategic advice. SLAC scientists like me are members of the DESY Scientific Council, and DESY researchers join SLAC's Scientific Policy Committee. I think DESY and SLAC understand each other's challenges very well and like to help each other. Last but not least, there are many personal ties. DESY director Helmut Dosch, for example, is not only a colleague but also a friend of mine.

You mentioned your husband, James Welch, who came with you to Hamburg. What is he working on?

Jim is an accelerator physicist at SLAC. He is collaborating with Winni Decking from DESY's XFEL Project Group. Together they are working on commissioning plans for the European XFEL.

Persis, we wish you a pleasant stay in Hamburg.

Thank you. I am already having a great time.

Ewald-Fellowships support research at the LCLS

With the Peter Paul Ewald Fellowships, the Volkswagen Foundation supports German young scientists who wish to work at the X-ray laser LCLS (Linac Coherent Light Source) at SLAC National Accelerator Laboratory of Stanford University, California. Funding is granted for a period of three years – partly in Stanford, and partly at a host institution in Germany. The idea is to provide grantees with the opportunity to carry out experiments with today's most powerful X-ray laser. In order to allow participants to transfer their newly acquired know-how to the European XFEL which is currently under construction in Hamburg, their research stay at the LCLS is followed by a period of funding at a German research institution. Application deadline for the next funding period is 25 January 2013. Namesake Peter Paul Ewald (1888-1985) was a German X-ray pioneer. *(tim)*

Fighting sleeping sickness with an X-ray laser

Investigations at the free-electron laser LCLS revealed the blueprint for a potential drug against sleeping sickness. With the help of such X-ray scattering images, an international team decoded the structure of the pathogen's vital enzyme. When this enzyme is blocked with a tailor-made drug, the pathogen is killed. Image: Karol Nass/CFEL

December

14 Lecture (www.planetarium-hamburg.de)
Das Higgs-Teilchen
Joachim Mnich, Hamburg, Planetarium, 19:30 h

19 DESY christmas show
Die Physikanten
DESY, Hamburg, auditorium, 19 h

January

14-18 CMS Data Analysis School (http://cmsdas2013.desy.de)
CMSDAS Hamburg 2013
DESY, Hamburg

15-17 Workshop & School
School and Workshop on Fast Simulation in High Energy Physics
DESY, Zeuthen

15 Lecture Series „Gesund bleiben"
Elektrounfälle: Medizinische Aspekte
Prof. Dr. med. Stefan Oppermann, HAW Hamburg,
DESY, Hamburg, bldg. 7, seminar room 7a, 16 h

18 Event series Music & Science
Centenary of the discovery of the nucleus
Video (englisch) & Lecture
Robin Marshall, FRS (University Manchester UK)
DESY, Hamburg, auditorium, 17:30 h
Shimmering Water
Piano concert with Kotaro Fukuma
DESY, Hamburg, auditorium, 19:30 h

23 Users' Meeting
European XFEL Users' Meeting
DESY, Hamburg, auditorium

24-25 Users' Meeting
DESY Photon Science Users' Meeting
DESY, Hamburg, auditorium

30 Science Café DESY (http://sciencecafe.desy.de)
Symmetrien – Gebrochene Helden der Physik
Isabell Melzer-Pellmann, Hamburg, DESY Bistro, 17 h

February

12 Event
1. DESY Health Day
8:30 -17:30 h (auditorium, foyer & other seminar rooms)

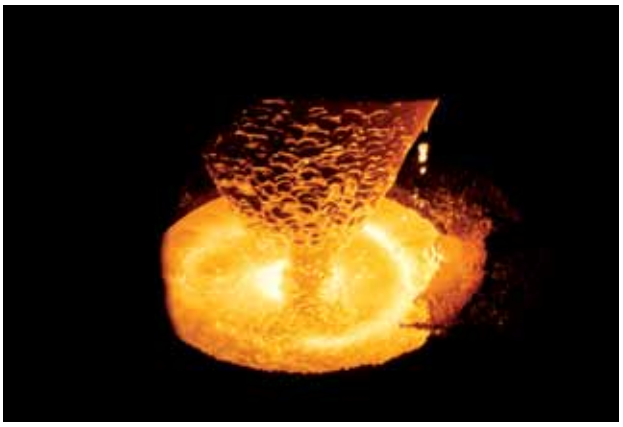
27 Science Café DESY (http://sciencecafe.desy.de)
Cool runnings – Kalte Technologien für schnelle Teilchen
Karsten Büßer, Hamburg, DESY Bistro, 17 h

All current events: www.desy.de/events

Time-lapse cavity

They are the heart of many accelerators, have demonstrated at FLASH what they are capable of, and will provide the European XFEL and the International Linear Collider with high-energy electrons (and positrons): superconducting accelerator cavities. The cavities, made of pure niobium and cooled down to -271 degrees centigrade, transfer almost all power to the particles. They also deliver a very fine, very intensive and well bundled electron beam. Serial production of the 800 cavities for the European XFEL is running. Images by photographer Heiner Müller-Elsner tell the story of the life of a cavity from niobium ingot to cryomodule. *(baw)*

A niobium ingot is lowered into the electron beam melting oven at the German company Heraeus. The melting process turns the already pure niobium into the highly purified material needed for cavity production.



When liquid niobium drips off the ingot in the electron beam melting oven at Heraeus, all other gases and impurities vanish.

The surface of the niobium sheets is inspected by eye at DESY.

Only few companies around the world are qualified to turn the niobium into sheets which form the basis of the cavities' cells.

A water jet cutter turns the niobium sheet ino the template for the cavity dumbbells.

Freshly pressed into form the half cells are ready for welding.

A robot with a specially designed and programmed camera checks whether the welding seams may have the potential of causing a quench and what the inner surface of the cavity looks like.

Eight cavities in their helium tank and all other necessary equipment are assembled into a cavity string. This requires extreme precision and extreme cleanliness.

The tried and tested nine-cell cavities are standing ready for assembly.

These couplers, built at the French laboratory LAL in Orsay, feed the high frequency into the cavities.

The gaseous helium is returned through this pipe. The cavity string is later attached to this construction before it is inserted into the cryomodule. Here: CEA, Saclay, France.

The cavity's final home: the cryomodule. Eight cavities sit in one module, and depending on the accelerator there may be some hundred or more than a thousand of these cryomodules connected to each other in a row.

Midterm evaluation

By Irene Strebl

DESY has successfully passed an intermediate assessment in the second round of the programme-oriented funding (POF II) of the Helmholtz Association. This so-called midterm evaluation took place in November. DESY scientists produced impressive achievements, acknowledged Janos Kirz from Lawrence Berkeley National Laboratory, Chairman of the DESY Scientific Council.

"We are glad to receive this appreciation," said Helmut Dosch, Chairman of the DESY Board of Directors. "It is also an approval of our strategic orientation, which we will continue to focus in the coming POF III programme application."

As one of the 18 research centres DESY applies for its research programmes within the framework of the Helmholtz Association's programme-oriented funding every five years. In the current POF II period from 2010 to 2014, DESY participates in the programmes elementary particle physics, astroparticle physics and photon/neutron/ion science in the research field "Structure of Matter".

Particle accelerators act as life-savers

Two DESY lorry drivers gave first aid on the motorway

Not only particle accelerators in hospitals save lives by irradiation used for tumor treatment – two DESY transport service staff members, Bianca Neuzil and Andre Müller, saved a life as well. When travelling with their lorry labeled "Teilchenbeschleuniger" (particle accelerator) and about to exit the motorway near Halstenbek they noticed a swerving car which then stopped with the hazard flasher turned on. The two lorry drivers stopped immediately, headed to the car and opened the door. The driver was unconscious; the other passenger – his nephew – said that the driver had a heart problem. Both DESY staff members pulled the driver out of his car and placed him on a thermal blanket. "The man had a very weak pulse," said Bianca Neuzil who had attended a first-aid course at DESY just two weeks earlier. "I placed him in the recovery position and Andre immediately called the emergency doctor."

The doctor diagnosed a stroke and took over all further medical care. Before the transport to the Pinneberg hospital, the paramedics assured the first aiders that, without their help, the man would probably have died.

"The situation was more or less frantic, but the first-aid course was still fresh in my memory. I was only annoyed because many people just drove by and gaped. My conscience would not alow me to do that," said Bianca Neuzil. "What happened here is a perfect example that our regular and free first-aid training is extremely valuable," added Andreas Hoppe, head of the safety and environmental protection group. "Our occupational safety and accident prevention programme depends first and foremost on committed employees." *(tz)*

Batteries on demand

DESY's trainees with creative potential

If ever the batteries of the laser pointer or of the remote control are empty (which mostly happens in the middle of a seminar), you can now get new batteries from special battery dispensers which will be mounted in all seminar rooms at DESY in Hamburg. The remarkable thing is that they were designed and manufactured by DESY apprentices. The IT department FEPOS first tried to purchase these dispensers, but without success; thus, Oliver Krüger asked the DESY apprentice workshop to design and build one themselves.

"This was a wonderful practical work project that fits perfectly into the training programme," said training manager Sabine Marquardt. No sooner said than done. Three technical product designers in their second year and seven mechanics in their first year designed, optimised and built the dispensers.

"The apprentices managed the project completely on their own: the draft, the prototype and the final product," Marquardt emphasised. "All of the team members worked perfectly together, we only provided consultation if necessary," adds Marquardt's colleague Dirk Kornmüller. Thanks to this special DESY creation, there will always be plenty of batteries in the seminar rooms. *(tim)*

Ten trainees have implemented the battery dispenser project together: Maria Pourbaghai, Karolin Kopper, Schagayeg Masoudi, Isabelle Masuch, Mathis Helmig, Konstantin Herbst, Stefan Mohr (standing from left) und Ekanan Saithong, Andreas Kisselmann, Emerson-Kevin Ortega Lopez (seated from left).

First Helmholtz day in school labs

New event format at the start

The 25 school labs of the Helmholtz Association organised the first nationwide Helmholtz Day at the end of November. This new type of event was created to communicate the achievements of Hermann von Helmholtz (1821 – 1894) especially to pupils. The namesake of the Helmholtz Association was one of the last prominent polymaths; however, Helmholtz's in many cases pioneering findings are often not associated with him.

Several hundred pupils from all over Germany took part in the first Helmholtz Day. The DESY school labs in Hamburg and Zeuthen each welcomed a class of sixth graders. A total of almost 50 pupils from Goethe-Gymnasium Hamburg and Europa-Schule Storkow were first introduced to Hermann von Helmholtz's research work and then had the opportunity to do vacuum experiments. Each participant received a Helmholtz-T-shirt as a souvenir. *(tim)*

New family service at DESY

Free family care services finder

Sometimes private life and job just don't go together. You need child care on a short call or extra care for an elder family member, or simply a place where you can leave your dog when you have to go on a business trip. In such a situation it is of great help if you don't have to search and contact all these services on your own but can simply get in touch with a well-established and reliable network. From January 2013, precisely this kind of service is available at DESY through cooperation with Besser Betreut GmbH.

Besser Betreut (better care) offers a comprehensive database with information and contacts in the field of child care, elder care, pets, and house and garden. An online platform provides individual information for everyone and helps to find the most convenient service or care offer.

The use of the Besser Betreut database is free of charge for DESY staff members, all care services must be paid individually. *(uw)*

Helmut Dosch vice president of Helmholtz Association

On 1 January, Helmut Dosch assumes the office of vice-president of the Helmholtz Association. He will coordinate the research field "Structure of Matter", one of the six Helmholtz research fields. One of Helmut Dosch's first tasks will be to advance the restructuring of this research field. As from 2015, this field with the new and simpler name "Matter" will be subdivided into "Matter and the Universe", "From Matter to Materials and Life" and "Matter and Technologies".

Next to the President and the Managing Director, the executive committee of the Helmholtz Association includes eight vice presidents. They support, advise and represent the president in the fulfilment of his tasks, which involve implementing the programme-oriented funding system and coordinating the development of programmes across research fields and developing the Association's overall strategy. Each vice president is at the same time responsible for the coordination of one of the six research fields; in addition, the executive committee has two vice-presidents from the centres' administrative bodies. *(tz)*

New particle physics brochure

What is happening in Germany in the field of particle physics and what are the perspectives for the coming years? A recently published brochure by the German Committee for elementary particle physics (KET) provides an overview on current projects, demonstrates the far-reaching impact of particle physics research on society and presents the German physicists' strategy for the future. The brochure (in German) can be picked up at PR (bldg. 1). *(tz)*

View from the deck of “Polarstern”. Photo: Carolin Schwerdt

Astroparticle physics on the high seas

DESY at the research vessel “Polarstern”

When the research vessel “Polarstern” (polar star) started its journey from Bremerhaven via Cape Town to Antarctica in October, DESY was on board, too: Carolin Schwerdt from DESY in Zeuthen installed a new cosmic-particle detector on the A-deck of the ship. In the coming one-and-a-half years, the detector will continuously record data. In addition to a variety of marine research missions, this physics project is quite exotic indeed – most of the about 40 scientists on board are biologists and meteorologists.

This project is a joint venture of DESY and Network Particle World, aimed at providing data to interested young people and teachers throughout Germany. The goal of the measurements is to determine the amount of cosmic particles dependent on the degree of latitude, i.e. the influence of the earth’s magnetic field on the charged particles.

At sea level, about 80 percent of the charged particles are muons. The detector specialises in these particles, thus enabling dose measurements. Moreover, the weather data taken on the research vessel are also included. Within the next months, the objective will be to evaluate the data and consider the influence of temperature and air pressure fluctuations at different altitudes, to draw clear conclusions from the effect of the geographical latitude.

In the Cosmic Project at DESY, and nationwide within the framework of Network Particle World, young people can do scientific work with modern measuring and analysis methods. With the direct contact with scientists from the institute, the young researchers have the opportunity to deal with current scientific questions and at the same time experience the everyday life of a scientist in all its facets. With access to the “Polarstern” data, it will be possible in the future to meet the increasing demand of young people and teachers who want to deal with astroparticle physics in long-term projects at school. *(ub)*

HELMHOLTZ ASSOCIATION

670 Tonnes to combat cancer

It is 25 metres long, 13 metres wide and three storeys high: the new ion radiation control device (gantry) of the Heidelberg university hospital at the Heidelberger Ionenstrahl-Therapiezentrum (HIT - Heidelberg Ion Radiation Therapy Centre). The combination of proton and heavy ion radiation, developed by the GSI Helmholtz Centre for Heavy Ion Research, is unique in the world and, moreover, it is the world’s largest rotating particle radiation control device. It allows for comparative studies that will serve to identify which kind of radiation treatment is best suited to combat the respective kinds of tumour diseases.

With its 670 tonnes of weight, the huge steel construction is a colossus indeed, but it is also very moveable – a real heavyweight champion when it comes to combating tumours. The gantry can be turned by 360 degrees and allows for radiation beam control that is precise to a millimetre. The ions can accelerate to three quarters of the speed of light and penetrate the patient’s tissue to a depth of 30 centimetres. In future, the new gantry will be used in particular for clinical studies that focus on the treatment of tumours, which remain unaffected by traditional treatments. These studies are to demonstrate which kind of radiation is the most successful in treating the respective kinds of tumour diseases: radiation using protons or heavy ions such as carbon, helium or oxygen ions. Already today, HIT treats a total of 750 patients each year, 70 per cent of those in the context of clinical studies.

www.helmholtz.de/hermann

Imprint

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