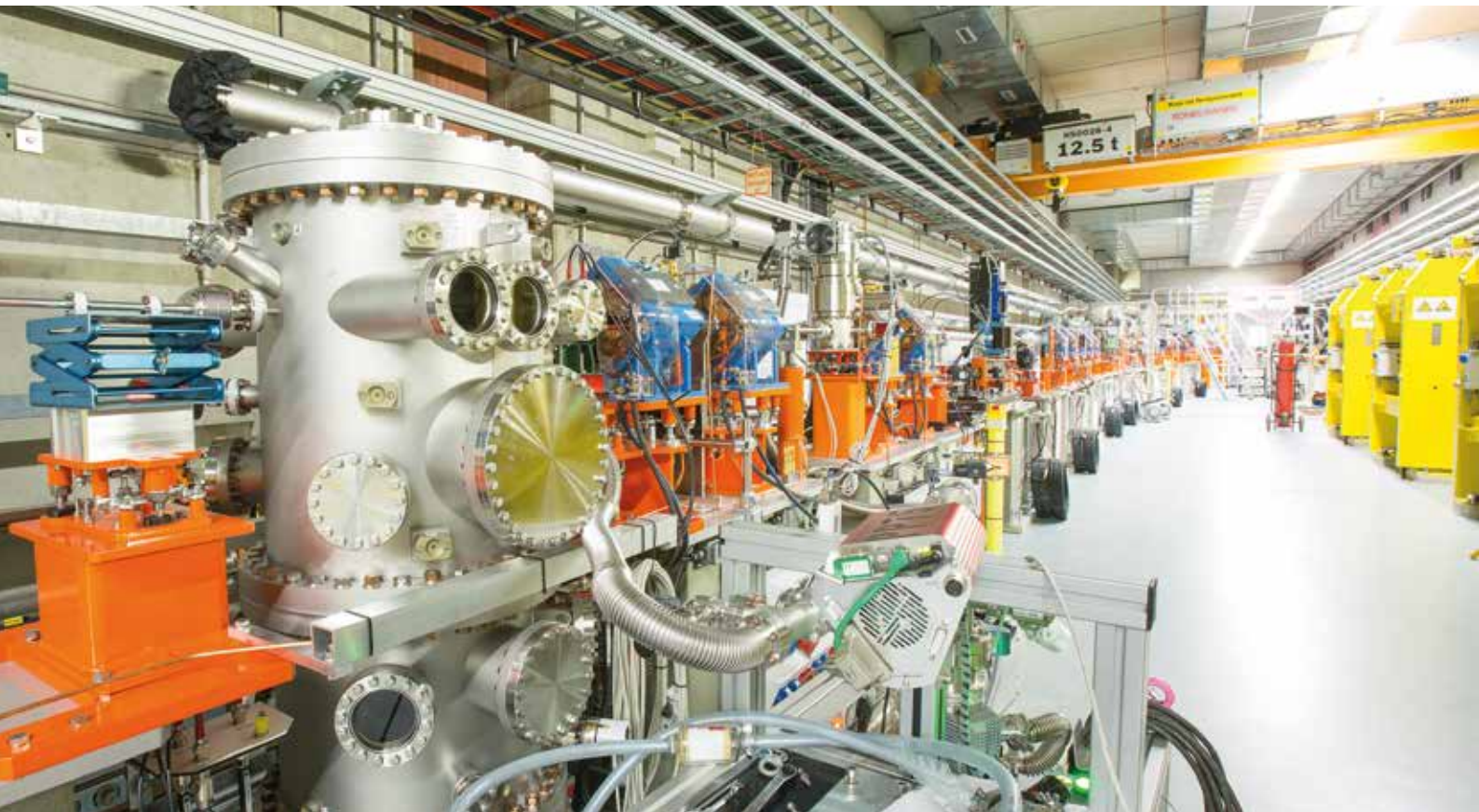


Accelerating particles with particles

Plasma wakefield experiment FLASHForward takes up operation in the FLASH tunnel



The end of the recent FLASH shutdown is at the same time the beginning of an exciting new operational phase for the FLASHForward team: The first stage of the beamline for the plasma acceleration project has been installed alongside the second FLASH undulator line. As a result, in addition to its two light-generating lines, the free-electron laser now features a third direction into which the accelerated electrons can be sent.

FLASHForward is a project to test the so-called plasma wakefield acceleration. The electric fields created in a plasma can be a thousand times stronger than those in conventional particle accelerators. Researchers around the world are investigating whether these strong fields can be used for extremely efficient parti-

cle acceleration and thus to develop very compact particle accelerators. A special characteristic of FLASHForward is that the facility can either generate and accelerate electron bunches in the plasma cell itself or else bring particle bunches from the FLASH accelerator to even higher energies in the plasma cell. The experiment is technically designed for almost doubling the particle energy of 1.25 gigaelectronvolts of the FLASH electrons.

But it is not only the energy that counts, says project leader Jens Osterhoff. "The possibility to further accelerate particle bunches in plasma cells has already been experimentally proven. With FLASHForward, we will test in particular whether we can further accelerate the very good beam from the superconducting FLASH

View of the FLASHForward beamline: The components mounted on the orange supports lead the particle bunches into the vacuum chamber containing the plasma cell. The laser for igniting the plasma is guided through the overlying tube. The light-generating line for the Kai Siegbahn experimental hall can be seen on the right side of the photo. Photo: Marta Mayer

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Dear DESY colleagues,

One highlight of the new year will be the DESY 2030 strategy and its implementation. In the nearly 60 years of its existence, DESY has earned the reputation of being a globally leading research centre for the investigation and decoding of matter. Our centre is an internationally renowned accelerator and X-ray laboratory and a key player in particle and astroparticle physics. In all our research fields, we will face both great opportunities and major challenges in the future. In order for our laboratory to continue to successfully assert its international significance, robust strategies and pioneering visions are required, which are now merging in the new DESY 2030 strategy.

The DESY 2030 strategy is a plan for the future of our laboratory. As I was able to report at the staff meeting in December, the development of the strategy was preceded by a consultation process that lasted almost a year and a half. More than 400 DESY colleagues within 19 competence teams in the fields of science, large-scale facilities, supporting infrastructure and important cross-sectoral topics participated in the strategy design. Finally, the directorate, the deputy directors and selected experts combined the details of the draft into a homogeneous strategy.

To celebrate the presentation of the new DESY 2030 strategy, I cordially invite you to join an all-day event on 20 March 2018 in the Stage Theater an der Elbe. Together with you, the DESY directorate would like to give the starting signal for the implementation phase of the strategy and cast a glance into the future.

I am looking forward to initiating this new chapter in the history of DESY together with you, and I would like to thank you already for your active commitment to filling our laboratory's future plan, for which all hands and minds will be needed, with life.

Yours,
Helmut Dosch

accelerator without losing its high quality." Important factors are the energy distribution of the electrons in the particle bunch and the emittance, a measure of how parallel and bundled the electrons move. For this purpose, the whole beamline is equipped with instruments measuring the properties of the FLASH bunch before it enters and after it leaves the plasma cell.

Currently, the facility is being commissioned. The FLASHForward team hopes to generate the first plasma in spring and to accelerate the first particles in summer. For the first experiments, the scientists are inserting an approximately three-centimetre-long plasma cell into the beamline. It has to be meticulously aligned because the channel in the cell in which the plasma is generated and through which the particle beam is led has a diameter of less than one millimetre. The plasma for the acceleration can be ignited using high voltage or a high-power laser placed in front of the beamline.

As soon as the system will be running stably and reliably, the scientists will proceed to double the FLASH energy step by step by introducing longer plasma cells with acceleration lengths of up to 25 centimetres. At the same time, in cooperation with colleagues from FLASH, SINBAD, the Paul Scherrer Institute and CERN, the team will develop a measuring instrument with the catchy name X-band transverse deflection structure. The device will be used to precisely analyse the temporal structure of the particle bunches accelerated in FLASHForward. Richard D'Arcy, scientific coordinator of FLASHForward, reports: "With this technology, we will be able to measure the beam with a time resolution down to one femtosecond." As a member of the development team coordinated by Barbara Marchetti, D'Arcy is in charge in particular of the usability of the measuring instrument at FLASHForward. In 2019, the structure is to be installed in an extended diagnostic line behind the plasma cell.

In 2018, a variable beam block called a scraper will be inserted into the beamline between the FLASH accel-

erator and the plasma cell. It will enable another special feature of the facility: the acceleration of particles with particles. The scraper will split a long particle bunch from the accelerator into two small bunches – more precisely: it will cut a part out of the centre of the bunch. The resulting double bunch will then be injected into the plasma of the accelerating cell. Within the laser-ignited plasma, an area with a very high electric field strength will be generated behind the first bunch. The second bunch flying about 0.1 millimetres behind it will then be accelerated in the wakefield of the first bunch.

This sounds complicated; and in fact, it is. The Osterhoff team is therefore working out an ambitious plan. Together with colleagues of the FLASH accelerator and experiments, they are currently planning the time schedule for FLASHForward operation. "This year, we'd like to achieve 1000 operating hours," says D'Arcy. Most of it will take place within the framework of the Helmholtz Accelerator Research and Development (ARD) programme and during the so-called machine studies, another part in parallel to research operation at FLASH. At present, simultaneous operation is possible with experiments in the Albert Einstein hall. From 2019 on, a new kicker magnet will allow FLASHForward experiments to be carried out in parallel to the X-ray laser experiments in both FLASH experimental halls.

As a further step, the scientists plan to install an undulator behind the plasma accelerator, with which they hope to see at least some extent of lasing of the accelerated particles. The declared long-term goal of the project is to increase the average power, i.e. to operate the complex accelerating mechanism with a high number of accelerated particle bunches of high electric charge. Thanks to its superconducting accelerator, FLASH offers ideal conditions for this purpose. "Today and possibly for the next ten years, FLASH is the only facility in the world at which plasma acceleration with high repetition rate and thus with high average power can be tested," says Osterhoff. (tz)

Gerhard Knies

1937–2017

By Manfred Fleischer und Frank Lehner

Gerhard Knies was a former particle physicist at DESY who, after his retirement, became known as the founding father of “DESERTEC”. His vision was to harness the huge potential of solar energy in the African desert to create a more sustainable world. He inspired many people in science, society, politics and business. Gerhard Knies died on 11 December.

Gerhard Knies began his scientific career at DESY in the late 1960s, working on bubble chamber experiments. In the 1970s, he joined the experiment PLUTO at DORIS and later at PETRA. At that time, he studied baryon–photon couplings and later participated in measurements in gamma–gamma physics at PETRA. In the mid-1980s, he joined the JADE collaboration, working on analysing the recorded electron–positron data. During the HERA era, he was a member of the H1 collaboration and worked on the analysis of diffractive events – so-called rapidity gap events.

During a sabbatical year in 1995, Gerhard Knies already started to work on ideas



Gerhard Knies speaking at the “Solar Energy for Science” symposium at DESY in May 2011.

Photo: DESY

that were to become the main theme of his commitment as a retiree. Realising the enormous potential of the African deserts for the production of renewable energy, he initiated an energy partnership between Europe and the Middle East and North Africa (MENA) region. As the main promoter of this idea, he was

able to convince politicians, industrial players and scientists to join forces by creating the DESERTEC Foundation and later the DESERTEC Industrial Initiative in order to support the renewable energy plans in the MENA region.

At his suggestion, in 2011, DESY organised a widely acclaimed and recognised international symposium, “Solar Energy for Science”, to strengthen North–South scientific collaboration and, in addition, support the DESERTEC energy partnership through research and technology. The symposium attracted many prominent scientists – among them two Nobel laureates – and initiated many follow-up activities, including a much closer cooperation of DESY with institutes in the MENA region, in particular with the SESAME research centre in Jordan.

Gerhard Knies was an exceptional scientist with inspiring ideas and contributions. With Gerhard Knies, we have lost a very enthusiastic and visionary colleague and friend.

An impressive picture

For one week, DESY was evaluated on behalf of the Helmholtz Association

The preparations took about one year. At the beginning of February, DESY underwent a scientific evaluation on behalf of the Helmholtz Association. In 70 talks, 126 posters and countless personal encounters, about 400 DESY colleagues presented everything that makes the research centre and its accomplishments unique. The 26 evaluators chaired by Hugh E. Montgomery, the former director of the US accelerator centre Jefferson Lab, were impressed.

The expert panel emphasised the remarkable change the research centre has shaped over the past decade. The staff members and in particular the high

proportion of young researchers especially convinced the evaluators. “You are part of a remarkable lab,” said Montgomery in the final presentation. In addition to the professional performance, the excellent atmosphere and the smooth organisation of the evaluation week itself were also acknowledged.

“On behalf of the entire directorate, I would like to express my sincere thanks to all the staff members who have contributed to the extremely successful content and organisation of the review process,” said DESY director Helmut Dosch. “You have made a significant contribution to impressively presenting

the excellent achievements of our research centre to the international experts. The feedback was excellent, and the panel of experts extensively praised the outstanding atmosphere of the centre!”

The evaluation is part of the so-called programme-oriented funding (POF), which provides funding to the 18 Helmholtz centres within the framework of cross-centre research programmes. The current third funding period started in 2015 and runs until 2019. The Helmholtz Association will use the recently completed evaluation also to review the third and prepare the fourth funding period (POF IV). (tim)

Start of construction at Photon Science

In January, construction of the new Centre for X-ray and Nano Science (CXNS) started on the DESY campus in Hamburg. The new building next to Building 25f is created jointly with Helmholtz-Zentrum Geesthacht and Christian-Albrechts-Universität Kiel and will be the new home of the DESY Nanolab, among others. Completion of the new building, which was formerly termed photon science building, is expected in spring 2019.

**Ground-breaking ceremony for HARBOR**

At the end of December, the ground-breaking ceremony for the Hamburg Advanced Research Centre for Bioorganic Chemistry (HARBOR) of the University of Hamburg was held on the DESY campus in Bahrenfeld. HARBOR has evolved from the excellence cluster Centre for Ultrafast Imaging (CUI), in which DESY is also involved, and is directly connected to research at CUI on structural dynamics at atomic resolution. The new building next to the Center for Hybrid Nanostructures (CHyN) of the university will host nine work groups with about 130 employees.



From left: University chancellor Martin Hecht, senator for science Katharina Fegebank, HARBOR lead scientist Arwen Pearson and Sprinkenhof managing director Martin Görge. Photo: Jörg Harms

Cornerstone ceremony for “Light & Schools”

The physics school lab “Light & Schools” of the University of Hamburg will get a new building on the research campus. The “House of Teaching”, for which the foundation was laid in January, will provide room for physics school projects and advanced practical training courses. The building is being erected next to the Institute of Laser Physics of the university near Luruper Chaussee. The programmes of the DESY and university school labs complement each other.



Photo: UHH, Dingler

LEAPS – Light for research

European consortium of research light sources launched in Brussels



DESY director Helmut Dosch chairs LEAPS. Photo: LEAPS

A new strategic alliance strengthens cooperation between European accelerator-based research light sources. With its joint scientific excellence, the League of European Accelerator-based Photon Sources (LEAPS) aims to take on global challenges as well as to boost European competitiveness and integration. In November 2017, representatives of 16 institutions from across Europe approved the Consortium Declaration in the presence of Robert-Jan Smits, Director General for Research and Innovation at the European Commission in Brussels.

“Light from particle accelerators plays a crucial role in studies carried out in virtually every area of the natural sciences – from physics, chemistry and biology, through energy, medicine and transport, to studies in cultural history,” says Helmut Dosch, the chairman of the DESY directorate, who put forward the idea of LEAPS and is also the chairman of the consortium. “National facilities have so far mostly been developed and operated independently of each other, yet they have much in common, because most of their scientific objectives are very similar.”

The new form of collaboration between the participating institutions is to ensure that the large European research infrastructures can be used even more

efficiently in the future and that major scientific and technological challenges can be tackled together. This will not only benefit fundamental and applied research, but also industrial research carried out at accelerator-based photon sources.

Sixteen institutions from ten European countries have joined to form LEAPS, serving a community of more than 24 000 scientists from a wide range of fields. The new consortium is to encourage the exchange of ideas between its member institutions and with users, so as to speed up the development of the technology and to promote the necessary political environment for the long-term operation of the facilities. Also, it intends to strengthen the collaboration with industrial stakeholders and other scientific institutions, to pursue and advance the strategic development of key technologies in the field, to facilitate access to research light sources, to promote education and to communicate to the general public the importance of the research light sources for society. (tim)

INFO

<https://www.leaps-initiative.eu>

Excellent!

DESY silver badge of honour for Hans Weise and Winfried Decking

For their outstanding contributions to the construction and commissioning of the superconducting accelerator of the European XFEL, DESY scientists Hans Weise and Winfried Decking were awarded the DESY silver badge of honour at the DESY Science Day. “Thanks to the extraordinary commitment of Hans Weise, Winfried Decking and their teams, DESY has been able to further expand its position as an internationally leading accelerator laboratory,” DESY director Helmut Dosch pointed out. Both honourees emphasised the role of teamwork. “In our understanding, we have received the silver badge of honour on behalf of everyone who participated in the design, construction and commissioning,” said Weise.

The European XFEL X-ray laser is fed by the world’s largest superconducting linear accelerator. For its construction, an international consortium was founded in 2005, headed by Reinhard Brinkmann, today DESY director of the accelerator



From left: Winfried Decking, Helmut Dosch and Hans Weise. Photo: Bente Stachowske

division. In 2010, Hans Weise took over the leadership of the consortium, with Winfried Decking as his deputy. Behind them stood a highly motivated team of about 500 DESY colleagues and numerous employees from the 15 partner institutions of the accelerator consortium. Huge challenges in many fields had to be overcome during construction; these

were excellently mastered in international cooperation and thanks to the great commitment and team spirit of all the participants. In May 2017, on the occasion of the “first lasing” – the first generation of X-ray laser light – of the European XFEL, the accelerator consortium celebrated its successful completion. (hw)

Record attendance at DESY DAY

More than 20 000 visitors attended the open day

The open day of DESY and its Hamburg campus partners in November attracted more visitors than ever before: 20 287 persons were registered at the three entrances. More than 150 activities and attractions offered hands-on research for visitors to touch and grasp. In experimental halls, laboratories, accelerator tunnels, workshops, construction departments, the computer centre and the school lab, about 1000 helpers demonstrated what the research centre is all about.

The open day on the DESY campus took place for the seventh time as part of the Hamburg Night of Knowledge. DESY had opened its doors several hours before the official start of the Night of Knowledge, and between 12:00 and 17:00, more than 13 000 persons seized the opportunity to visit the research centre, among them many families. The numerous hands-on experiments in particular were very popular. Also on display were the works of the “Art meets Science: Dark Matter” project, the first such project at DESY.



For the seventh Hamburg Night of Knowledge, a total of 58 Hamburg universities, research centres and scientific institutes had opened their doors, offering an extensive programme with more than 1000 individual events. Everywhere in the city, visitors could

find experiments, guided tours, hands-on activities, lectures, films and music as well as culinary treats. Programmes for young talents were also included: There were 230 events for children of different age groups. (uw)

ICO Prize for Francesca Calegari



For her innovative and pioneering research on the generation of isolated attosecond pulses in extreme-ultraviolet light (XUV) and their application to the study of electron dynamics

in complex molecules, DESY leading scientist Francesca Calegari has been awarded the ICO Prize of the International Commission for Optics (ICO). The prize is presented annually to young scientists who have made a substantial contribution to optics. The award is endowed with 2000 US dollars.

Best apprentice award for Anna Förster

Zeuthen apprentice Anna Förster achieved the best results in Brandenburg in the final exam of the professional category industrial mechanics, precision instrument making, for which she was honoured by the Chamber of Industry and Commerce Cottbus in November. Training instructor Jürgen Grote (right) also attended the ceremony. Christian Stegmann, head of the DESY location in Zeuthen, congratulated: "This is a tremendous success for the mechanical workshop, which demonstrates once more the outstanding commitment of our apprentices and their instructor!"



René Zimmermann best mechatronics apprentice

René Zimmermann (second from left) completed his mechatronics training at DESY as the best in his professional category in Hamburg, an achievement for which he was honoured by the Hamburg Chamber of Commerce. At the same time, DESY was awarded the rating "Outstanding Achievement in Vocational Training 2017". Christian Haringa, deputy head of the DESY directorate, said: "We are very proud of René Zimmermann and the outstanding performance he demonstrated. On behalf of the DESY directorate, I congratulate him and his training instructors on this great success."



DESY start-up wins "Photonics Oscar"

Class 5 Photonics, a spin-off from DESY and Helmholtz Institute Jena specialised in high-power laser technology, won the PRISM AWARD 2018 in the laser category at the SPIE Photonics West conference and tradeshow in San Francisco. Class 5 Photonics' laser system

SuperNova OPCPA, which convinced the jury of the prestigious award, enables researchers to perform experiments up to ten times faster than with conventional lasers. The PRISM AWARDS are the premier worldwide event in the laser industry.

Astroparticle physics roadmap

European strategy sets research priorities for the next decade

Dark matter, neutrinos, cosmic gamma rays and gravitational waves are high on the list of research priorities of the European astroparticle physics community. This is highlighted in the new strategy published by the Astroparticle Physics European Consortium (APPEC) in January. With its new roadmap, APPEC will guide the community's research priorities over the next ten years.

and community, such as the Cherenkov Telescope Array (CTA), the Cubic Kilometre Neutrino Telescope (KM3NeT), future gravitational interferometers (the Einstein Telescope) and a substantial upgrade of underground research infrastructures, such as the Gran Sasso laboratory in Italy.

The new APPEC roadmap includes three relevant astroparticle physics research areas: the so-called multi-messenger approach, i.e. the simultaneous study of various cosmic messengers (charged cosmic rays, electromagnetic radiation, neutrinos and gravitational waves) emitted from very high-energy cosmic sources; a detailed study of the elusive neutrinos that fill the universe; and the exploration of the "dark side of the universe", i.e. dark matter and dark energy.

"The roadmap identifies CTA as the first large research infrastructure in high-energy astroparticle physics in Europe," said Christian Stegmann, representative of the DESY directorate in Zeuthen and member of the General Assembly of APPEC. "At DESY, we are proud to be in a lead role in CTA and to host the CTA Science Data Management Centre in Zeuthen. The roadmap documents the excellent alignment of astroparticle physics in Germany and at DESY, in particular, with efforts in Europe." (tz)

APPEC is calling for continued experimental efforts and funding support in these areas, in particular through large projects endorsed by the consortium

INFO

APPEC Roadmap:
<http://www.appec.org/roadmap>

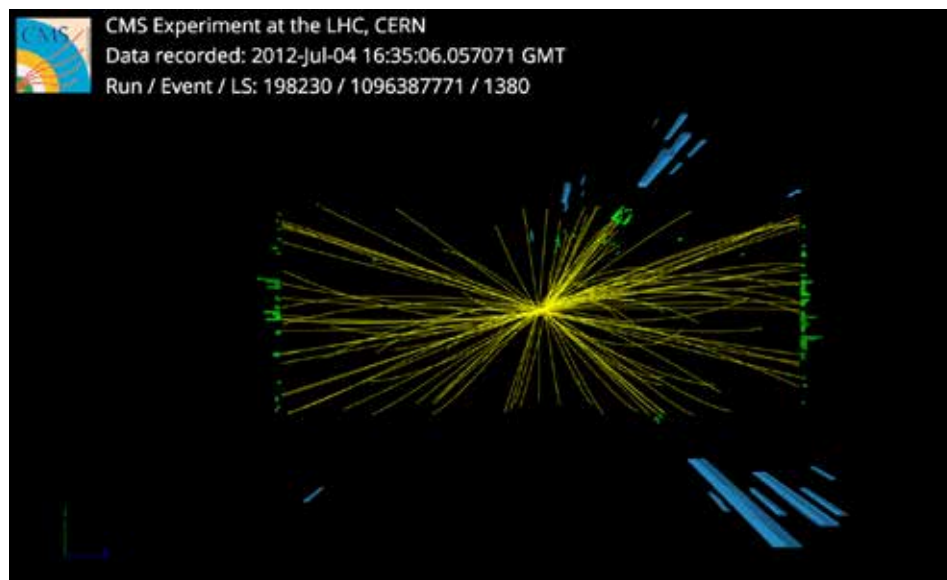
Higgs hunt on the sofa

CMS releases LHC collision data

Openness is one of the maxims of particle physics, particularly of research at the Large Hadron Collider (LHC). All scientific publications are open access – i.e. accessible for everyone – including portions of the real data from the particle collisions, which for years have been released in large batches in the open data portal. Now, particle physicists working at the CMS detector provided another enormous batch: About one petabyte of data in the original format is waiting for curious scientists and non-professionals.

The batch contains about half of the data collected by CMS researchers in

out analysis projects – for example theorists or colleagues from other experiments. In fact, on the basis of previously released batches, two scientific papers have already been published,” says Achim Geiser from the DESY CMS group, who works at CMS on data conservation and data publication – that is, open data. “These data are also very appropriate for educational purposes, like Masterclasses. They also offer a great potential for bachelor theses.” Geiser hopes that the recently released data will motivate scientists to search for phenomena that are not included in the much-explored “mandatory programme”.



A possible Higgs event from 2012 in the CMS detector. Picture: CMS/CERN, Tom McCauley

2012 – i.e. proton–proton collisions with a collision energy of 8 teraelectronvolts. One highlight is that these data and the included simulations enable authentic scientific analysis. To illustrate this: A swift DESY doctoral student already proved that with the recently published information, it is possible to reproduce the steps that led to the discovery of the Higgs boson in 2012. Now, anybody with enough patience can use the included free software and go Higgs hunting right from the sofa.

“These data are in the first place intended for researchers who want to carry

The material encompasses part of the raw data, reconstructed original data and simulations, simplified data formats as well as example results derived from these data. Users download a kind of virtual computer to their own computer, where the CMS data software will then be executed. With every use, the virtual machine accesses the data stored at the open data portal, meaning that the users do not have to download all the data to their own computers. In addition, there are sample codes and meta data, which for example show the status of the LHC at the time of data taking. (baw)

Windows migration at DESY

By Martin Gloris

Over the next two years, DESY and its partners will migrate 5500 computers from Windows 7 to Windows 10, the new standard at DESY. Is this effort really necessary? What will be preserved? Which changes are to be expected? Will there be problems?

Currently, the Windows standard version at DESY is Windows 7. However, Microsoft will terminate the maintenance of this operating system at the beginning of 2020. From then on, security leaks will not be eliminated any more – an unbearable risk. Moreover, there will be no manufacturer support in some cases for newer computers running the old Windows version.

That’s why there is no getting around Windows 10. In addition, the state-of-the-art Windows 10 better meets today’s requirements, offering many new and improved features. It will include the new web browser Edge, provide better support for mobile devices, especially with touch screens, enable virtual desktops, and many things more.

The most important innovation will be Microsoft’s “Windows as a Service”. The idea is that, in future, updates including new features will be released twice a year. The intention of Microsoft is to issue modifications more quickly in the fast-paced IT environment. DESY too will have to face the challenges involved.

The DESY specifics, however, will not change with Windows 10. The DESY environment with the network drives H:, N: and S:, the DESY printer system and the almost unaltered software portfolio, available via Net Install, will still be the same.

Windows 10 is known to exchange data with Microsoft. Based on recommendations of D4, IT adjusted the DESY Windows installation in such a way that exchange is reduced to a minimum. Moreover, data storage services in the cloud, such as Microsoft OneDrive, will be avoided. Microsoft accounts are not needed and should not be used.

The migration to the new Windows system requires some effort. Hardware must possibly be replaced, and all computers have to be newly configured. This will be carried out with the help of IT. Users will have to adapt their individual working environment by themselves. Corresponding documentation is in progress, training will be available if needed. At DESY, Windows 10 will be available in the first quarter of the year. Implementation into the DESY groups will be carried out gradually and in coordination with the Windows group administrators. Given the diversity that is common at DESY, a couple of difficult issues will surely have to be negotiated.

INFO

http://it.desy.de/dienste/betriebssysteme/windows/windows_10/index_eng.html

Gravitational acceleration at the particle accelerator

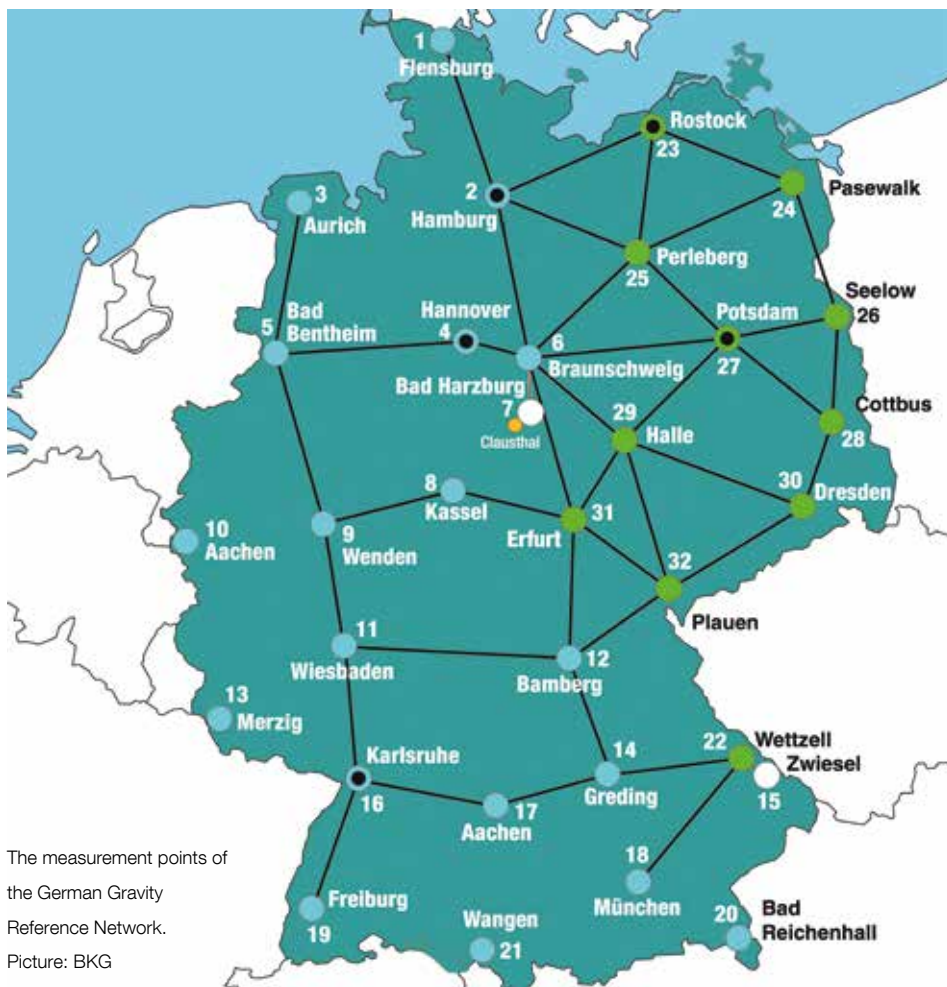
Measurement point at DESY in Hamburg becomes part of the German Gravity Reference Network

By Andreas Reinhold

Gravitational acceleration varies over time, with different factors influencing its absolute value. Thus, one of the key tasks of the Federal Agency for Cartography and Geodesy (BKG) is to provide the level and scale of gravitational acceleration for the territory of the Federal Republic of Germany to the German National Geodetic Survey. For this purpose, the BKG created the German Gravity Reference Network 1994 (DSGN94). It consists of 30 groups of points evenly distributed over the German territory. Since 1994, each of the centre points of the groups has been determined and repeatedly controlled with a so-called absolute gravimeter.

One of these point groups is positioned in Hamburg. The former centre point, which has been used as a gravity point since the mid-1970s, is located in the basement of the Oskar Lühning telescope at the Hamburg Observatory. The position of the measurement point, however, was defined before the introduction of the currently used FG5-type gravimeters of the firm Micro-g LaCoste. The point turned out to be inconvenient for their use because the height of the instrument requires an eccentric setup – hence the desire to find a better accessible and centrally usable point in Hamburg.

The scientific cooperation of the BKG with the gravimetry group of the Institute of Geodesy (IfE) of the University of Hannover, which also operates a FG5 instrument, helped to find a new measurement point at DESY, in the basement of Building 30. The IfE had already explored this point for one of their own projects and determined it absolutely with regard to gravitational acceleration, and they considered it to be very appropriate. After approval by the Applied Geodesy group at DESY, with Johannes Prenting and Markus Schlösser supporting the proposal, last summer the first absolute gravity determination was made at the point with the FG5 301 of the BKG. The instrument works according to the principle of free fall of a test specimen in vacuum. As physical standards, it uses an iodine-stabilised helium-



The measurement points of the German Gravity Reference Network. Picture: BKG

neon laser and a rubidium frequency standard.

The result of the measurements corresponds to the previous results of IfE Hannover, but still has to be finally verified with comparative measurements at the BKG reference stations in Bad Homburg and by the Wettzell Observatory. Subsequently, this gravity value will be included into the DSGN documentation and made available to the National Geodetic Survey. This will allow the authorities in Hamburg and Lower Saxony to bring their federal-state first-order gravity networks to the DSGN level, among others with connecting measurements to the point at DESY.

To precisely determine gravitational acceleration, its temporal variations have to be modelled and measurements corrected accordingly. Regarding its absolute value, the Earth tidal reduction – the impact of the gravitational pull of the sun, moon and large planets on solid Earth and the oceans – is the main correction, with a daily variation of about

± 1.50 micrometres per second squared ($\mu\text{m s}^{-2}$). The atmospheric correction is calculated as the difference between the station air pressure and the normal air pressure according to DIN/ISO 2533 (normal atmosphere), scaled with the empirical factor $0.003 \mu\text{m s}^{-2} \text{ hPa}^{-1}$. Depending on the current air pressure, it varies by $\pm 0.10 \mu\text{m s}^{-2}$. The reduction for polar motion, which can be derived from the current pole coordinates determined by the International Earth Rotation Service (IERS), is used to calculate the alteration of the centrifugal acceleration as a result of distance changes between the measurement point and the current rotational axis of the Earth. The absolute value of the reduction for polar motion is less than $0.01 \mu\text{m s}^{-2}$. In future, the measurement point 2/6 DESY Hamburg can be used as a new centre point within the DSGN, and it has been marked with the corresponding official label. It should remain available as long as possible for control and follow-up measurements for many projects.

VFFD award

Association of the Friends and Sponsors awards PhD Prize

For their outstanding doctoral theses, Volodymyr Myronenko and Johann Haber were awarded the 2017 PhD Thesis Prize of the Association of the Friends and Sponsors of DESY (VFFD). The prize, which is worth 4000 euros in total, was presented at the DESY Science Day in November.

Johann Haber's PhD thesis deals with quantum optics in the hard X-ray range and will help to further establish this new field of research at modern X-ray sources. In his thesis, Haber examined how the quantum optical phenomenon of strong coupling between light and matter can be applied to X-rays. Haber was also awarded the Helmholtz PhD Prize for his work.

Volodymyr Myronenko from Ukraine did his PhD at DESY and the University of Hamburg, working on physics at HERA. In his thesis, Myronenko combined and analysed the inclusive neutral- and charged-current cross sections for



From left: DESY director Helmut Dosch, Volodymyr Myronenko, VFFD chairman Friedrich-Wilhelm Büber and Johann Haber. Photo: Bente Stachowske

lepton-proton scattering measured by the H1 and ZEUS experiments at the former HERA storage ring. In addition, he presented experiments on the inner surfaces of superconducting nine-cell niobium resonators.

The PhD Prize is awarded once a year by the association VFFD for the best doctoral theses conducted at DESY. (tz)

Exemplary occupational safety

Official recognition of DESY

DESY ensures exemplary occupational safety, as has been officially recognised by the Hamburg Office for Occupational Safety. Within its Hamburg supervision, counselling and system monitoring concept, the Office continuously controls the occupational safety systems of Hamburg companies. In 2017, as one of five firms, DESY was rated in the highest category – a distinction achieved by only one to two percent of the supervised companies.

Reasons for the recognition of DESY were, among others, the halving of the accident rate since 2011, the systematic analysis and improvement of occupational safety and the good safety-related assistance of external researchers, technicians, students and other guests. Moreover, the Office highlighted DESY's occupational health management, including initiatives such as health days, healthy food and exercise breaks, as



well as its social counselling, in-house sports and compatibility of work and family. DESY's social and societal commitment was also appreciated. (tim)

INFO

<http://www.hamburg.de/ausgezeichnete-betriebe>

AWARDS

Humboldt Research Award for Hitoshi Murayama



Theoretical physicist Hitoshi Murayama has been awarded the prestigious Humboldt Research Award. From April, he will spend one year at DESY to continue his research into physics

beyond the Standard Model and the connections between particle physics and cosmology. He will extend his collaboration with DESY scientists and participate in the international efforts to corroborate the physics case of future collider projects.

Murayama is director for the Kavli Institute for the Physics and Mathematics of the Universe in Kashiwa, Japan, and professor at the University of California in Berkeley, USA. He is also deputy director of the Linear Collider Collaboration. He is also an enticing and passionate teacher and speaker, who knows to inspire both students and the general public.

Innovation Award on synchrotron radiation

A DESY team has received the Innovation Award on synchrotron radiation of the Friends of Helmholtz-Zentrum Berlin. The grant was presented at the ninth BER II and BESSY II User Meeting in December. Mikhail Yurkov, Markus Tischer, Bart Faatz, Evgeny Schneidmiller and Siegfried Schreiber (from left) received the prize for "Innovative applications of gap-tunable undulators with integrated phase shifters in SASE X-ray FELs" at FLASH2.



Ahmed Ali elected APS Fellow



For his contributions among others to precision tests of the Standard Model of particle physics, DESY scientist Ahmed Ali was elected Fellow of the American Physical Society (APS). The society also emphasised Ali's role in the organisation and consultancy of international conferences and his constant efforts to advance the cooperation of physicists from numerous countries and cultures. APS members who did exceptional work are elected Fellows. The election is regarded as a special honour.

Volunteers wanted as “Future Day” tutors!

26 April 2018 is the date of the Germany-wide “Future Day”, also known as “Girls’ and Boys’ Day”. After a break last year, DESY will take part again and open its doors for the first time not only to 75 girls, but also to 25 boys. The new concept is aimed especially at pupils who have not yet come into contact with DESY – all places are booked out already. Apart from workshops, the proven tutor programme will be offered again. For this, the organisers need your help: Give the girls and boys of fifth to tenth grade an insight into your daily work at DESY and your profession. If you are interested, please contact: carmen.schueler@desy.de

Second European XFEL undulator starts operating

At the beginning of February, a team of DESY and European XFEL scientists put the SASE3 undulator line of the European XFEL into operation, producing first laser light. SASE3 uses electrons that have first passed through the light source SASE1 where they have already generated laser light. The new X-ray light source will provide laser light for the scientific instruments SQS (Small Quantum Systems) und SCS (Spectroscopy and Coherent Scattering), which are currently under construction. SQS is specialised for the study of fundamental processes such as how chemical bonds break in molecules, while SCS will focus on the investigation of fast changes in material properties.

Collaborative research centre on mirror molecules

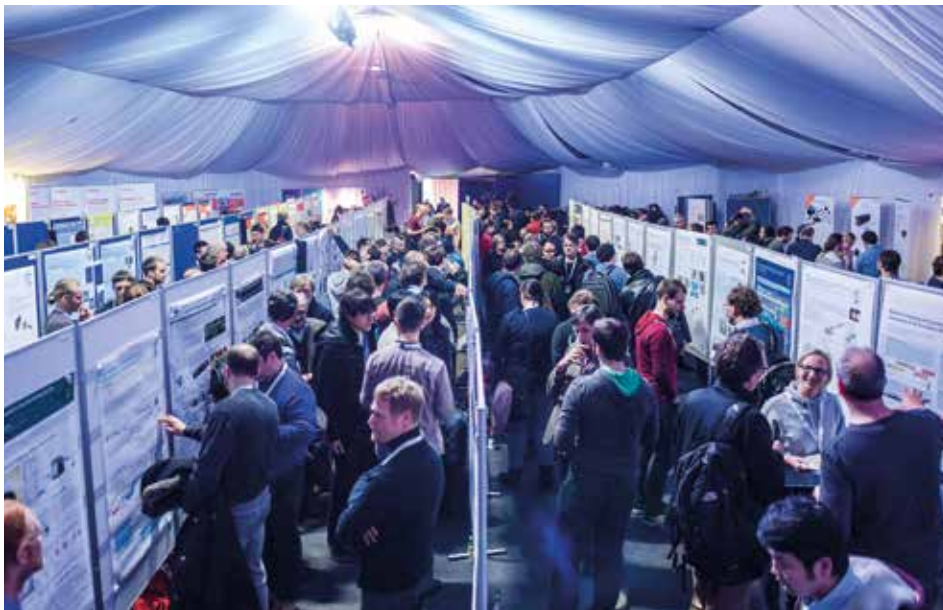
DESY Lead Scientist Melanie Schnell will be involved as subproject leader in a new collaborative research centre (SFB), which will use laser radiation to investigate molecules that exist in two mirror-inverted versions. These chiral molecules play an important role among others in the chemistry of life. The SFB 1319 “Extreme light for sensing and driving molecular chirality” (ELCH) will be funded by Deutsche Forschungsgemeinschaft (DFG) initially for four years and coordinated by the University of Kassel. Other partners are the universities of Marburg and Frankfurt am Main.

Heidrun Bojahr assumes corruption prevention office

Heidrun Bojahr is the new anti-corruption officer at DESY. She is the successor of Wiebke Eggers. As the contact person for corruption prevention, she is ready to inform all employees in all matters of corruption and corruption prevention. She can be reached by email at korrupsionspraevention@desy.de or through the phone extension numbers -5361 and -7235. More information including code of conduct and guidelines is available at: <http://d2.desy.de/korrupsionspraevention>

Record crowd

1200 participants at DESY and European XFEL Users’ Meeting



Poster session at the Users’ Meeting. Photo: Axel Heimken

The joint meeting of users of DESY’s research light sources and the European XFEL X-ray laser once again drew a record number of attendees to Hamburg. Some 1200 participants from nearly 100 institutions of around 30 countries had registered for the three-day event, more than ever before. A particular highlight of this year’s meeting, which took place on 24–26 January at DESY, was the beginning of scientific user operation at the European XFEL, first results of which were presented.

“The Users’ Meeting in Hamburg is the largest in the world for research with X-ray light

sources, and we are very proud of that,” emphasised DESY director Helmut Dosch. “The tremendous interest reflects the importance of these unique research tools for all natural sciences and beyond.” DESY’s research director for photon science, Edgar Weckert, added: “With the X-ray lasers FLASH and European XFEL and the storage-ring-based X-ray source PETRA III, the metropolitan region offers a worldwide unique combination of high-intensity research light sources that serve a wide range of disciplines, from biology and medicine through energy, materials and Earth science to physics, chemistry and even art history.”

Starting signal

Innovation Advisory Committee (IAC) begins working

By Maike Bierbaum

The Innovation Advisory Committee (IAC) – a new advisory board for DESY – will begin working in spring. The IAC and the DESY innovation strategy go hand in hand. The task of the IAC is to provide important feedback to DESY concerning innovation and technology transfer and to scrutinise activities, accomplishments and difficulties. The nine IAC members are innovative players from industry and science. Chairman is Henning Fehrmann, owner of the long-established Hamburg-based metal processing company Fehrmann Metallver-

arbeitung, which regards innovations as essential to remain successful in global competition.

The IAC members will meet once a year and provide advice to the DESY management. Based on their recommendations, the innovation strategy and corresponding measures may be readjusted – a process that is already familiar to DESY from other advisory boards. A first informal meeting of the IAC members, who will officially start working in spring, took place on 22 January.

International Cosmic Day

Research connects teenagers worldwide for one day

For the sixth International Cosmic Day, more than 1400 teenagers gathered in 20 countries around the world in late November to explore messenger particles from the universe. The students conducted their own experiments investigating cosmic rays, discussed the results with scientists and worked for one day like an international research collaboration. Scientific institutions worldwide opened their doors on the occasion to offer the high-school students – and about 30 teachers – an exciting insight into astroparticle physics. The event was initiated by DESY in cooperation with Netzwerk Teilchenwelt and the US particle physics centre Fermilab with its teachers' network QuarkNet.

their findings in video conferences with the other participants worldwide. Groups had registered from Bolivia to China and from Denmark to Ethiopia. This joint analysis, comparison and discussion showed the students how international cooperation can succeed and how science acts as a connecting element across national borders, language barriers and cultural differences.

“Every year, it is remarkable how quickly young people take up the scientific spirit and exchange their ideas enthusiastically, openly and critically in the video conferences,” said Carolin Schwerdt, coordinator of the astroparticle projects for young people at DESY and in Netz-



Global video conferences showed researchers' everyday lives. Photo: DESY

Experiments specifically designed for high-school students enabled the young researchers to detect cosmic rays themselves. With the mostly laptop-sized detectors, they examined for instance which direction most muons – particles that are generated when fast cosmic particles hit Earth's atmosphere – are coming from. Do we get the same number of muons from all directions, or is there a preferred direction?

Scientists and trained teachers supported the young people in planning and implementing the experiments and evaluating and visualising the data obtained. The young people could then discuss

werk Teilchenwelt. “Our research benefits from a multitude of personalities and nationalities with different cultures and education. Together, we are exploring our universe every day. It's great that more than 100 groups of young people in 20 countries around the world could experience this for themselves on International Cosmic Day,” added Christian Stegmann, head of the DESY location in Zeuthen. (ub)

INFO

International Cosmic Day:
<https://icd.desy.de>

Work without council?

Call for works council elections

By Hans Henschel

At the end of March and beginning of April, the works council elections will be held at DESY. The call for the elections was published in Zeuthen in mid-January; in Hamburg, it will follow shortly. The works councils invite all employees to participate in the elections – by voting or as a candidate!

Some of you may wonder whether a works council is really necessary? As a body required and protected by law, the works council has a control function in many of the employer's decisions; in addition, it has extensive advisory and shaping competencies.

At DESY, the works council exercises its control right in particular in the area of personnel planning and remuneration. It intervenes in case of increasing work density, monitors correct grouping and takes care of transparency and equity in the granting of allowances and bonuses. It exerts its shaping function for example in working time arrangements, occupational safety and data protection, restructuring and further training, health protection and matters concerning social services, such as canteen, sports facilities and campus structuring. The works council has extensive experience in these areas. If needed, it can also resort to independent expertise from outside within the network of the Helmholtz Association or the trade union.

At DESY, it is a good tradition that management and works councils collaborate with confidence. This creates a better work atmosphere: Management decisions are made with more transparency and take into account the employees' interests as well. On the other hand, the trust placed in the elected works councils enables them to more easily and quickly identify potential for conflict within the centre and to try to eliminate it together with the management.

The works councils at both locations, Hamburg and Zeuthen, are facing an imminent change of generations: Many experienced members of the works councils will retire in the coming years. This is why we explicitly wish to encourage DESY employees to stand as candidates for the elections! If you are interested, please contact us – we are ready to inform you about your tasks, duties and rights as a works council member. Whether you stand for elections or not – exercise your right to vote! This will help to ensure a strong staff representation and thus support DESY.

INFO

<http://betriebsrat-hamburg.desy.de>
<http://betriebsrat-zeuthen.desy.de>



FIT and healthy into the New Year!

DESY offers help to realise New Years' resolutions

By Natascha Peleikis

Anyone planning to realise one or the other New Year's resolution or looking for suggestions could find help at DESY in January and February.

In line with the main theme "DESY eats healthy" of the Health Day 2017, Alsterfood participated in an action of the "food docs" from the NDR television series: On Mondays from 8 January to 12 February, the DESY canteen offered a meal fitting the theme of the weekly evening programme in its menu line 2. The motto was "Health à la carte – the right food keeps us healthy." Apart from the DESY canteen, the NDR studio kitchens and the canteens of Beiersdorf and Tchibo, among others, also participated in the action.

Another follow-up action of the Health Day 2017 is the nutrient-optimised "FIT" menu line developed by the canteen committee. Since the beginning of the year, one meal of the daily four menu lines has not much more than 700 kilocalories, and the ratio of nutrients corresponds to the current recommendations

of the German food association (DGE): carbohydrates amount to 50–55 percent (about 85–95 grams), fat to 25–30 percent (about 18–25 grams) and proteins to 15–20 percent (about 34–40 grams). There are no deep-fried products in the "FIT" line, and the meals generally include a smaller carbohydrate side dish and less meat or fish, but more vegetables. Distributed over one week, on average, fish is offered once, meat once or twice and a vegetarian or vegan meal two or three times per week.

Anyone who also wanted to tackle one or the other ailment or physical problem could find inspiration and pick up practice tips during the "exercise breaks". Whether brain fitness, shoulder tension relief, posture coaching, deeper breathing, fasciae training, acupuncture, hip mobility or mental relaxation – for four weeks, the short exercise units focused on specific topics, which was very well received.

INFO

<http://gesund.desy.de>

Hermann von Helmholtz –

The philosopher who did not want to be one
He was a real universal scholar, building bridges between physics, chemistry, mathematics and medicine, theory, experiment and application. Hermann von Helmholtz stands for the whole diversity of natural sciences research. Born in 1821, he received his doctorate in medicine in 1842. After holding various positions in different cities, as from 1871 he taught as a professor of physics in Berlin.

He was not only interested in the natural sciences, however. From the beginning of his career, he viewed scientific cognition and action also in a philosophical way. "Helmholtz was not a philosopher and he did not want to be one," state the science theorists Michael Heidelberger, Helmut Pulte and Gregor Schiemann. "But he always attached great importance to the philosophical reflection of scientific knowledge and scientific action."

The science theorists now published a complete edition of Helmholtz's philosophical and popular scientific papers in the Felix Meiner publishing house. The 66 scientific philosophical and epistemological texts, lectures and talks have not only been collected "for the 'antiquarian conservation' of one of the great men of science and the philosophy of science". They are intended to encourage topical discussions, among others on the position of science in society. In times when climate change is denied and fake news invade social media, more than ever before this goal should be worth striving for.

www.helmholtz.de/perspektiven

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