

DESY honours physics pioneer Max von Laue

PETRA III hall named after the discoverer of X-ray crystallography



19 September was a day of great events and changing weather conditions. Shortly before the arrival of Chancellor Merkel, a thunderstorm clattered down on the festival ground in front of the PETRA III hall, which prompted the “Hamburger Abendblatt” newspaper to state that “perhaps the courage and optimism to celebrate this party of the decade on 19 September in Hamburg as an outdoor event are representative of the scientific curiosity that characterises this institution, and which will now lead it to a new dimension.” And the courage was justified: it stayed dry during the ceremony itself, and 800 DESY staff members and 400 outside guests witnessed the enthusiasm of Angela Merkel who emphasised in her speech:

Chancellor Angela Merkel, Helmut Dosch, Ada Yonath and Hamburg's First Mayor Olaf Scholz (from left) unveil the inscription “Max von Laue” by the push of a button.

“Germany needs top-level research like it is done here. Germany needs your knowledge and ideas for tomorrow’s technologies.”

Physicist Angela Merkel grabbed the opportunity to take a detailed look at research in the PETRA III experimental hall, and her comment was that the facility extends the world of research and knowledge for which Max von Laue laid the foundation stone a hundred years ago in a remarkable way. Another guest was Hamburg’s First Mayor Olaf Scholz. He stressed the significance of DESY’s basic research for the region.

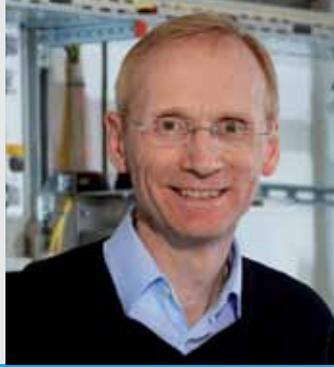
Good bye DORIS, hello PETRA! 3
Shutdown of DORIS

Strategy meeting 6
Particle physicists discuss the future

International Cosmic Day 8
DESY in Hamburg and Zeuthen take part

“The metropolitan region of Hamburg is happy and also a little proud of the fact that a significant and world-renowned

CONTINUED ON PAGE 2



DIRECTOR'S CORNER

Dear colleagues,

one hundred years ago, Max von Laue, assisted by Paul Friedrich and Walter Knipping, and after inspiring discussions with Peter Paul Ewald, discovered with a single and at the time pioneering experiment that X-rays are nothing more than extremely short-wave light and that a crystal is a periodic array of atoms. Two years after this discovery Laue was awarded the Nobel Prize. Laue's experiment is the foundation of our current knowledge of the atomic structure of matter – including all influences on nano-

technology, material science, microelectronics and structural biology. Today, the instruments are much larger and more expensive and the samples are extremely small, but in principle little has changed since then.

Much of the research we do with synchrotron radiation, especially at PETRA III, has a close connection with the work of Max von Laue. Naming the hall after him is an obvious choice. For the naming ceremony, we were happy to welcome Federal Chancellor Angela Merkel, the First Mayor of Hamburg

Olaf Scholz and Ada Yonath, who was the head of a Max-Planck research group at DESY for 18 years. I think this is a good example for the significance that political decision-makers attribute to science in general and to DESY in particular. Last but not least, this is the result of work done at DESY in all fields, and this will lead us into the future: with the aim to continue and extend the very successful experiments with X-ray light, DESY and its national and international partners plan to build two new experimental halls as an upgrade of the PETRA III

facility. Surely Max von Laue would eagerly look forward to the new insights that will be possible in the future.

With more than 1000 participants, the naming ceremony of the PETRA III hall was a great event. I would like to give a big thank-you to all those who contributed to this event.

Yours,

Edgar Weckert

sector of structural research in natural sciences is taking place here.”

This is also due to the contributions of Israeli scientist Ada Yonath who decoded the structure of the ribosomes at DORIS, for which she was awarded the Nobel Prize in Chemistry in 2009. Jointly with DESY Director Helmut Dosch, the three celebrity guests unveiled the new inscription “Max von Laue” at the PETRA III experimental hall while at the same time celebrating the interdisciplinary nano-bio research campus that is currently being established around PETRA III, opening up completely new perspectives in application-oriented research, for example in nanotechnology, materials science and infection biology.

In the field of basic research in natural sciences, DESY plays a pioneering role in the world and offers perfect conditions for global research cooperation, Merkel said. She mentioned the search for the Higgs particle as a good example for an effective international project and she concluded her address with a plea: “Research needs free space. Those who

think that research can be completely planned will hardly be successful. To hit the bull's eye requires free space. This is the key prerequisite for new ideas and new approaches which provide the basis for further research, which eventually lead to concrete applications.” (uw)



In a good mood: Chancellor and Mayor in the PETRA III experimental hall.

2 However, it is not only application-oriented research that leads DESY into the future. Chancellor Merkel also emphasised the important role of basic research which provides the breeding ground for tomorrow's technologies and innovations.

Goodbye DORIS, hello PETRA!

PETRA extension creates bright future for DORIS experiments

By Manuel Gnida

When DESY's almost 40-year-old particle accelerator DORIS will forever cease synchrotron radiation operation on 22 October, it will not only leave many scientists in a state of nostalgia – it will also challenge researchers with the pressing question as to where to perform their experiments in the future. To continue the most successful experiments at DORIS III, DESY and its national and international partners are planning two new experimental halls, extending the existing PETRA III facility. PETRA III is a highly brilliant light source, i.e. its intensity is concentrated in a very narrow, powerful beam. In fact, with its minuscule beam size of down to a millionth centimetre – ten thousand times thinner than a human hair – PETRA III is the world's brightest synchrotron radiation source. "Some experiments, however, do not always require PETRA's extraordinary brilliance," says DESY scientist and PETRA III extension project leader Wolfgang Drube. "Until now, these experiments have been located at DORIS." DORIS used to operate three X-ray absorption spectroscopy stations, for instance, of which there are currently none at PETRA. DORIS' retirement also affects several other methods such as X-ray diffraction for chemical crystallography studies.

With the PETRA extension, DESY's photon science user community will find more than merely a new scientific home for "DORIS methods". Researchers will



More experiments, more insight – view into a PETRA III experimental station.

also profit from the excellent beam conditions at the PETRA III storage ring. "At several experimental stations, the beam will be up to one hundred times more intense compared to DORIS III," Drube says. More intensity shortens data collection times, improves data quality, and enables new types of experiments. Moreover, smaller beam sizes at PETRA will allow high-resolution studies on smaller samples.

The new experimental halls will be located near the north (adjacent to the FLASH hall) and east (between buildings 18 and 61) ends of the DESY campus, where the PETRA ring is above ground or not too deeply buried. Both facilities will together host ten new beamlines with approximately sixteen new experiments. Preparations for the eastern extension have noticeably begun with the relocation of the through street between DESY's two gates.

Project planners face a particular challenge over the strict project timeline. "We need to modify parts of the accelerator ring, remove old magnets and put new ones in. This requires temporarily shutting down PETRA III," Drube explains. "To keep downtimes of user operations to a minimum, the accelerator modifications

as well as the radiation shielding on the outside must be completed as quickly as possible." In mid-May 2013, DESY will turn PETRA off for about five months to allow for the necessary machine alterations and construction of the experimental halls. Scientists and engineers, including former DORIS staff, will subsequently build the new experimental stations. State-of-the-art equipment and instruments from several DORIS beamlines will be transferred to the new setups. The first experiments will launch in late summer 2014, with the entire extension project completed in 2016.

The project has found worldwide support. In addition to DESY's national partners Helmholtz Association, Max Planck Society, and the Federal Ministry of Education and Research, the future PETRA III extension receives substantial funding through international collaborations (Sweden, India, and Russia) to implement three beamlines for high-brilliance techniques.



Designated sites of the two PETRA extensions.

INFO

<http://petra3-extension.desy.de>

October

- 4-9** Conference
By Students, For Students
Non-Perturbative Renormalization on the Lattice
DESY, Zeuthen
- 10** Conference
PhD-Days 2012
DESY, Hamburg
- 12** Concert
DESY Choir
DESY, Hamburg, Canteen, 20 h
- 15** ALPS Seminar
Axion-like particle and hidden photon search with a microwave shining through the wall experiment
Michael Betz (CERN)
DESY, Hamburg, bldg. 1b, seminar room 5, 14 h
- 22** Event (registration required)
Tschüüüs Doris
DESY, Hamburg, auditorium, 14 h
- 23** Lecture series „Gesund bleiben“
Organspende – Für und Wider Transplantationsmedizin
Björn Nashan, Leiter Transplantationszentrum UKE,
DESY, Hamburg, bldg.1b, seminar room 3, 16 h
- 23** Lecture
Carbon nanomembranes and graphene by conversion of self-assembled monolayers: Synthesis, structural characterization and functional properties
Andrey Turchanin (University Bielefeld)
DESY, Hamburg, bldg. 25f, room 456, 14 h
- 24** Science Café DESY (<http://sciencecafe.desy.de>)
„Weltuntergänge“ – Globale Katastrophen in Vergangenheit und Zukunft
Werner Brefeld, Hamburg, DESY Bistro, 17 h
- 31** Jentschke Lecture
From the Ionisation of Air to beyond the LHC – 100 years of Cosmic Rays
Alan Watson (University of Leeds, UK),
DESY, Hamburg, auditorium, 17 h

November

- 15** Event (www.mintforum.de)
1. Hamburger MINT Tag
DESY participation with student lab, physics show and Science Café DESY
- 28** Science Café DESY (<http://sciencecafe.desy.de>)
Warum findet mein Smartphone ohne Einstein seinen Weg nicht?
Jürgen Reuter, Hamburg, DESY Bistro, 17 h
- 28** Public Lecture
Mit Sand zu neuen Entdeckungen – Moderne Teilchendetektoren
Ingrid-Maria Gregor, DESY, Hamburg, auditorium, 19 h

DESY in miniature

A 1:500 scale model of the DESY and European XFEL campuses now adorns the foyer of building 1. The model builders invested 1500 hours of work to shape the contours of buildings and the grounds with every detail down to the size of 75 centimetres into pear wood. Accelerators and light sources are highlighted by light strips. Any project that is planned or under construction is made of acrylic glass and the model consists of "tectonic plates" which can be exchanged – meaning that completely new projects can easily be included at a later stage.

Make MINT!

First MINT day at DESY was a complete success



Even the organisers were surprised at the response: about 170 girls followed the invitation to attend the first MINT day at DESY. MINT stands for mathematics, engineering, sciences and technology. Reinhard Brinkmann, Director of the accelerator division, who welcomed the young ladies was happy to see such a large number of “potential future colleagues.” During the day, the girls had the opportunity to meet twelve female DESY staff members with MINT professions who readily answered all kinds of questions about their jobs and their not always streamlined careers.

After lunch, application training and DESY tours were on the agenda. Equipped with information material, giveaways and a lot of practical professional information, the last girls left the DESY campus at 16 h. The event is planned to be repeated every year. DESY will also participate in the MINT day for girls and boys on 15 November, which is organised by the Hamburg MINTforum. (tz)

Particle physics community discusses future strategy

Open Symposium in Cracow kick-starts a new round of discussion

Some 500 particle physicists from Europe and beyond met in Cracow, Poland, in September to kick-start the update of the European Strategy for Particle Physics, an initiative by the CERN Council that sets the European pace for global planning and cooperation on future projects in particle and astroparticle physics around the world. With the recent discovery of the Higgs-like particle at the LHC, a Higgs factory is high up on the wish list.

6 The European Strategy Preparatory Group, which starts the strategy process by consulting the community, received nearly 170 submissions of future plans, project proposals, status summaries and theory papers. Every five or six

years the strategy process starts anew, in the light of new results or political developments. The CERN Council will take the recommendations to update its Strategy for Europe’s role in the global world of particle physics in March 2013.

At the Cracow meeting, summaries of the submissions were presented, followed by intensive, detailed and very structured discussions on a multitude of different projects, plans and proposals. A tendency that emerged mirrors the recommendations from the last Strategy round that give highest priority to the full exploitation of the science potential of the Large Hadron Collider including its upgrades, complemented by a electron-positron precision tool. Accelerator and

detector R&D as well as active participation in the global neutrino and B physics programmes also featured on the list.

However, a new aspect in the discussions was the discovery of the Higgs-like particle at CERN. This new particle led to a state approaching consensus for a so-called Higgs factory, meaning an accelerator that can study all possible decay channels of the Higgs at an energy in the region of the Higgs particle. Options included a staged linear collider, a new proposal for an electron-positron collider in the LHC tunnel, and even a completely new, 80-kilometre ring tunnel. (baw)

Millions for research

PT-DESY wins Europe-wide tender for millions of Euros of funding

DESY's research funding division, PT-DESY, increases its portfolio: starting in October, PT-DESY, on behalf of the Federal Ministry of Education and Research (BMBF), will also manage research funding in the fields of hadron and nuclear physics, as well as mathematics for innovations in industry and services. Moreover, PT-DESY will still be responsible for funding basic science research at large-scale facilities. DESY's research funding division successfully applied for the respective BMBF call which in accordance with EU guidelines required a Europe-wide tender. In total, PT-DESY will grant more than 60 million euros of BMBF subsidies, mainly to universities.

On behalf of the BMBF, the project funding division assumes the task of an independent research funding agency. About 40 staff members support the ministry in the promotion of concrete projects and in strategic questions and

science communication. They counsel applicants, review applications and control the progress of ongoing projects. "PT-DESY has an excellent reputation and performs a very important task in Germany's academic activities," DESY Director of Administration Christian Scherf points out.

The funds which PT-DESY grants to research projects come from the BMBF budget and go into the so-called collaborative research pot. The aim is that universities and institutes that operate large-scale facilities are more closely networked and that university scientists get the opportunity to do research at large-scale facilities. "The successful outcome of the tender forms a strong basis for our work," said Klaus Ehret, head of PT-DESY. "With this, we are able to guarantee an efficient use of public funds, support researchers and promote science." (tim)

Focus on astroparticle research

7th meeting on astroparticle physics in Germany

On 20 and 21 September, Germany's astroparticle physicists came to DESY in Zeuthen to discuss the status and perspectives of their research field. Since 1999, there have been regular meetings of representatives of this young research area at the interface of particle physics, astrophysics and cosmology. With the committee for astroparticle physics KAT, the scientists created a coordinating institution on a national level, and in 2010 they published a roadmap for astroparticle physics. A year ago the Helmholtz Alliance for Astroparticle Physics HAP was constituted which funds Helmholtz centres and universities with additional ten million euros for a period of three years.

The field's scientific achievements are impressive. In the field of gamma astronomy – with Germany traditionally in the leading role – the number of detected sources increased dramatically,

the neutrino telescope IceCube at the South Pole provided data which remarkably exceeded the expectations, and the XENON 100 experiment in Italy's Gran Sasso laboratory recently delivered the narrowest limits so far for interaction probability of dark matter.

In Zeuthen, the experts presented the latest results and discussed upcoming projects, including the Cherenkov Telescope Array CTA, the global future project of gamma astronomy, with Germany being the most important partner, promising detectors for the long-awaited discovery of gravitational waves and several neutrino experiment approaches.

Due to the large number of new experiments with a large discovery potential and several ideas for completely novel detection methods, the astroparticle physicists expect decisive scientific advances within the next years. (tz)

Multifaceted – the new DESY brochure

DESY has been conducting basic research for more than 50 years. A new DESY brochure shows that this research influences many fields: the education of top-level researchers, innovations for our society, impacts on our metropolitan region – these are only a few of the catchwords that show DESY's role in public. More than 100 pages illustrate the colourful facets of DESY. The brochure (currently only in German) is available at the PR department (bldg. 1, foyer).



Russian-German seminar

In September, the "Russian-German Travelling Seminar" made a stopover at DESY. Some 20 participants from Russia and Germany learned about the experimental possibilities at PETRA III and FLASH. DESY was an outstation of this seminar that takes place every two years and is funded by the Federal Ministry of Education and Research with the aim of getting together young scientists from Germany and Russia in a network. Organiser of this event is the University of Erlangen-Nürnberg.

45 years of service

Manfred Biastoch from DESY in Zeuthen reached an exceptional anniversary: on 1 September 1967, Biastoch began his training as an apprentice in the electronics workshop of the former Institut für Hochenergiephysik IfH in Zeuthen. For 45 years he has remained faithful to the IfH and later to DESY. Today, with his long-standing experience as a technician, Biastoch supports the data processing team at DESY in Zeuthen.



Preparations for the experiments at the International Cosmic Day.

First “International Cosmic Day”

School students from across the globe measure cosmic particles from outer space

The first International Cosmic Day, a global research day in the field of astroparticle physics for school students took place on 26 September. This event was organised by DESY and Netzwerk Teilchenwelt (Network Particle World) in Germany as well as by QuarkNet, the school project of Fermilab in the United States. On the day, at 20 locations including both DESY institutes, school students captured cosmic particles that can tell us more about the structure and origin of the universe. The International Cosmic Day was held for the first time this year to celebrate the 100th anniversary of Victor Franz Hess’s discovery of cosmic particles.

School students from 10th grade were introduced to the fascinating astroparticle physics research field and to current astroparticle experiments. Afterwards, the young people assumed the role of astroparticle physicists and measured cosmic particles with a tabletop experiment. Questions focused on: What are cosmic particles? Where do they come from? How can they be measured?

During measuring, analysis and data evaluation, the students were tutored by scientists. Later, the participants presented their measuring results to the remaining participating locations to compare and discuss them – working like international research collaborations would do. The first International Cosmic Day was attended by young people from China, Germany, Great Britain, France, Italy, Mexico, Russia, Switzerland and the United States.

DESY leads the sub-project “astroparticle experiments” of the Netzwerk Teilchenwelt. In this position, DESY in Zeuthen initiated the International Cosmic Day and was responsible for the general coordination of this day. School students joined the first International Cosmic day at DESY in Hamburg and in Zeuthen. Over the internet, they shared their observations about the angle of incidence of cosmic particles with the participating students all over the world. *(ub)*

Lid for Wendelstein 7-X

The installation work at the research facility Wendelstein 7-X at the Max Planck Institute for Plasma Physics’ Branch Institute Greifswald is running at full speed. It is reaching its final configuration. After completion, Wendelstein 7-X will be the world’s largest stellarator-type fusion plant and will investigate whether this model is suitable as a future power station.

Wendelstein 7-X consists of five almost identically constructed modules. Each module encompasses a section of the plasma vessel, its thermal insulation, 14 especially formed superconducting magnet coils and a section of the support ring – a weight of about 120 tonnes per module. Enclosed in an outer steel shell, all modules have been installed on the machine’s foundation. Finally, a 14-tonnes lid was mounted on top, a component of the thermally insulating outer shell.

A number of research institutes contribute to the building of Wendelstein 7-X, including the Karlsruhe Institute of Technology KIT, the Institut für Plasmaforschung of the University of Stuttgart, Forschungszentrum Jülich and the Institute of Nuclear Physics Cracow. There is still a lot of installation work to do inside and at the periphery of the facility before Wendelstein 7-X will take up operation in two years.

www.helmholtz.de/hermann

Imprint

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