DESY inFORM.

02/2011
Newsletter of the
Research Centre DESY

Research attack on viruses

New Centre for Structural Systems Biology will be established at DESY

The starting shot for the new Centre for Structural Systems Biology (CSSB) at the DESY campus begins a new round in the fight against infectious diseases that still afflict mankind. The CSSB will be an interdisciplinary centre with partners from several universities and research facilities from Hamburg, Lower Saxony and Schleswig-Holstein. The common goal is to identify the attacks by pathogens with atomic resolution. On Friday 7 January, research minister Annette Schavan, Hamburg science minister Herlind Gundelach, and Lower Saxony science minister Johanna Wanka signed the federal and state-government agreement for the construction of CSSB.

Biomolecules in the foreground – also for Annette Schavan and Helmut Dosch

It is funded with 50 million Euros in total. “The cooperation of biologists, physicists and medical scientists across federal state borders offers great opportunities to study infectious diseases. Thus, the CSSB will sustainably strengthen basic research in the field of structural biology and bundle it in one nationally leading and internationally competitive centre”, Annette Schavan emphasised. Hamburg’s First Mayor Christoph Ahlhaus particularly stressed the innovative approach of CSSB: “The CSSB concept not only oversteps the federal state boundaries to bring together the best of the best, but in a new way also unites infection research, structural and systems biology.”

At the CSSB, biologists, chemists, medical scientists, physicists and engineers will investigate the interaction of pathogens with their hosts. With PETRA III and FLASH, DESY offers them unique facilities in Germany.

The planned multi-storey CSSB building will be erected in close proximity to the PETRA III experimental hall and it will unite the working groups of all participating research facilities under one roof. Therefore, it will be much easier in the future to use the ultra-modern light sources at DESY for biology issues. After completion, the CSSB will also be open to foreign scientists and thus make an important contribution to strengthen international cooperation.

Construction planning began after the signing of the agreement; construction start is planned in 2012. *(uw)*

Cosmic activities in the World of Particles Network

The World of Particles Network Teilchenwelt organises events in schools or school labs. Recently, the network received additional funds from the Federal Ministry of Education and Research for the extension of experiments with cosmic radiation. This sub-project is coordinated by DESY in Zeuthen, because of its vast experience in measuring cosmic rays that may be optimally used. Throughout Germany, groups from 15 institutes collaborate in the development of simple experiments. With their own cosmic-particle data, young people can become familiar with the methods and the physical basics of modern science.

DIRECTOR'S CORNER

Dear colleagues,

after the exiting last year, I would like to wish you all the best for 2011. Already this year's start at DESY couldn't have been better because, very early, the federal and the Hamburg and Lower Saxony state research ministers – Annette Schavan, Herlind Gundelach and Johanna Wanka – agreed to sign the federal and state-government agreement for CSSB on 7 January.

50 million Euros are provided for the construction and equipment of the Centre for Structural Systems Biology (CSSB) laboratory and office building at the DESY campus, with about 130 workplaces. Our partners for this project are the HZI Braunschweig, the Forschungszentrum Jülich, the University and the University Hospital of Hamburg, the Hannover Medical School, the Leibniz Centres Bernhard Nocht and Heinrich Pette Institute, the Forschungszentrum Borstel, the University of Lübeck, the EMBL, and very probably more institutes in the future.

Many of you will ask: what will actually be done at the CSSB? Structural systems biology tries to study and understand complex biological systems at a molecular level. Of course, DESY's extremely brilliant synchrotron and FEL radiation sources are particularly suitable for this. Special focus is put on the molecular processes during the initial steps of an infection, i.e. what actually happens when viruses attack our body cells and how bacteria interact with our body.
With a better understanding of these processes it is possible to develop improved medication. Perhaps work at the CSSB will some day contribute to reduce the infectious diseases we have to fight against.

Yours
Edgar Weckert

Green IT

Green Capital Hamburg guest at DESY

by Knut Woller

More than 150 IT managers met at DESY on 6 December. They followed an invitation of the Urban Development and Environment Authority and the Chamber of Commerce, under the motto "Energy-efficient operation of computer centres". This event was part of the climate protection programme of Hamburg, the European Green Capital 2011, and it showed that industrial environmental protection and efficiency are no contradictions in themselves. Almost all participants took the opportunity to see one of Germany's most energy-efficient computer rooms in building 2.

There are about 50 000 company computer centres in Germany. In his study, Ralph Hintemann from the Borderstep Institute informed that the large computer centres that amount to one per cent, host almost half of all servers – with the number of servers still increasing just at these centres. This is also true for DESY: 100 terabytes of data were produced by the HERA experiments during a whole year. Today, individual photon science groups only need four weeks for this, with a rising trend.

DESY's RZ2 - 3000 processors, 2000 terabytes and high-speed networks for DESY research in one of the most energy-efficient computer centres in Germany.

There is not only an increase of data volume per scientist; the number of scientists will also be growing at DESY in the future, due to the establishment of new institutes. Therefore, with the collaboration of MKK and ZBAU, IT plans measures that will reduce the operation costs per server, ensuring that the necessary increase of computer and storage systems can still be handled.

INFO

Website of the event:
www.hamburg.de/start-aktuelles/2607902/rechenzentren.html

Made it!

The last IceCube strings were deployed in December

by Christian Spiering

It took nearly six years until the neutrino telescope IceCube was completed on 18 December 2010. At the end, everything went very smoothly: the holes were drilled in three shifts and the strings, each with 60 glass spheres, were deployed to a depth of up to 2.45 kilometres. The last one, the 86th string, was installed four days before the planned date. Unusual at large-scale projects of this category: we kept within the estimated budget.

IceCube workers celebrate the completion of the world's largest neutrino detector.

The last Digital Optical Module in the IceCube array descends into the ice just before 6 pm South Pole time on the 18 of December.

The spheres enclose ultrasensitive light sensors that catch the tiny flashes of blue light emerging from neutrino reactions. A quarter of a total of 5000 optical sensors were assembled and tested at DESY in Zeuthen. Zeuthen is also where the receiver electronics on the ice surface that handle communication with the detector deep in the ice were developed.

The IceCube setup allowed carrying out measurements even before the finalisation of its construction. Starting in 2005, it was possible to take data in the following years with the so far completed string configuration (2005: 1, 2006: 9, 2007: 22, 2008: 40, 2009: 59, 2010: 79 strings). With the growing detector, data became more detailed every year and already provided first results. Data analysis runs at full speed. The IceCube data – about 50 terabytes per year – are made available in a global Grid structure, similarly as with the LHC, with Zeuthen playing a very important role as a European Tier-1 centre. We were able to register nearly one hundred thousand neutrinos coming from earth's atmosphere, some with energies up to 400 tera-electronvolts. This is a thousand times more than the energy from neutrinos produced in accelerators on earth. The existing data already cause some excitement: a strange pattern in the directional distribution of cosmic rays, with its explanation still pending.

Now IceCube has reached its full sensitivity and we are looking forward to discover extraterrestrial sources of highly energetic neutrinos soon!

Taking calibrations before a Digital Optical Module descends into the ice.

The last IceCube module
All IceCube staff members at the pole signed the last Digital Optical Module before it was deployed into the ice.

February

9 Science Café DESY (http://sciencecafe.desy.de)
Hollywoods Filmtricks – Physikalische Irrtümer von Spielberg, Tarantino & Co
Marc Wenskat, DESY Bistro, 17 h

9 Informationsveranstaltung Gesund Bleiben
Burn out
Gernot Langs, DESY, Hamburg, auditorium, 16 h

16 Public lecture
Geschichte der Synchrotronstrahlung – Die Nutzung eines unliebsamen Energieverlustes
Jost Lemmerich, DESY, Hamburg, auditorium, 19 h

21-25 TERASCALE (www.terascale.de/intro2011)
Introductory School Terascale Physics
DESY, Hamburg

23 Science Café DESY (http://sciencecafe.desy.de)
Die spezielle Relativitätstheorie und ihre Anwendung in Physik und Technik
Peter Schmüser, DESY Bistro, 17 h

March

2 Science Café DESY (http://sciencecafe.desy.de)
Schwarze Löcher sind nicht schwarz – sie leuchten!
Waldemar Tausendfreund, DESY Bistro, 17 h

4 Choir concert DESY Choir
Night and Day – Klänge aus der goldenen Zeit von Musical und Jazz
DESY, Hamburg, canteen, 20 h

7 International Masterclasses (www.physicsmasterclasses.org)
Hands-on Particle Physics Masterclasses
DESY, Hamburg

14-17 TERASCALE (www.terascale.de/mc2011)
Monte Carlo School
DESY, Hamburg

20-25 TERASCALE (www.terascale.de/capp2011)
Computer Algebra and Particle Physics 2011
DESY, Zeuthen

21 International Masterclasses (www.physicsmasterclasses.org)
Hands on Particle Physics Masterclasses
HU Berlin

23 Science Café DESY (http://sciencecafe.desy.de)
Was hat regenerative Energie mit Teetrinken zu tun?
Hans-Jörg Eckholdt, DESY Bistro, 17 h

23 Public lecture
Piraterie – Neue Dimension eines alten Phänomens
Eigel Wiese, DESY, Hamburg, auditorium, 19 h

24 **staff assembly**
DESY, Hamburg, auditorium, 9:30 h

+++ 29. October: DESY's Open Day and Night of Knowledge (Hamburg) +++

AMELI powers up

Both European XFEL tunnel boring machines are up and running

by Ilka Flegel

TULA got support: on 11 January, the second tunnel boring machine for the European XFEL powered up. The new machine is called AMELI (German acronym for “At the end (there will be) light”). With an external diameter of 5.48 metres, it is slightly smaller than its sister TULA. It will excavate the “tunnel fan” beneath the future research campus in Schenefeld. Starting from the construction pit of the experiment hall, it will drill a total of eight tunnel sections. This is a major challenge even for experienced tunnel builders. The 84-metre-long machine must be disassembled four times, transported back to its new launch point and re-assembled again. A further three times, it will be moved through an existing open shaft to start boring again on the opposite side of the shaft. The machine had to be designed especially for this purpose. AMELI will be busy beneath the future research campus until summer 2012.

Like TULA, the second machine was officially christened beforehand together with the tunnel sections it is going to build. The patroness of the tunnels is Schleswig-Holstein’s State Secretary of Science, Cordelia Andreßen. She is assisted by the patroness of the tunnel boring machine, Schenefeld Mayor Christiane Küchenhof.

AMELI in early December during its assembly inside the construction pit for the future experimental hall

The two patronesses, Mayor Christiane Küchenhof and State Secretary Cordelia Andreßen, equipped with a pit lamp and security outfit

After its holiday break in the shaft at Osdorfer Born, TULA is also running again. On 19 January, it started constructing the main tunnel towards DESY-Bahrenfeld, where it is due to arrive in summer 2011.

INFO

www.xfel.eu/projekt/tunnelbaufortschritt/

DESY is world-class, fascinating and up to date

Relaunch of website on 3 February 2011

The DESY website offers all kinds of detailed information on our research activities. The information is distributed on central websites for the general public and – for experts – on project and group websites. Creating a platform for active communication for different target groups with this enormous amount of information was a challenging task for the DESY website revision. The main focus was on three aspects: DESY is world-class, fascinating and up to date.

Manifesting world-class

DESY is one of the world’s leading research centres – this must be clearly recognisable on the website. This is why the research sector was considerably extended: apart from the three research sectors “accelerators”, “photon science” and “particle physics”, there is also information available on the DESY research facilities and projects in which DESY is participating.

Arousing fascination

DESY research is fascinating. In future, the contents of the DESY homepage clearly address the general public. Pages with powerful pictures and introductory information arouse curiosity and interest to discover and explore DESY topics.

Being up to date

Many things happen at DESY – and in the future, you will read more about this in the web. A new news system and a new datebook were specifically created for the new website. This information is presented on the homepage and on several sub-pages on the website.

Access of extensive information and service offers needed in everyday life at DESY is made easier for DESY staff members and guests. The main improvement is a separate internet site for ‘DESY users’, directly available at: http://user.desy.de *(cm)*

INFO

Comments and questions:
www-feedback@desy.de

Two magic eyes

First results of the MAGIC stereo system of telescopes

by Elisa Bernardini

Between the end of January and beginning of February a large fraction of the MAGIC collaboration have met at DESY in Zeuthen for the "MAGIC stereo analysis workshop."

The MAGIC collaboration ("Major Atmospheric Gamma-Ray Imaging Cherenkov Telescopes"), a joint effort of 150 European physicists, inaugurated in 2003 the largest telescope in the world to measure very high energetic (VHE) gamma-rays: the 17-metre-diameter MAGIC-I telescope on the Canary Island of La Palma. Having set out to study the nature and the mechanisms of particle acceleration and production in galactic and extragalactic astronomical objects, MAGIC-I already made seminal discoveries. In 2008, an improved second telescope of the same size was constructed at a distance of 85 meters from MAGIC-I, more than doubling the power of the previous telescope; the new stereoscopic system started taking stable data the end of 2009.

Within the first months of observation, the MAGIC stereo system already discovered six new extragalactic emitters of VHE gamma rays. VHE gamma-rays are tracers of the highest-energy phenomena in the Universe and point to the sources of the highest-energy cosmic rays. The new sources are a two galaxies located in the Perseus cluster of galaxies, a so-called quasar, a supermassive black hole located at a distance of about 4.5 billion lightyears (one third of the radius of the Universe) and thus belonging to the three most distant VHE sources ever found, the mysterious source J2001+435, the distance and nature of which are still uncertain, and two objects located at distances of 1.4 billion lightyears, respectively.

The two mirror eyes of MAGIC (photo: Robert Wagner, MPI for physics, Munic)

The second telescope has turned MAGIC into the best-suited instrument for bridging the observational gap between satellite and ground-based gamma-ray telescopes. Its superior performance exceeds expectations and holds the promise of future milestone discoveries. In their workshop at Zeuthen, more than 50 people discussed how to improve the know-how transfer and use the new cutting edge software to exploit the data sets being provided by the Stereo System of MAGIC telescopes.

Saving lives with knowledge from DESY

The world' smallest calorimeter for detection of cancer

Expertise gathered at DESY will soon be used to build a device to help detect cancer. It will be so tiny that it can fit on the tip of an endoscope to be inserted into a person's stomach. Since January 2011, a consortium of 60 scientists from 13 European institutes is officially building the world's first in-body calorimeter. The project is funded by the European commission's 7th Framework Programme with about 6 million Euros over a period of four years. It is called EndoTOFPET_ US: multi-modal endoscopic probe with Time of Flight Positron Emission Tomography and ultrasound.

The goal: develop and test new biomarkers for pancreatic cancer. This challenging medical task requires building and operating a detector with unprecedented space resolution. It combines ultrasound and PET imaging techniques, and medical doctors work together with detector developers from the particle physics community to merge the expertise of both worlds.

One detector will be small enough to be inserted into the patient's stomach. Its partner is a detector plate of 15 by 15 centimetres that will sit on the patient's abdomen to form a direct line with the endoscope inside the body. The combination with the small detector head on the endoscopic probe placed a few centimetres away from the pancreas provides a sensitivity 100 times higher than whole-body PET scanners.

The detectors will be integrated and tested at DESY, building on the experience in large-scale detector integration and in the operation of specialised detectors. The technology frontiers in inorganic crystals, diffractive optics, single-photon detectors, time-of-flight readout electronics contributed by the partner institutes of the consortium will be assembled at DESY into its final form. The existing facilities will be put to good use in the next three years. In the final year of the project the device will move from lab tests to real hospitals. *(baw)*

New at the library: ebook readers

Books 2.0

DESY's official library inauguration

Already in September last year, all the books from the central DESY library had been moved to new rooms in building 1d. Finally, the official inauguration took place in January where director of research Joachim Mnich, the architect and the head of the library Martin Köhler took the opportunity to outline their favourite features of the new library.

Until the very last moment, small decorative repairs were carried out – there was even still wet paint at some spots. However, there are not only new library rooms but many other things too. As of now, you can not only view or borrow classical media like books or periodicals, but also electronic books: the so-called ebooks are also available at the library. These readers give access about 150 000 books – directly from the workplace. The ebook readers can be borrowed at the library counter. Currently, Hamburg has four ebooks and Zeuthen one – the service may be expanded, depending on the demand. The ebooks are especially suitable for contents that get out-dated quickly, since the online contents of ebook readers are constantly updated.

Nevertheless, not only the ebooks are the only major innovations. Since the relocation, the library is also equipped with a coffee corner and has a roof terrace. *(gh)*

INFO

http://library.desy.de

HELMHOLTZ ASSOCIATION

Essays to "Energie 2050"

On the occasion of the Year of Energy 2010, the German research ministry and the newspaper DIE WELT initiated an essay competition on envisioning the energy supply in 2050. The first prize went to photovoltaics expert Henning Döscher from Helmholtz Zentrum Berlin for his essay "Energy 2050 – a retrospective". From the perspective of a 70-years-old man, he describes how the energy market and the user behaviour have changed in the decades preceding 2050. In his essay, he glances at the current conflicts, indicates ways of solving problems and outlines a future that could work. The second prize was awarded to KIT student Kai Mainzer who describes the self-organisation of the future electricity grid. Katharina Latif won the third prize with her essay on energy migrants, power donations and motorway batteries. The economist from Munich University graduates at KIT with a thesis on the risks for power industry due to water scarcity. The first three prizes for convincing visions were thus presented to young scientists of the Helmholtz Association.

www.helmholtz.de/hermann

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Keep well

The German research ministry's website of the Science Year 2011 "Research for our Health" is available at www.forschung-fuer-unsere-gesundheit.de (in German). It provides information on the current science year and advertises events on this theme.

Gay-Lussac Humboldt Prize for Volker Schomerus

Volker Schomerus, head of the DESY Theory Group, received the Gay-Lussac Humboldt Prize from the French research minister Valérie Pécresse. He is honoured for his commitment in Franco-German collaboration in theoretical particle physics models.