

## Record number of visitors attend Open Day

Almost 19,000 curious guests experience DESY research at first hand



Photo: DESY/Lars Berg

“It was a fabulous event. Many thanks for the opportunity to see a top research facility from the inside! Everything was very well organized!” This Facebook comment is typical of the countless enthusiastic responses expressed by the 18,674 visitors who streamed through the open doors at DESY in Hamburg on 2 November. Hours before the official start of Hamburg’s 5<sup>th</sup> “Night of Knowledge”, DESY had already opened its doors. Between noon and 5:00 p.m. more than 11,000 curious guests, including many families, took advantage of the opportunity for early admission. In addition to the milestone reached in terms of the visitor turnout, yet another record was set: more than

1,000 voluntary helpers from DESY and its partner institutions were on hand at the DESY campus to tirelessly answer questions and show that there is more to research than fascinating high-tech equipment. Above all, research requires the participation of dedicated and enthusiastic employees. These volunteers encouraged their guests to not only observe but also participate, try things out and ask questions. In addition to touring the large FLASH and PETRA III facilities, walking through the HERA tunnel and looking into the European XFEL, the visitors were treated to more than 100 activities organized by the staff, who were happy to demonstrate their contributions to the research activ-

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ities at DESY. All of these experiences made the Open Day a very special event for the visitors. (*uw*)

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## DIRECTOR'S CORNER

Dear colleagues,

Fundamental research is always exciting, but at the moment it is especially satisfying to work in this field. That's because the hard work of particle physicists from all over the world has recently been rewarded indirectly with the Nobel Prize and directly with the Prince of Asturias Award (cf. the article below).

In my opinion, the fact that a pioneering theory that was formulated almost 50 years ago is being confirmed today through experiments is a triumph of the human spirit. Generations of particle physicists have searched for the Higgs boson, and its discovery owes much to the many young scientists who have set up the LHC experiments and evaluated the resulting data with tremendous dedication. This is a community of more than 10,000 people from all over the world, including approximately 1,000 from Germany. I think we can justifiably be very proud of ourselves and look ahead with confidence. There's still a lot more to discover!

During the Open Day at DESY, many visitors asked questions about the Higgs boson and about research concerning the nature of matter. The nearly 19,000 visitors received a fascinating insight into the world of

science at DESY, ranging from particle physics to photon research and the unique DESY accelerators that are making these expeditions into the microcosm possible in the first place. I would like to take this opportunity to thank all of the helpers who made themselves available as sources of information at the weekend — your enthusiasm was directly transmitted to the visitors!

I must conclude with a sad piece of news. The former director of the particle accelerator department, Gustav-Adolf Voss, died recently at the age of 84. As the man who prepared the way for DORIS, PETRA and HERA, he played a key role at our research centre, and long after he went into retirement he was a frequent and very welcome guest at many DESY events. We greatly valued his advice and his personal commitment, and we will always hold the memory of Gus Voss in the highest esteem.

Sincerely yours,

Joachim Mnich

# Multiple awards for particle physics

## Nobel Prize and Prince of Asturias Prize for the “fathers” of the Higgs mechanism

“Today is a great day for particle physics. It's a great day for theory and for experimentation, because they belong together,” said CERN Director General Rolf Heuer on 8 October, the day the Nobel Prize for physics was awarded. Heuer was speaking spontaneously to a large group of physicists who were celebrating at CERN. This year the Nobel Prize for physics was shared by the theoretical physicists François Englert and Peter Higgs for their theory explaining the mass of elementary particles, which is known as the Higgs mechanism. This theory explains how elementary particles retain their mass. Their idea was confirmed by the detection of the Higgs particle, which is part of the theory, in July 2012. The measurement was made in the course of the ATLAS and CMS experiments with the help of the LHC particle accelerator at CERN in Geneva, Switzerland. Many German researchers



François Englert, Peter Higgs and Rolf Heuer receiving the Prince of Asturias Award. Photo: Iván Martínez/FPA

also played a key role in this discovery. They conveyed their congratulations to the two award winners through messages and by organizing local events. A few days later, the two scientists received an additional award. The two of them had met for the first time in 2012

at CERN when the discovery of the Higgs particle was publicly announced. At a gala ceremony on 25 October that was attended by the Queen of Spain and the Princess and Prince of Asturias, Englert, a native of Belgium, and Higgs, who comes from the UK, were presented with the Prince of Asturias Award — this time together with CERN, which was represented by Rolf Heuer. The three men jointly received the award in the category of research in the natural sciences for „the theoretical prediction and experimental demonstration of the Higgs particle“. The award money received by CERN will be used to support the work of young scientists. (baw)

### INFO

[www.nobelprize.org/nobel\\_prizes/physics/laureates/2013](http://www.nobelprize.org/nobel_prizes/physics/laureates/2013)  
[www.fpa.es/en/2013-special/laureates](http://www.fpa.es/en/2013-special/laureates)

# Gustav-Adolf Voss

1929-2013

*By Reinhard Brinkmann*

On 5 October Prof. Dr. Dr. h. c. Gustav-Adolf Voss passed away in Hamburg at the age of 84 after a short serious illness. Gustav-Adolf Voss was Director of the DESY accelerator division from 1973 to 1994 and has shaped the development of our laboratory like few others. With his strong, charismatic personality, deep knowledge and extraordinary high motivation he had also a shaping influence on many people who had the privilege to work closely together with him. I myself was lucky to work as a young scientist under his leadership as division director during my first 11 years at DESY.

After obtaining his PhD at Technical University of Berlin Gustav-Adolf Voss had his first contact with DESY in 1958/59. He decided to go to Harvard University in the USA to join the Cambridge Electron Accelerator bypass project with which the machine was upgraded to a colliding electron-positron beam facility. This extremely challenging project generated a number of innovations to which he made essential contributions. Gustav-Adolf Voss himself spoke about these years in the small but outstandingly competent and innovative CEA team as the most influential, exciting and challenging time of his entire career. No doubt here also the foundation was laid for what became later known as the legendary "Voss-Style", not only at DESY but in the accelerator community worldwide.

In 1973 Gustav-Adolf Voss was appointed as member of the DESY directorate and took over as head of the accelerator division. Already shortly after the successful commissioning of DORIS the plans for the much larger electron-positron storage ring PETRA started taking shape. Under the competent leadership of Gustav-Adolf Voss this

project was realised from 1975 – 78 and became a worldwide outstanding success. The construction time was about one year shorter than planned and the cost was well below budget. PETRA was ahead of the competing project PEP at Stanford, what at that time meant a worldwide leadership of DESY for electron-positron colliders. Already shortly after the commissioning in 1979 at PETRA one of DESY's most out-



Gustav-Adolf Voss (centre) talking to science minister Heinz Riesenhuber (right) and DESY DG Volker Soergel (left) shortly before the completion of the HERA tunnel in 1986.  
Photo: DESY

standing scientific successes was obtained with the discovery of the gluon. The matrix structure in the M-division introduced by Voss at that time for the organisation of accelerator operations is still in effect at DESY today.

The HERA project starting 1984 was jointly led by Björn Wiik and Gustav-Adolf Voss, with Voss being in charge of the electron ring, buildings and technical infrastructure. Already after slightly over four years construction time the first electron beam was stored in 1988. First colliding electron and proton beams were obtained in 1991. One unique feature of the electron ring was the possibility of longitudinal spin polarisation, which was first successfully established in 1993 and was then available for many years of experimentation at HERA.

Already during the HERA construction and commissioning phase Gustav-Adolf Voss had the vision to realize the potential of linear accelerators and discussed with an initially small group of scientists conventional and innovative approaches towards a next-generation colliding beam facility. I remember this time as the probably most intensive and exciting phase of my working together with Gustav-Adolf Voss.

After retirement in 1995 he remained very closely connected to DESY and was often a committed, curious and constructively critical discussion partner for topics where one was seeking advice or technical-scientific discourse. In later years he got passionately engaged in the synchrotron radiation facility SESAME, which is under construction in Jordan and as an international project brings together in science the states in the Middle East. For his long-standing merits in science, his essential contributions to the development of particle accelerators,

for his commitment to support eastern European scientists after the breakdown of the Soviet Union and for his dedication to SESAME Voss received numerous awards, among which are the Order of Merit of the Federal Republic of Germany, the honorary doctorate of the University of Heidelberg and the prestigious Tate Medal of the American Institute of Physics. For his numerous merits for our laboratory in 2009 Gustav-Adolf Voss became the first person to receive the DESY Golden Pin of Honour, which was awarded to him during the colloquium on the occasion of his 80th birthday.

We lose with Gustav-Adolf Voss an outstanding personality who has shaped DESY decisively and to whom many of us owe very much.





## November

- 11-15** MINT-EC Students Camp  
Messung kosmischer Teilchen  
DESY, Zeuthen, SR2
- 11-15** Terascale Workshop ([www.terascale.de.cplusplus2013](http://www.terascale.de.cplusplus2013))  
C++ – from Basics to Not-so-Basics and advanced Root analysis techniques  
DESY, Hamburg, SR4
- 13** Public Lecture  
Teilchenphysik in der Medizin  
Erika Garutti, Uni Hamburg  
DESY, Hamburg, auditorium, 19:00 h
- 13** Film Festival ([www.kurzundkalt.de](http://www.kurzundkalt.de))  
Das Beste von den Antarktis-Filmfestivals  
DESY, Zeuthen, SR3, 19:00 h
- 19** Event  
Helmholtz-Tag in den DESY-Schülerlaboren  
DESY, Hamburg and Zeuthen
- 21-22** MINT-EC teacher training  
Messung kosmischer Teilchen  
DESY, Zeuthen, SR2
- 25** Teacher training ([www.desy.de/higgs-lehrerfortbildung](http://www.desy.de/higgs-lehrerfortbildung))  
Higgs-Entdeckung – Neue Erkenntnisse der Teilchenphysik  
DESY, Zeuthen, SR3, 9:30-16:30 h
- 27** Science Café DESY (<http://sciencecafe.desy.de>)  
Was macht ein theoretischer Physiker in der Praxis?  
Robin Santra, DESY, Hamburg, DESY Bistro, 17:00 h
- 27** Public Lecture  
Higgs, Higgs, hurra! Physik-Nobelpreis 2013  
Thomas Naumann  
DESY, Zeuthen, SR3, 19:00 H
- 29** Workshop ([www.mint-ec.de/mint400-das-hauptstadtforum.html](http://www.mint-ec.de/mint400-das-hauptstadtforum.html))  
Kosmische Teilchen sichtbar machen – Schule trifft Wissenschaft  
DESY, Zeuthen

## December

- 4** Public Lecture  
Das Higgs-Teilchen - gesucht, gefunden, geehrt!  
Joachim Mnich  
DESY, Hamburg, auditorium, 19:00 h
- 10-12** Workshop (<http://mtcaws.desy.de>)  
2nd MTCA Workshop for Industry  
DESY, Hamburg
- 11** Science Café DESY (<http://sciencecafe.desy.de>)  
Guten Rutsch! – Die Physik des Schlittschuhlaufens  
Vedran Vonk, DESY, Hamburg, DESY Bistro, 17:00 h
- 14** Sunday Lecture „Potsdamer Köpfe“  
Higgs-Jagd an der Weltmaschine – Physik am Large Hadron Collider LHC  
Thomas Naumann, DESY  
Bildungsforum Potsdam, 11:00 h
- 17+18** DESY Christmas Event  
Klingende Zahlen – Musikalisch-mathematische DESY-Weihnachtsshow  
Michael Bratke  
DESY, Hamburg, auditorium  
19:00 h, Public Event  
18 Dec., 16:00 h, DESY internal event

### Ice cream hazard!

Visitors to DESY's Open Day got a crash course in making delicious chocolate ice cream on the spot. All you need – apart from the usual ingredients – is some liquid nitrogen at nearly minus 200 degrees...  
Photo: DESY/Lars Berg



It's all in an Open Day's work: fun, action and attractions just as much as interesting facts about research done on the DESY campus.

Photos: DESY/Lars Berg, Marta Mayer





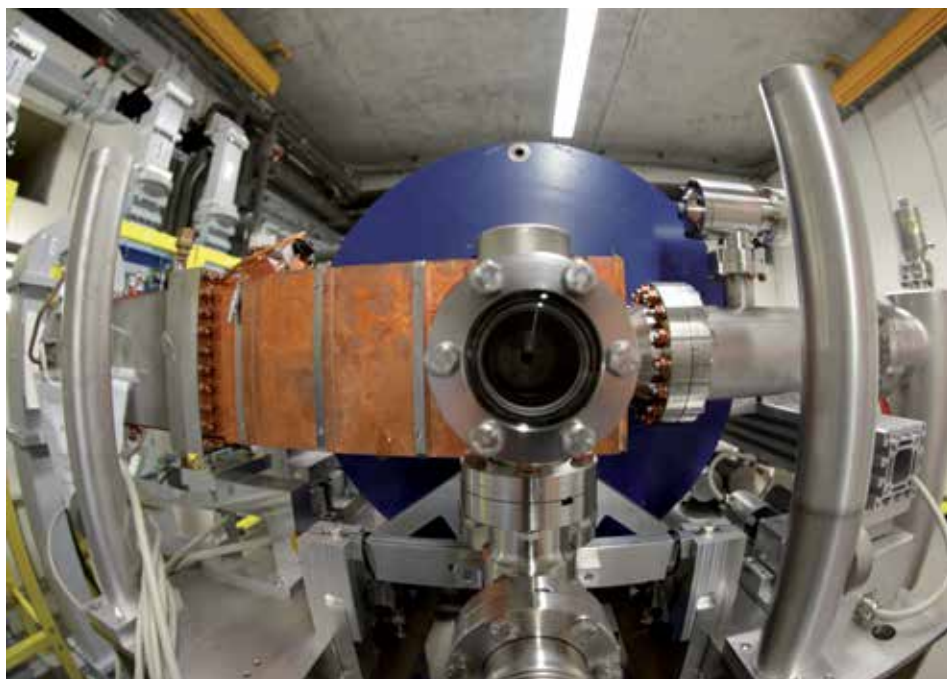
# Starting point of the European XFEL

## European X-ray laser electron source installed

By Michael Bükler

The first component of the accelerator for the European X-ray free-electron laser XFEL has been installed at DESY in Hamburg. The component — a high-frequency electron source — is the first part of the injector. In future, it will deliver the electron bunches that will be accelerated to high energies in order to ultimately create 27,000 X-ray laser pulses per second.

The injector was built by DESY in Hamburg and has been custom-made for the European XFEL. The extensive experience DESY has gained from its pioneering X-ray laser, FLASH, was critical to the construction of the new injector. The many years of development work for FLASH are also beneficial for the European XFEL.



Peering into the electron source: soon electron bunches will come out of this tube. Photo: DESY/Dirk Nölle

The high-frequency electron source, also known as an electron gun, is located on the seventh subterranean level of the injector hall in Bahrenfeld, right at the entrance to the accelerator tunnel. Four floors above, the necessary high-frequency pulses will be created in what is known as a klystron. These will be transported to the injector through waveguides.

The heart of the electron gun is a caesium-telluride photocathode. Electrons are ejected from this cathode by the photoelectric effect, triggered by an ultraviolet laser. These electrons are then pre-accelerated in a one-and-a-half-cell-long mini accelerator before they are injected into the actual linear accelerator.

Before installation, the electron gun was prepared for operation at the Photo Injector Test Facility in Zeuthen (PITZ). "The system has to be "conditioned" before the high-frequency power necessary for creating the acceleration wave can be fed into the cavity resonator," explains PITZ coordinator Anne Oppelt. Once the injector hall infrastructure for providing power, cooling water and air conditioning had been prepared at the beginning of October, it was possible to install the gun and the klystron. The individual components are now being tested and connected in order to begin trial operation.

### VFFD Ph.D. Thesis Award

This year's Ph.D. Thesis Award of the Association of the Friends and Sponsors of DESY (VFFD) is being shared equally by Johannes Hauk and Andrej Singer. Hauk received his doctorate in high-energy physics in the CMS group at DESY.



His work delivers, among other things, important findings about the interaction of electroweak processes with the processes of heavy quarks.



Singer did his doctoral work in the area of photon science at DESY. Among other things, he investigated coherence characteristics and statistical features of the radiation emitted by new types of X-ray sources, such as the free-electron lasers FLASH at DESY and LCLS at Stanford. His findings will be particularly significant for the future use of free-electron lasers in new research areas such as quantum optics.

<http://vffd.desy.de/e25/>

### Arnim Balzer receives H.E.S.S. Award

The doctoral candidate Arnim Balzer, who works at DESY in Zeuthen, has been honoured with the H.E.S.S. Award for his outstanding contributions to the High Energy Stereoscopic System (H.E.S.S.).



Balzer, who is 28 years old, has helped in a variety of ways to make the data input and start-up phase of the new 28-metre telescope completely smooth. He accepted the award at the H.E.S.S. conference in Bordeaux, France, in October. The H.E.S.S. system of telescopes, which is located in Namibia, observes air showers induced by cosmic radiation.

### Ioffe Röntgen Institute launched

With a kick-off meeting at DESY in Hamburg the newly founded German-Russian Ioffe Röntgen Institute (IRI) has taken up work. The new institution will serve as an umbrella for cooperation in the development and application of large-scale research infrastructures. It is supposed to place cooperation between German and Russian scientists on a new structural basis and to further strengthen and deepen cooperation in strategically important research areas for both countries.

# Cultivate your spaces!

Healthy management in science



Senior physician Hans-Peter Unger spoke at the Helmholtz session for sharing experiences related to professional health management. Photos: DESY/Marta Mayer

According to a recent study by German health insurance Techniker Krankenkasse every second person feels stressed. Stress on the job is often unavoidable. But there have to be enough phases of rest and personal space, says Hans-Peter Unger, senior physician of the Centre for Mental Health in Harburg, speaking to Natascha Peleikis.

## *Isn't burnout simply a media-driven topic?*

In our society, everything is supposed to be possible and everyone is assumed to be the shaper of his or her own destiny. And when the subject of burnout comes up in the media, the discussion focuses on the excessive demands made on the individual, his or her limits, and his or her personal exhaustion. But the underlying question is a general one: How does chronic stress affect our health? If there is no appropriate buffer protecting our resources and if we don't take care of ourselves, at the end of a burnout process long-term stress can lead to mental illnesses such as addiction, depression or anxiety syndrome. The key aspect is not only the amount of work I have to do but also how much appreciation, fairness and support I receive in the workplace and to what extent I feel like a participant. A spiral of fatigue can form. Although this process can be reversed at any time, without intervention, it can also end in mental illness.

## *How does working in the field of research affect our health?*

Professional groups who strongly identify with their work as a rule seem to have been unaffected by stress-driven illnesses so far. However, investigations are now also focusing on scientists. According to the findings, the key factor is not the number of hours one spends doing research but rather the conditions under which the research is done. The pressure to publish, excessive bureaucracy, temporary work contracts, budget cuts, and unclear priorities lead to frustration and anxiety, and in the long term they generate chronic stress. In

combination with personal factors such as perfectionism and conflicts between work and private goals (such as family planning), burnout and depression can result. When we are under permanent stress, we always act in a more automatic way — we switch over to autopilot mode. The frontal brain lobe, our organ of control and decision-making, no longer functions properly. We are no longer aware of how much room we have to manoeuvre, and we stop taking care of ourselves.

## *How can I prevent this from happening to me and my co-workers?*

The commercialisation of research and the pressure to publish diminish the sense of solidarity. It's helpful to ask oneself, "How can I join up with others in a group and defend my interests?" At the personal level, everyone needs repeated phases of free time to reflect on one's own position and one's own room to manoeuvre. It's important to keep asking oneself, "What do I need to do to ensure I can make decisions and control developments?" "When can I clear my mind?" "How can I plan breaks into my schedule and stick to this plan?" It's helpful for employees to make sure they have enough opportunities for their private and social development as well as their private and social lives. In the field of scientific research we are familiar with the depression associated with post-tenure exhaustion. In other words, after the individual has reached a goal, for example, by completing a PhD or finding employment, a new type of pressure starts up: pressure to publish, leadership of research groups, the development of intercultural skills, etc. In these situations it's all the more important to take care of one's sources of inner strength. These may include sports activities, meditation, social commitment or solitude, music or awareness training. For young scientists, coaching that supports them in their initial phase of work can prevent their new challenges from becoming burdens.

## Lobsters released into the wild off Heligoland

A total of 415 young lobsters have been released into their natural North Sea habitat off the cliffs of Heligoland in the presence of their "sponsors." Researchers at the Alfred Wegener Institute, the Helmholtz Centre for Polar and Marine Research (AWI), have been releasing laboratory-bred lobsters into the wild every year since 2008 in order to halt the decrease of the lobster population.

The lobster is the heraldic animal of Heligoland. In addition, lobsters play an important role in the ecosystem of Germany's only island in the high seas. Under the direction of Heinz-Dieter Franke and Isabel Schmalenbach, the AWI researchers raise the lobsters in the laboratory, from the time they are eggs until they become free-swimming larvae and eventually juveniles that are up to four centimetres long and can live on the ocean floor. "Before the lobsters are released, they receive a coloured marking that enables us to tell them apart from those born in the wild," says Schmalenbach, who examines the lobsters caught by fishermen and by the Institute. More than 1,500 „sponsors“ support the project, which is carried out by the AWI together with the municipality of Heligoland. When the research cutter Aade heads out to sea with its cargo of scientists and lobsters, the "sponsors" can accompany their "adoptees" in boats owned by the municipality. For the young lobsters, who have cannibalistic tendencies, the trip is much less social. They are separated from one another in order to avoid any conflicts.

<http://www.helmholtz.de/perspektiven>

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