

A healthy start into the New Year

First Health Day at DESY



New Year's resolutions are not easily kept.

Health concerns us all. It is not only a central issue in everyone's life but it is also gradually gaining attention in the working world. The management of work-life balance, stress and the up-keep of efficiency have a substantial impact on success in our careers – and ultimately on the success of DESY. "Our manpower is the most important potential of our research centre," DESY director Helmut Dosch points out. "Therefore, we place high demands on occupational safety and health protection." This is a good reason to raise the awareness to health issues. On Tuesday, 12 February, the first Health Day will take place at DESY in Hamburg. From 8.30 to 17.30, all employees get the opportunity to participate in workshops, go through short

health checks, listen to lectures or visit information points on subjects regarding physical and emotional well-being.

"We think that work is an important part towards individual fulfilment in life," explains DESY doctor Katharina Bünz. "Working life should enable all employees with their individual capabilities to manage their tasks with health, motivation, efficiency and sustainability." In accordance with New Year's resolutions, the Health Day should motivate us to take care of our well-being. Lectures, including a talk by Professor Dietrich Gröne-meyer on the spine being more than just a part of our body, will be of vital interest to many employees, just like other topics dealing with work-life balance

Big things	3
Major Projects at DESY in 2013	
Antiparticles	6
DESY's unique positron accelerators	
Final Sprint for DORIS	8
Christmas shift at OLYMPUS	

and satisfaction in everyday life, how to avoid self-inflicted stress situations or the effects of smoking on our health.

CONTINUED ON PAGE 2



DIRECTOR'S CORNER

Dear colleagues,

we are taking big steps into the year 2013. Every year is a fresh start, a time with a zest for action, new goals and New Year's resolutions.

DESY started this year with the end of an era. In the morning of 2 January 2013, DORIS, the former double storage ring facility at DESY was shut down for good after almost 40 years. I would like to take this opportunity to thank all DESY staff, friends and users. This is a major achievement of many people who made DESY's second

accelerator a success. On 14 May, we will celebrate this in a commemorative event for DORIS.

Within six years, we have now shut down the second large-scale facility at DESY after HERA. To say goodbye is difficult but to do so also offers the opportunity to do something new. The PETRA upgrade PETRA III and the FLASH upgrade show that it pays off to venture into new territory.

What will not be entirely new is the third round of the so-called Programme-oriented

Funding of the Helmholtz Association. New here is Helmut Dosch attending this process as Vice-President of the Helmholtz Association as of 1 January 2013, and as spokesman of the research field Structure of Matter. All of us wish him success in guiding DESY with due visibility through the coming Helmholtz Association challenges.

Another new event at DESY this year is the DESY Health Day. All of us hope for good health for another year and DESY is taking serious steps to realise this. We recommend making use of the opportunities

that are offered on this special day to our employees. We especially address those who have yet to put their New Year's resolutions to action.

I wish you a successful, healthy and all-round good year 2013.

Yours,
Christian Scherf

In addition there will be workshops that offer the possibility to try out tips and tricks straight away, for example how to live our life with energy and efficiency or how to take care of our voice and breath, presented by the DESY choir. This is complemented by short free health checks. Employees who are interested in testing their health have a choice between a back check, bone densitometry and feet measurements including shoe recommendations. All lectures and workshops on this day will be held in German.

Considering all possible and helpful activities to improve the physical, psychological and social well-being, Katharina Bünz thinks it is especially important to know that "we will never be completely free of discomfort and will never be perfect in all fields. In my opinion, health is the inner readiness to have a positive attitude towards limitations and to make the most of

one's capabilities. In this sense, I believe that a healthy person is someone who faces individual limitations in an active and constructive way and therefore remains productive." (Uw)

INFO

Many events require registration. You will find the complete programme and the possibility to register online on: <http://gesund.desy.de/>



Professor Dietrich Grönemeyer, radiologist, specialised in minimally invasive surgery. Combining this with pain therapy, he developed a treatment he termed micro therapy. He is known as an expert for back pains and he dedicates himself to this topic in numerous in popular science publications. His lecture (in German) on the spine being more than just a part of our body takes place on 2 p.m. in the DESY auditorium. The lecture is also transmitted live streaming at <http://gesund.desy.de>
Photo: Public Address/Hannemann

Big things in 2013

The major projects at DESY – an incomplete survey

The New Year had hardly begun when there was already an overflow in the DESY project calendar. Not only international experiments with DESY participation reach important milestones – the major LHC upgrade, the publication of the ILC technical design report or the intensive BELLE II vertex detector test under real conditions. There is also a lot going on at DESY in 2013.

FLASH II is now entering a new phase: whereas construction of the experimental hall is beginning at the outside of the PETRA accelerator, the first technical installations can be made in the nearly finished tunnel sector. In October this year, tunnel and hall will be finished already and the new laser light generator will go into operation. The completion of the experimental stations is scheduled for 2014.

Construction of the CTA prototype for medium-sized telescopes will also be completed. In spring, the 12-metre dish of the mirror support structure will be activated for the first time; thus starting the motor control and components' safety test operation.

Adjacent to the FLASH II building site is one of the two large PETRA III construction areas: the extension buildings in the north and east of the ring accelerator will each contain five radially-configured beamlines for synchrotron radiation experiments. For this purpose, two new and about 80 metre-long halls will be attached to the ring. After relocation of the road to the side entrance to make room for hall east, the construction start for the extensions is scheduled for August. In a long PETRA shut down beginning in September, the halls' structure will be erected until February 2014; at the same time, in each case about 70 metres of the accelerator will be completely replaced. By now, the halls do not have much in common anymore. "Our first ideas provided for two very similar halls in the north and east," said Wolfgang Drube, head of the project. "In the course of planning, it became obvious that both halls had to be constructed in very different ways." In the east, the low level of the hall and the narrow access road are the greatest



View into a tunnel of the European XFEL

challenges; in the north, the planners will have to cope with subsoil that is almost as bad as in the construction of FLASH II. In spite of this, PETRA III is scheduled to take up operation again in the second quarter of 2014; the first beamlines of the extensions will be commissioned as of October.

The PETRA shut down beginning in September is also the construction start of the CSSB building, in the immediate vicinity of PETRA extension east. Detail planning has already begun and all necessary approvals should be obtained until summer.

The largest project in 2013 will surely be the European XFEL. The operation of the accelerator module test facility AMTF has now begun. The first of two test benches for single cavities has already tested some of these; the three test benches for complete modules are now in the commissioning phase. And the almost complete working team from Poland that will later on run AMTF is eagerly awaiting the arrival of the industrially produced XFEL accelerator units. End of March, the first module will be cooled down, the first series module in June. "We are now entering the phase of real serial production. The first completely industrially manufactured cavities have been delivered," said Hans Weise, coor-

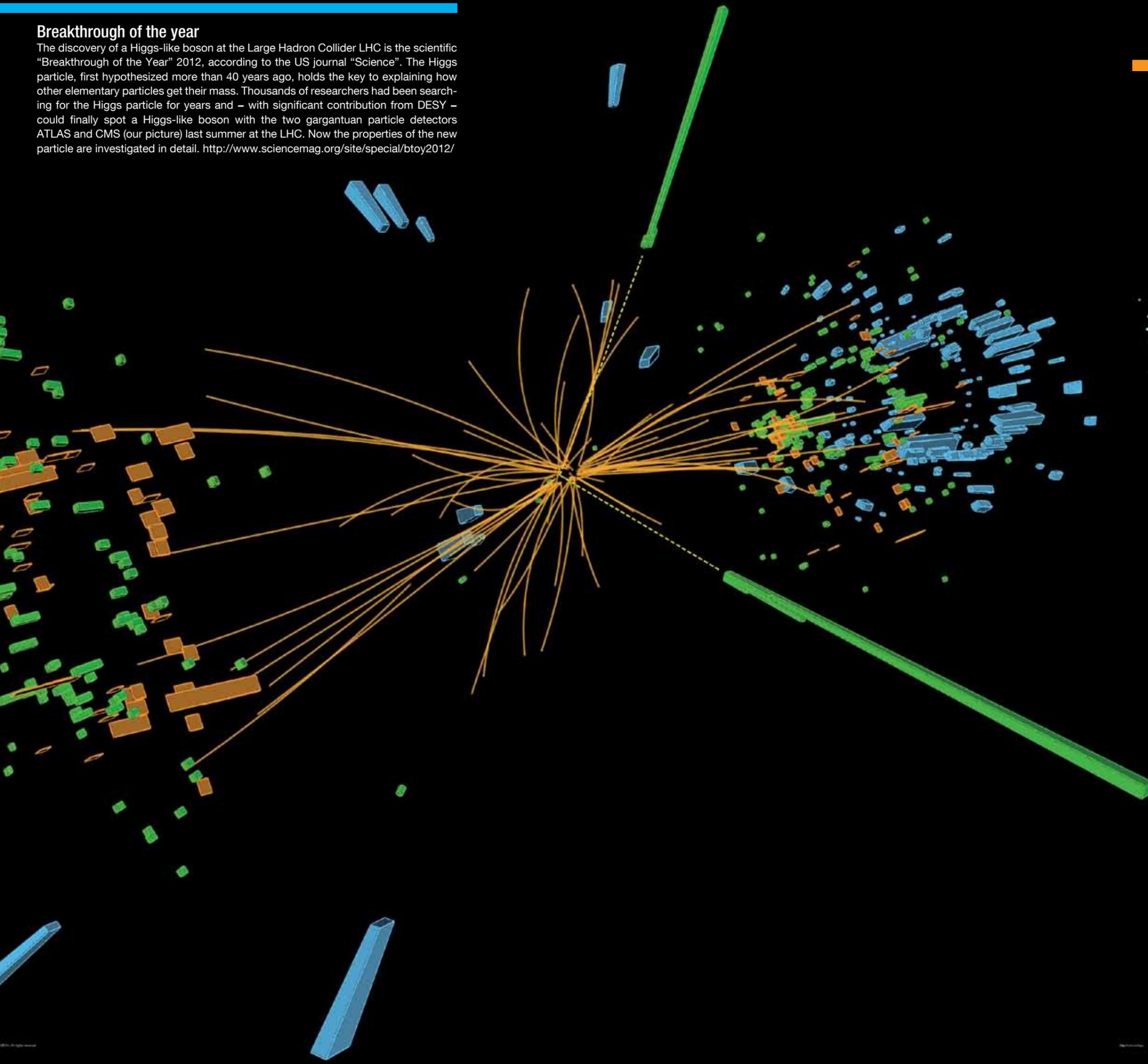
dinator of the accelerator consortium. "We don't see a substantial technical risk in serial production. The challenge is the perfect cooperation of all groups involved, including the industrial partners." The first complete pre-production module (called "module minus three") will soon be tested, although not in AMTF but on the CMTB test bench.

When the tests pick up pace in summer, the scientists plan to test one module per week and hope to get the first ten modules ready for installation in the accelerator tunnel by the end of autumn. Meanwhile, the tunnel has been equipped with plenty of safety technology and piping. This is also true for most of the pulse cables that will later supply the accelerator modules with voltage. As of November, when all roof trusses for the accelerator suspension are welded on, the superconducting modules will be transferred into the tunnel. Moreover, a total of about 800 beamline magnets located in front and behind the superconducting accelerator will be built in. Already this year, the "gun" built in Zeuthen will be finished and tested, i.e. the first part of the electron injector for the European XFEL.

Oh, and we will have Open Days too. In Zeuthen, it will be on 2 June; in Hamburg, it is planned on 2 November, together with the Science Night. (tz)

Breakthrough of the year

The discovery of a Higgs-like boson at the Large Hadron Collider LHC is the scientific "Breakthrough of the Year" 2012, according to the US journal "Science". The Higgs particle, first hypothesized more than 40 years ago, holds the key to explaining how other elementary particles get their mass. Thousands of researchers had been searching for the Higgs particle for years and – with significant contribution from DESY – could finally spot a Higgs-like boson with the two gargantuan particle detectors ATLAS and CMS (our picture) last summer at the LHC. Now the properties of the new particle are investigated in detail. <http://www.sciencemag.org/site/special/btoy2012/>



WHAT'S ON AT DESY

February

- 6** Public Lecture
Freie-Elektronen-Laser – Biomachines bei der Arbeit zusehen
Rolf Treusch, DESY, Hamburg, auditorium, 19 h
- 12** Event (<http://gesund.desy.de>)
First Health Day at DESY
8.30 -17.30 h (auditorium, foyer & other seminar rooms)
- 19** Staff assembly
Betriebsversammlung
DESY, Hamburg, auditorium, 9.30 h
- 19-21** Workshop (www.terascale.de/mc2013)
Monte Carlo Methods in Natural Science, in Engineering and in Economics
DESY, Hamburg
- 25-28** Workshop (<http://gatis-kickoff.desy.eu>)
GATIS Kickoff Workshop
DESY, Hamburg
- 25-27** Workshop (www.terascale.de/intro2013)
13 Introduction to Terascale Physics
DESY, Hamburg
- 27** Science Café DESY (<http://sciencecafe.desy.de>)
Cool runnings – Kalte Technologien für schnelle Teilchen
Karsten Büßer, Hamburg, DESY Bistro, 17 h

March

- 11-15** Conference (www.terascale.de/capp2013)
Computer Algebra and Particle Physics
DESY, Zeuthen
- 18-22** School (www.terascale.de/statistics2013)
Introductory Statistics School 2013
DESY, Hamburg
- 20** Public Lecture
Schwarze Löcher – Himmelsobjekte mit Imageproblem
Marc Hempel, DESY, Hamburg, auditorium, 19 h
- 20-22** XII. Research Course on X-ray Science
Theoretical Foundations of Research with X-ray Free-Electron Lasers and Synchrotron Radiation Sources
DESY, Hamburg
- 21** Series of Events Music & Science
Physik in Hollywood – Wo Regisseure sich irrten und wo sie recht hatten
Marc Wenskat (DESY)
DESY, Hamburg, auditorium, 17.30 h
Liebeck String Trio
DESY, Hamburg, Hörsaal, 19.30 h
- 27** Science Café DESY (<http://sciencecafe.desy.de>)
Die Corioliskraft – Geschichte, Missverständnisse und Mythen einer Scheinkraft
Frank Lehner, Hamburg, DESY Bistro, 17 h

How to create an antiparticle

A behind-the-scenes look at DESY's unique positron accelerators

By Manuel Gnida

Antiparticles are rather mysterious. Although physics teaches us that every particle has an antiparticle, antiparticles tend to be sidelined in our earthly world. All ordinary matter around us is made from particles (electrons, protons, neutrons) and – for reasons unknown to scientists this far – not antiparticles. Since particles and antiparticles ultimately eliminate each other once they meet, antiparticles are typically short-lived. On DESY's particle highways, in contrast, positrons, the antiparticles of electrons, are free to run laps for hours on end. The capability to experiment with electrons and positrons alike is a unique feature of DESY's particle accelerators. "DESY is one of only a few facilities in the world that currently has this ability," says PETRA machine coordinator Alexander Kling.

DESY has a long history of research involving electrons and positrons. Driven by the goal of demystifying nature's fundamental forces, researchers brought electrons and positrons to collisions at DORIS (1974–1992) and PETRA (1978–1986). Later at HERA (1992–2007), scientists shot both types of particles at protons. Finally, in 2012, DORIS catapulted electrons and positrons into hydrogen targets in the OLYMPUS experiment.

In nature, positrons are created when cosmic rays hit the Earth's atmosphere. On the ground, positrons emerge from unstable atoms in the radioactive β^+ decay. But how does DESY make its positrons?

It all begins with electrons in Linac II, a seventy-metre long linear accelerator. Engineers use heat to "evaporate" electrons from a metal. Electromagnetic

fields subsequently accelerate these electrons to almost the speed of light. After they have traveled approximately one-third of Linac II, the electrons' speedy journey comes to a sudden stop when they slam into a tungsten target blocking their path. "We use brute force to create positrons," says Markus Hüning, head of DESY's MIN group (Machine INjection). Despite being only seven millimeters thick, the target is so dense that the electrons release all their energy in the collision. Because energy

where they run in circles, waiting for more and more positrons to be added. With every revolution, the positron beam not only becomes more intense; it also becomes narrower as the positrons emit a light known as synchrotron radiation along their circular path. After leaving PIA, the positrons enter yet another circular accelerator (DESY II) before they finally reach their final destination. Until recently, this destination had been either DORIS or PETRA.



Positron makers: in front: H. Poggensee, M. Schmitz, M. Hüning, I. Peperkom, in the middle, R. Jonas, K. Müller, B. Krause (MEA), O. Goldbeck, T. Schulz, at the back: J. Herrmann, A. Petrov (MEA), R. Neumann (MDI), M. Lomperski, J. Rothenburg, A. Janke (without specifying: MIN)

and mass are intimately linked, as described by Einstein's famous equation $E = mc^2$, some of this energy materialises into electron-positron pairs. A magnet captures the emerging particles, which are then further accelerated towards the end of Linac II.

Positron creation is a cumbersome process. "The energy content of all positrons produced at DESY over an entire year is only one kilocalorie, or one Tic Tac," says Hüning. "For every one thousand electrons hitting the target, we only obtain three useable positrons." When exiting Linac II, the positron beam is quite the opposite of what researchers want for their experiments: it has low intensity and is fairly wide. Therefore, the positrons enter the PIA accelerator (Positron Intensity Accumulator) next,

Since the termination of the OLYMPUS collision experiment and DORIS' permanent shutdown on 2 January 2013, the sole purpose of DESY's positron beams is the production of synchrotron radiation at PETRA III. Scientists use this intense radiation for a multitude of studies in the basic sciences, materials and biomedical research, and more. When it comes to synchrotron radiation, electrons behave just like positrons. However, electrons are much easier to produce. "We started operating PETRA III with electrons in January," Kling says. This change in operation bypasses the tedious positron creation step for DESY's signature light source.

Nevertheless, switching to electrons will not mark the end of DESY's positron era. "We definitely intend to preserve our ability to produce and use positrons for future particle physics experiments," Hüning says. The particle physics community widely agrees that the next-generation particle accelerator (an international linear collider) should be a large-scale positron-electron collider. DESY's expertise in the field of positron-electron acceleration will come in handy.



Participant-record at the photon-science users meeting

DESYs and European XFELs photon-science users meeting beat its own participant record again this year. The organisers counted more than 800 applications. This is well 200 more than last year's 580 attendants. The new photon science web portal was officially introduced in

the meeting. It was set up and adjusted to its target group of scientists by the DESY weboffice and the Photon Science department together with the PR office and the US agency Sandbox Studio. Thanks to its "responsive design" it is easy to use on any media device – from smartphone to desktop PC. (es)

„Taking the lead“ Helmholtz mentoring programme for women

By Anke Watenphul and Birgit Fischer

“What is my professional goal? How can I reach it?” 30 young women participating in the Helmholtz “Taking the Lead” mentoring programme were confronted with these questions at their first joint workshop. All of them have ideas and plans but sometimes the path to reach the goal is not clear enough. This is precisely where the one-year programme steps in. Every mentee is tutored by a mentor from the Helmholtz centres’ management bodies, the science organisations or from free enterprises. In a personal discussion, experiences are shared and the mentors act as counsellors and promoters of their protégées’ career planning. The joint workshops of mentees and renowned coaches deal with subjects including individual competences, job interviews, career and family, resource management, conflict situations and change of roles through managerial responsibility. The topics will always meet the women’s current requirements. Moreover, we, the participants profit a lot from mutual exchange of information. The personal

discussions between colleagues from science, administration and science management provide us with new insights into the work of others and they promote networking within the Helmholtz Association and beyond. Furthermore, this is supported by annual network meetings for participating women, mentors and alumni.

The call for proposals for the mentoring programme 2013/14 will be issued beginning of March for a period of four to six weeks. Applications may be submitted by young women who have had a PhD for around two to five years and by women working in administration and management who are at the beginning of their careers and aspire to an executive-level position. More information is available at the Helmholtz Association’s website.

INFO

www.helmholtz.de/en/working_at_helmholtz/helmholtz_mentoring_programme/

Young researchers’ competition

For the first time a Hamburg regional round of the annual German competition “Jugend Forscht” is taking place at DESY this year on 14 and 15 February. It is a youth competition with three rounds, in which the contestants present their scientific projects divided into two age groups. It is open to everyone interested, who is at least in the fourth grade and not older than 21. More than 60 projects signed up this year. The winners qualify for the Hamburg state competition in the beginning of April. Anyone interested can come and watch the regional round at DESY on 15 February between 9 h and 11 h in the Hamburg student lab. (es)

German particle physics community supports ILC in Japan

German particle physicists, represented by the KET committee, have published a statement reacting to the proposal from Japanese particle physicists to host the ILC: “The proposal of the Japanese community to host the ILC as an international project finds enthusiastic support in the German community.” They strongly advise their country to participate actively in the realisation of the project. Read the full statement at the newly designed KET-website:

www.KETweb.de/stellungnahmen (baw)

Otto Stern Prize for an accelerator physicist

For the second time in a row, a DESY accelerator physicist received the Otto Stern Prize of the Hamburg physics department: Jan-Patrick Schwinkendorf from the FLA group was honoured for the best diploma thesis.

For his thesis, Jan-Patrick Schwinkendorf developed a procedure to produce and test capillaries to be used in laser plasma acceleration. These capillaries consist of a few hundred micrometre-thick and a few centimetre-long channels that are cut into sapphire crystals with lasers. Plasma ignited in these capillaries can be controlled in a better way and allows generating an electron bunch of higher quality more effectively than with plasma created within more space. For his doctoral thesis, Jan-Patrick Schwinkendorf continues to do research in this field, among others.

Minjie Yan won the previous Otto Stern Prize. She worked on her diploma thesis in the same group and currently works on her doctoral degree at DESY. (tz)



The last experiment at DORIS – the OLYMPUS detector

OLYMPUS final task for DORIS

Christmas shift at the nuclear physics experiment

DESY was on Christmas holidays, but one large experiment held the fort and was on duty – the OLYMPUS detector was running as the only (large) experiment during the holidays and at the turn of the year. For about two months before the final DORIS accelerator shutdown, OLYMPUS shot positrons and electrons that were alternately circling in the storage ring onto a hydrogen gas target. By comparing the collisions, the scientists will determine with high precision if there is only a one-photon or even a two-photon messenger-particle exchange at the collision of these particles.

The accelerator team liked this experiment so much that many volunteers put their hands up to run DORIS until 2 January instead of mid-December. You could see many shift workers sitting in the control room day and night, with tangerines, a Christmas tree and cookies, taking lots of collision data which is currently being evaluated. “Everything ran smoothly, including the daily switch of the different types of particles and the DORIS top-up mode, in which every two

minutes particles are injected into the circling bunches,” says Uwe Schneekloth from the OLYMPUS team.

In order to improve the determination of the detector components’ precise geometry analysis, OLYMPUS is continuing to operate. “Until the beginning of February, we will measure a few million cosmic radiation runs,” said Schneekloth. However, the United States partner institute MIT will take over the night shifts during this time.

At the same time, the OLYMPUS team has started to analyse the recorded collisions. This requires precision and a lot of attention and a huge amount of calculations. “OLYMPUS has a toroid magnet which, unlike a solenoid, produces an inhomogeneous magnetic field,” Schneekloth explains. “This means that there is a different magnetic field at each point of the drift chambers. Its value, however, is extremely important for the precise track reconstruction.” (tz)

The new HelmholtzNET

Around 3,000 colleagues use HelmholtzNET – particularly the group sections. In technical terms, however, it has now reached its limits. Therefore, the Helmholtz Association introduces the new HelmholtzNET based on MS Sharepoint 2010, the most widely used intranet software worldwide. Existing user profiles will be migrated to the new HelmholtzNET and users will gain online access in spring 2013 after receiving an invitation to confirm their account. The main uses of HelmholtzNET are:

1. Applications and appraisals: applications and reports on current projects can be submitted online. The expert evaluations are also posted online.
2. Programme evaluation: for programme evaluation processes, the evaluator gets all necessary information and a compilation of reports with the possibility to work in parallel.
3. Group sections: Working teams, working groups and other project groups can access a members-only area where they can share documents, mailing lists, wikis and calendars. External guests can also become members of the new HelmholtzNET.
4. HelmholtzBox: allows an easy exchange of files, both internally and externally. All users have the option of setting up a HelmholtzBox.
5. Intranet: a streamlined information section featuring useful contents such as Centre overviews, hotel information and information on booking rooms.

www.helmholtz.de/en/hermann

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