

Faces & Places

APPOINTMENTS

John Womersley appointed director of ESS

The European Spallation Source (ESS) under construction in Lund, Sweden, has named John Womersley as its next director general. Womersley, who is chief executive of the UK's Science and Technology Facilities Council (STFC), will take over from current ESS director general Jim Yeck on 1 November.

More than 40 institutions from 15 countries are participating in the €1.84bn ESS, which will be the world's most powerful source of neutrons when it enters full operation in 2025. Womersley, a particle physicist who worked at Fermilab and later became a scientific adviser to the US Department of Energy, was directly involved in the UK's decision to join the ESS project in 2014. He has led STFC, which manages the UK's contribution to CERN and other international projects,



since 2011 and is also the current chair of the European Strategy Forum on Research Infrastructures.

"I'm excited to join ESS. It's one of Europe's largest and most visible new research projects.

John Womersley at the Foundation Stone Ceremony in 2014, which marked the beginning of the construction of the ESS.

Scientists, staff, partner institutions and countries across Europe have come together to build what will be the world's leading neutron source for research on materials and life sciences," says Womersley. "The impressive progress at ESS can be seen in the construction site in Lund and I am determined to keep up the momentum."

Yeck, who was previously director of the IceCube neutrino telescope project, joined ESS as CEO and director general at the beginning of 2013 and successfully led ESS into construction. The ESS ERIC (European Research Infrastructure Consortium) was established in August 2015.

TRIUMF welcomes new associate director

Oliver Kester has been appointed associate laboratory director for the Accelerator Division at TRIUMF in Canada, succeeding Robert Laxdal. An accomplished accelerator physicist and scientific leader, Kester is currently a professor at Goethe-Universität Frankfurt and director at FAIR (Facility for Antiproton and Ion Research) under construction in Darmstadt, Germany. He has also held faculty and administrative positions at CERN, the University of Munich and Michigan State University.



Oliver Kester will start his new role at TRIUMF in September.

Kester's research interests focus on the production and transport of intense charged-particle beams, the development of accelerator cavities, beam instrumentation and electron targets for heavy-ion storage rings. In his new role, effective from 12 September, he will be responsible for the operation of the accelerator facilities, the construction of the ARIEL project and the advancement of accelerator research at TRIUMF. "I couldn't be more thrilled to join TRIUMF at such an exciting time for accelerator science at the laboratory," said Kester.

AWARDS

Markov prize for black-hole theory

The Institute for Nuclear Research (INR) of the Russian Academy of Sciences has awarded its 2016 Markov prize to Victor Berezin of INR RAS and Valery Frolov of Alberta University in Canada for their outstanding contributions to the theory of black holes. Berezin is a well-known specialist in the field of gravity theory and cosmology. He contributed much to



Prize winners Victor Berezin of INR RAS (left) and Valery Frolov of Alberta University.

the theory of quantum and quasi-classical gravitational collapse, and carried out

pioneering research in the properties of black holes, the spectra of their masses and radiation parameters. Frolov, who was unable to attend the ceremony due to other commitments, has made advances in our understanding of interior space and black-hole entropy, extra-dimensional models and the interactions between black holes and strings or branes.

The award was presented at the 14th Markov Readings in Moscow on 13 May. These are a series of international seminars held in commemoration of the prominent Russian scientist Moisey Markov (1908–1994).

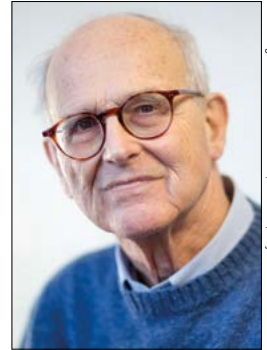
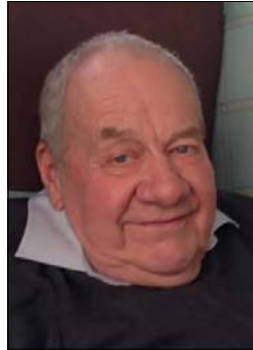
Prizes galore for LIGO discovery

Following the discovery of gravitational waves by LIGO (Laser Interferometer Gravitational-Wave Observatory), which was announced in February this year, the breakthrough has been recognized by three major awards.

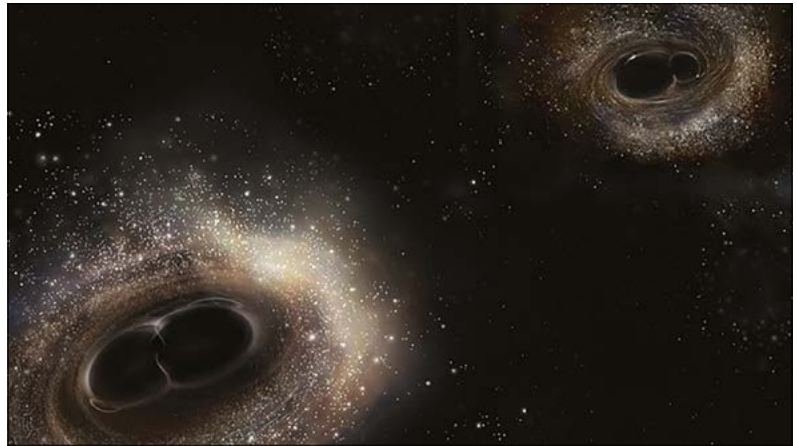
On 2 May, the selection committee of the new \$3 million Special Breakthrough Prize in Fundamental Physics announced that LIGO founders Ronald Drever and Kip Thorne of Caltech and Rainer Weiss of MIT would share one third of the award, with the remaining amount being shared equally between LIGO's 1005 authors and seven members of LIGO's sister experiment VIRGO. The laureates will be recognized at the 2016 Breakthrough Prize ceremony in autumn, where the annual Breakthrough Prize in Fundamental Physics (which is distinct from the special prize) will also be presented.

Just two days later, on 4 May, the same founding LIGO members and the LIGO discovery team received the \$0.5 million Gruber Cosmology Prize for the detection of gravitational waves, which the prize announcement described as "a technologically herculean and scientifically transcendent achievement". Drever, Thorne and Weiss will also receive a gold medal recognizing their dedication and work. Finally, on 2 June, the pioneering LIGO trio was awarded the 2016 Kavli Prize in Astrophysics. The \$1m prize, which is presented once every two years, recognizes their instrumental role in establishing the experiment.

"The lion's share of the credit for LIGO's gravitational-wave discovery belongs to the superb 1000-member LIGO team, who pulled it off," said Thorne. "They have made Weiss, Drever and me look good. And my deep thanks go out, also, to the succession of outstanding LIGO directors who provided the leadership required for success – Robbie Vogt, Stan Whitcomb, Jay Marx, David Reitze, and especially Barry Barish, who designed and led the transformation of LIGO from the small R&D project that Weiss, Drever and I created."



LIGO founders Ronald Drever, Kip Thorne and Rainer Weiss.



The recent discovery of a second black-hole merger marks the beginning of gravitational-wave astronomy.

- LIGO's announcement in February was based on the detection of waves from a single cosmic event that arrived at the interferometer sites on 14 September 2015. The waves were generated 1.3 billion years ago by the merger of two orbiting black holes, which caused tiny displacements (on the order of one part in 10^{21}) in LIGO's twin interferometers located on either side of the US.

In June, however, LIGO reported a second event, also from colliding black holes, which was detected on 26 December. Named "GW151226", it marks the beginning of gravitational-wave astronomy, said LIGO spokesperson Gabriela González. "It takes a lot of people, physics and engineering to build these exquisite instruments, and they detected these gravitational waves very clearly."

CONTROL THE SMALLEST LEAK
WITH OUR GAS DOSING LEAKVALVE



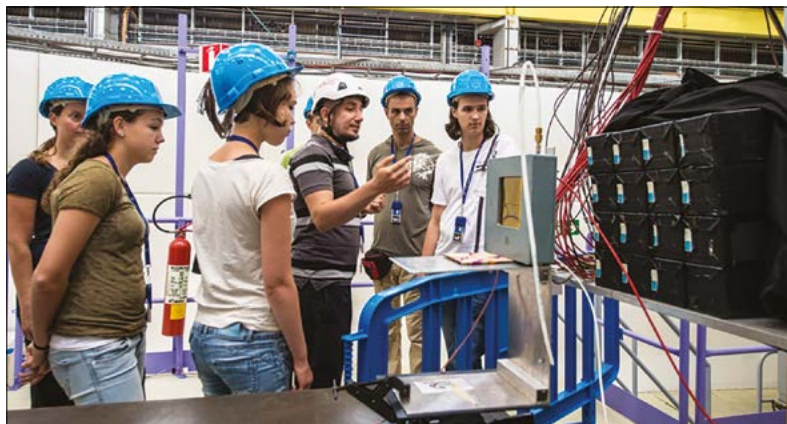
 **nenion**
www.nenion.at

Faces & Places

Winners of the 2016 Beamline for Schools announced

Sixteen students have won the chance to conduct their own experiments at CERN, having been named as the winners of CERN's 2016 Beamline for Schools competition. Two teams of high-school students were selected from a total of 151 teams from 37 countries to come to CERN in September. The "Pyramid Hunters", from Marshal Stanisław Małachowski High School in Poland, propose to measure the muon absorption of limestone to help understand muon-tomography images of the Chephren pyramid recorded many years ago. The other winners, "Relatively Special" from Colchester Royal Grammar School in the UK, aim to test the validity of the Lorentz factor by measuring the effect of time dilation on the decay rate of pions.

The Beamline for Schools competition enables high-school students to run an experiment in the same way that researchers do at the Large Hadron Collider and other CERN facilities. Students were asked to submit a written proposal and video explaining their experiment's methods and goals. "This competition is very effective in triggering motivation for fundamental



Students undergoing training on the beamline as part of the 2015 competition.

physics in young, brilliant students at a moment that is crucial for their future career choices", said Claude Vallee, chairperson of the CERN SPSC committee that chose the winning teams.

The first Beamline for Schools competition was launched two years ago to coincide with CERN's 60th anniversary,

and has so far seen winning teams from the Netherlands, Greece, Italy and South Africa perform experiments at CERN. "We are very happy to be able to offer this experience to high-school students, thanks to the support received via donations to the CERN & Society Foundation," said Markus Joos, Beamline for School project leader.

ANNIVERSARIES

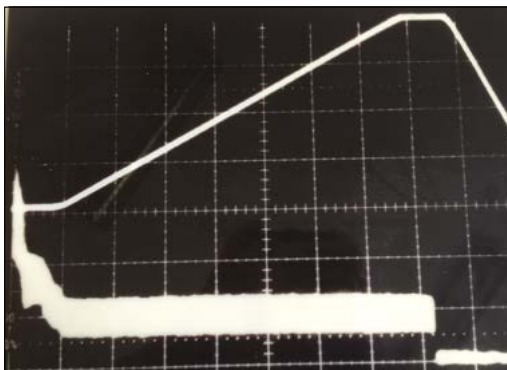
Celebration marks 40 years of SPS service



Physicists gathered for a barbecue at CERN's Prévessin site on 17 June to celebrate 40 years since the first beam in the SPS (above).

An event at CERN held on 17 June celebrated the 40th anniversary of the Super Proton Synchrotron (SPS), which has been at the centre of some of CERN's most famous discoveries. The 6.9 km-circumference SPS operated as a hadron collider from 1981–1984, flushing out the W and Z bosons, before going on to feed particles to LEP and the LHC. The

image (above, right) shows the original scope trace of the first beam accelerated to 300 GeV (the SPS was originally called the "300 GeV Project", although it soon reached higher energies). It was taken during the meeting of the CERN council in June 1976, recalls Lyn Evans, who is director of CERN's Linear Collider collaboration. Aged 30 at the time,



Evans was a junior physicist and was sent over to the council chamber to show the trace to the director general, John Adams, so that he could announce the exciting news at the council meeting. When he got there, however, he found the chamber empty. "They had broken for lunch, so I just left it on the DG's desk," says Evans. "The rest is history!" (See p61.)

CERN openlab: supporting the LHC community for 15 years

CERN



Charlotte Warakaulle, CERN director for international relations, presents an award to Peter Gleissner of Intel in recognition of 15 years of fruitful collaboration.

CERN openlab held an event on 8–9 June to showcase CERN's collaboration with leading ICT companies and research institutes, which are a key source of support for the worldwide LHC research community. The event marked 15 years since CERN openlab was established, and more than 100 people attended.

"Since 2001, this unique public-private partnership has worked to ensure that members of CERN's scientific community have access to the very latest ICT solutions to help them carry out their ground-breaking physics research," said Alberto Di Meglio, head of CERN openlab.

Celebrating 40 years of supergravity

With 2016 marking 40 years since the formulation of supergravity (SUGRA), a celebration took place at CERN on 24 June, attended by SUGRA pioneers Sergio Ferrara, Dan Freedman and Peter van Nieuwenhuizen. Supergravity is central to the scientific heritage of the CERN Theory Department, and has inspired and continues to inspire generations of physicists, theorists and experimentalists alike.

Bennett, Sophia



Peter van Nieuwenhuizen, Sergio Ferrara and Dan Freedman at the Council Chamber.

PT2026 NMR Precision Teslameter

Reach new heights in magnetic field measurement

The Metrolab PT2026 sets a new standard for precision magnetometers. Leveraging 30 years of expertise building the world's gold standard magnetometers, it takes magnetic field measurement to new heights: measuring **higher fields** with **better resolution**.

The PT2026 offers unprecedented flexibility in the choice of parameters, interfacing and probe placement, as well as greatly improved tolerance of **inhomogeneous fields**. And with Ethernet & USB interfaces and LabVIEW software, it fits perfectly into modern laboratory environments.



www.agence-arca.com - Photo: Scott Maxwell, Masterfile



metrolab
Magnetic precision has a name

www.metrolab.com

Faces & Places

INDUSTRY

Netherlands firms exhibit products at CERN

The biennial Holland@CERN event took place on 30 May – 2 June, attracting 36 firms from the Netherlands to exhibit their products. The Netherlands has been a contributor to big-science projects for 60 years, ranging from major particle accelerators like the LHC and fusion reactors such as ITER to telescopes such as the E-ELT and various light sources.

“The Dutch firms were very happy with the many new contacts they have been able to make with people at CERN, and received many visitors to their stands,” said Rob Klöpping, Dutch Industrial Liaison Officer, Netherlands Organisation for Scientific Research (NWO).

CERN Director-General Fabiola Gianotti with Ambassador Roderick van Schreven, Permanent Representative of the Netherlands to the United Nations and the World Trade Organisation (to her right).



Sophia Bennett

Third European Cryogenics Days focuses on HEP



Sophia Bennett

The attendees of June's European Cryogenics Days event in front of the main building.

Cryogenics has contributed widely to the successes of high-energy physics (HEP). Conversely, HEP has pushed cryogenic engineering developments to a high level of technical excellence. The third European Cryogenics days, hosted by CERN on 9–10 June, focused on the latest developments in this area. Organized by the Cryogenics Society of Europe, together with the High-Energy Physics Technology Transfer Network (HEPTech) and CERN, the event attracted 176 participants from industry and academia, mostly from Europe.

Cryogenics are not just crucial for machines such as CERN's LHC and the

Wendelstein-7X stellarator in Germany, but also for state-of-the-art light sources such as the European X-ray Free Electron Laser at DESY and also the central solenoid module of the ITER fusion experiment. Lessons learnt from ATLAS and CMS, which both use dedicated cryogenic equipment, addressed noticeable shortfalls such as oil contamination. Cryogenics for the European Spallation Source (ESS) target was also explored, as were the novel membrane cryostats for the large-volume neutrino detectors under development as part of the CERN Neutrino Platform (see p21).

Regarding future cryogenic applications

for HEP, efforts will be concentrated on the development of dedicated cryogenic systems for the high-luminosity LHC and the Future Circular Collider (FCC). It is clear already that the FCC cryogenic system will require cryoplants far beyond the present state-of-the-art, with unit capacities of 100 kW at 4.5 K.

The event also addressed instrumentation for cryogenic systems, research in the cryogenic field, and future developments in cryotherapy and space applications. The event was accompanied with an industrial exhibition and bilateral brokerage meetings organised by the Enterprise Europe Network.

CONFERENCES

Beauty on show in the south of France

The 16th International Conference on B -physics at Frontier Machines, Beauty 2016, was held in Marseille, France, from 2–6 May. The conference, which saw 66 invited talks divided between 18 theoretical and 48 experimental topics, covered a wide range of subjects including studies of CP violation and rare decay properties of beauty and charm hadrons.

Heavy flavour physics, in particular decays of b -hadrons, offers a powerful probe of physics beyond the Standard Model because new particles may manifest themselves in observables that can be calculated and measured with high precision. Run 1 of the LHC has resulted in the discovery of the rare decay $B_s^0 \rightarrow \mu^+ \mu^-$ and new constraints for CP violation in $B^0 \rightarrow J/\psi \phi$ decays, for instance, and several puzzling patterns in data for rare b -hadron decays have emerged.

Highlights of Beauty 2016 include the world's best measurement of the semi-leptonic CP asymmetry in $B^0 \rightarrow B^0$ mixing by the LHCb experiment. The corresponding observable, $a_{SL}^s = [0.39 \pm 0.26 (\text{stat}) \pm 0.20 (\text{syst})]\%$, which probes the difference between $B^0 \rightarrow B^0$ and $\bar{B}^0 \rightarrow \bar{B}^0$ transitions, is in agreement with the Standard Model expectation (which predicts a_{SL}^s at the 10^{-5} level) and therefore does not confirm a previous intriguing result by the D0 Collaboration at Fermilab. ATLAS also presented the world's best measurement of the decay-width difference of the B_d^0 -meson system, while CMS reported the double up-silon-production result at $\sqrt{s} = 8$ TeV and the BaBar collaboration released the first study of the rare decay $B^+ \rightarrow K^+ \tau^+ \tau^-$, which is experimentally challenging.

Some of the most interesting current results concern "flavour anomalies". In particular, the ratio $BR(B \rightarrow D^* \tau \nu)/BR(B \rightarrow D^* \ell \nu)$, where



The Beauty 2016 participants in front of the conference venue in Marseille.

$\ell = \mu, e$, is measured to be approximately 4σ away from Standard Model expectations, providing a test of lepton flavour violation. The rare decay $B^0 \rightarrow K^{*0} \mu^+ \mu^-$ also shows deviations from expectations, with the angular distribution of its decay products (namely the " P_5' " observable) looking particularly intriguing. In order to interpret these and further data from LHC Run 2, it is crucial that we have a point of reference from the Standard Model. In the case of P_5' , the situation is complicated due to effects from strong interactions, for instance. Impressive progress on lattice QCD has enabled calculations that are crucial inputs for theoretical predictions, such as the decay constant of the B_s^0 and hadronic form factors.

LHCb also reported new world-best measurements of the angle γ of the unitarity triangle from pure tree-level decays, which still has a significant uncertainty, $70.9^{+7.1}_{-8.5}$ degrees, and leaves a lot of space for future improvement. Concerning possible CP violating effects in the $B_s^0 \rightarrow J/\psi \phi$ decay, the experimental precision has reached a level

where effects from so-called penguin topologies have to be included. The pentaquark state observed by LHCb has also put hadron spectroscopy and exotic states under the spotlight, although LHCb data do not confirm the udsb "tetraquark" state recently reported by D0.

Whilst CP violation in the charm sector has not yet been observed, LHCb is close to approaching the Standard Model expectations. Recent theoretical progress has also resulted in new analyses of direct CP violation in the neutral kaon system, which are not in good agreement with experiment, thereby adding yet another flavour anomaly that has to be understood. Finally, the NA62 experiment raises the exciting prospect of testing the Standard Model via the rare decay $K^+ \rightarrow \pi^+ \nu \bar{\nu}$.

Beauty 2016 was a great success. The future experimental programme for heavy-flavour physics is very bright, with the super- B factory at KEK under construction and further LHC data to come.

• <http://beauty2016.in2p3.fr>.

Highlights of IPAC 2016 in Korea

The 7th International Particle Accelerator Conference, IPAC16, was held in Busan, Korea, from 8–13 May, attracting more than 1200 participants from 37 countries.

Lepton and hadron colliders continue to push performances to serve research in particle physics. The LHC is back in action after a major shutdown and has successfully restarted operation at the unprecedented energy of 6.5 TeV per beam, while the

commissioning of the SuperKEKB collider in Japan is progressing firmly after a major upgrade to increase its luminosity. At RHIC in the US, electron lenses have been used to enhance the collider's performance by compensating for beam-beam effects.

Meanwhile, several upgrade programmes and new storage rings for the synchrotron X-ray community are in full swing, led by MAX IV in Sweden, which is the

first synchrotron light source based on a multi-bend achromat cell. Novel optimization techniques based on genetic algorithms are taking the horizontal emittance of storage rings towards the X-ray diffraction limit, which allows smaller and more stable beams for users. More than a dozen contributions at IPAC16 focused on the development of linear optics measurement and correction techniques, >

Faces & Places

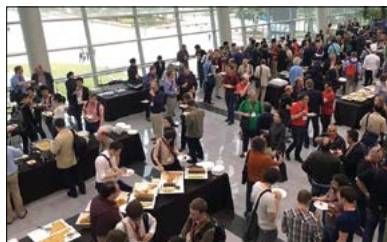
with recent studies of beta functions opening the door for light sources to replace the traditional and lengthy orbit response techniques with fast turn-by-turn-based optics corrections.

At the high beam-power front, the Spallation Neutron Source in the US has reached 1.4 MW and launched a study to double the power at 1.3 GeV. Meanwhile, the European Spallation Source in Sweden, which is based on an unprecedented 5 MW linear accelerator that will reach an energy of 2 GeV using superconducting RF cavities, is well into construction and progressing towards first beam in June 2019. Accelerating superconducting cavities based on Nb₃Sn (the same material being explored for the HL-LHC and FCC magnets) have now been shown for the first time to outperform Nb cavities, defining the next generation of superconducting RF technology.

Other highlights from the Korea event included developments at J-PARC in Japan, where the rapid-cycling synchrotron is approaching routine 1 MW operation and the main 50 GeV ring is delivering a 400 kW beam for long-baseline neutrino experiments. There was also a session devoted to engagement with industry, which is crucial for the high-luminosity LHC, and a report from PACMAN – a Marie-Curie network based at CERN that is pushing the limits of technology in component alignment, in addition to training qualified engineers and creating synergies between institutes.

The Xi Jalin Prize for outstanding work in the accelerator field was awarded to Derek Lowenstein from Brookhaven National Laboratory in the US, while the Nishikawa Tetsuji Prize was awarded to Gwo-Huei Luo at the NSRRC in Taiwan. Sam Posen of Fermilab in the US received the Hogil Kim Prize, and the Mark Oliphant Prize was awarded to Spencer Jake Gessner of SLAC for his PhD thesis work on hollow-channel plasma wakefield accelerators.

The eighth IPAC will take place in Copenhagen, Denmark, on 14–19 May 2017. www.ipac16.org.



IPAC16 was hosted by Pohang Accelerator Laboratory in Korea.

VISITS



Austria's minister for labour, social affairs and consumer protection, **Alois Stöger**, visited CERN on Wednesday 8 June, during which he toured the ATLAS cavern with experiment spokesperson **Dave Charlton** (right).

Sophia Bennett

The **Rt Hon Hugo Swire MP**, minister of state, Foreign and Commonwealth Office, UK, in the LHC superconducting magnet test hall with head of the beams department **Paul Collier** (right) on 9 June.



Sophia Bennett



On 14 June, the Japanese minister for education, culture, sports, science and technology, **Hiroshi Hase**, signed the guestbook with the director for research and computing, **Eckhard Elsen**, and the director for international relations, **Charlotte Warakaulle**, during a visit that took in the ATLAS visitor centre and the LHC magnet test hall.

Maximilien Brice

Under secretary for science and energy at the US Department of Energy, **Franklin (Lynn) M Orr**, pictured at CMS on 16 June with CMS scientist **Isobel Ojalvo** from the University of Wisconsin-Madison.



Sarah Charney

OBITUARIES

Péter Hasenfratz 1946–2016

Péter Hasenfratz was born in Budapest, Hungary on 22 September 1946. He studied physics at Eötvös University, finishing his PhD in 1973, and in 1975 he took up a postdoc position under Gerard 't Hooft in Utrecht. He then returned to Budapest, before moving to the CERN Theory Division in 1979.

Péter then began to work on field theory regularized on a space–time lattice. In 1980, together with his younger sister Anna, he presented the first correct computation of the scale parameter of QCD on the lattice. In 1982 he organized the first international workshop on lattice field theory at CERN, sending handwritten invitations to each of the participants. He had planted the seed for a new scientific community, and today several hundred people meet annually at the lattice conferences.

In 1984 he went to the University of Bern, and from 1999–2001 he was the director of the Institute for Theoretical Physics there. His lectures, not only in Bern but also at numerous international schools, have been described as a revelation by participants.

Péter was extremely creative and made many original contributions to quantum

Ruth Bestgen



Péter Hasenfratz was a member of the CERN Theory Division from 1979–1984.

field theory. He often calculated things analytically that had seemed incalculable before, such as the exact value of the dynamically generated mass gap in several 2D asymptotically free quantum field theories. In addition, he significantly

contributed to our understanding of chiral symmetry on the lattice. While cleaning up his office in 1997, he discovered an old preprint by Paul Ginsparg and Kenneth Wilson from 1982 that contained the now famous Ginsparg–Wilson relation, which turned out to hold the key to understanding chiral symmetry. By constructing a novel solution for this relation, Péter breathed new life into this old paper and today, with more than 950 citations, it has become one of the most cited papers in lattice field theory.

He had always wished that he could witness the discovery of the Higgs boson, since he had a special interest in electroweak symmetry-breaking, and his wish was granted in 2012 – one year after his retirement. Tragically, after this most remarkable scientific career, rapidly advancing Alzheimer's disease probably prevented him from fully appreciating the scientific significance of this discovery.

Péter was an extraordinary scientist and an extremely friendly, kind person. He passed away peacefully at home on 9 April, leaving behind his wife Etelka, their four children, six grandchildren, and his sister Anna.

● *His colleagues.*

Tom Kibble 1932–2016

Tom Kibble, an internationally renowned theoretical physicist whose contributions range from the theory of elementary particles to modern early-universe cosmology, died on 3 June in London, aged 83.

One of Kibble's most important pieces of work in this area was his study of spontaneous symmetry-breaking, whereby vector particles can acquire a mass accompanied by the appearance of a massive scalar boson. This mechanism – which was put forward independently in 1964 by Brout and Englert, by Higgs and by Kibble, Guralnik and Hagen – lies at the heart of the Standard Model and all modern unified theories of fundamental particles. It was finally confirmed in 2012 by the discovery of the Higgs boson at CERN (the associated massive W and Z vector bosons having already been discovered at CERN in the early 1980s), winning Higgs and Englert the 2013 Nobel Prize in Physics.

Mike Finn-Casey, Imperial College London



Tom Kibble, co-inventor of spontaneous symmetry-breaking.

The vindication of spontaneous symmetry-breaking presented a much-debated dilemma for the Nobel Committee, notwithstanding Brout's demise in 2011, because prizes can be awarded to at most three individuals. However, Kibble was also sole author of a 1967 paper that focused on the non-abelian generalization of the mechanism. When the Standard Model came along shortly afterwards, Kibble's paper was seen to explain not only why the W and Z acquire a mass but, equally crucial, why the photon does not. At a celebration of Kibble's 80th birthday at Imperial College in March 2013, Steven Weinberg ended a public lecture by stating "Tom Kibble showed us why light is massless". Indeed, Higgs said that Kibble should have shared the prize awarded to Englert and himself "because of what he

Faces & Places

wrote in 1967". Kibble himself maintained a dignified modesty throughout, in keeping with the honesty and integrity for which he was justly famous.

Spontaneous symmetry-breaking also predicted the existence of soliton-like solutions of the field equations of unified field theories. In 1976, Kibble realised that these structures could condense as the universe cooled from the hot conditions prevailing in the Big Bang, and might therefore have striking effects on the development of large-scale structures in the universe called cosmic strings. Kibble's vision has thereby provided an extraordinary link between the macroscopic and microscopic features of our universe – an effect that has been confirmed experimentally in the context of vortex formation in superfluid helium 3.

Kibble was born in Chennai, India, to missionaries Walter and Janet (nee

Bannerman) and he attended Edinburgh University in the UK from 1951–58. After spending a year at Caltech in the US he joined the theoretical physics department at Imperial College London, which had recently been founded by Abdus Salam. In 1970 Kibble became professor of theoretical physics at Imperial, and was head of the department of physics there from 1983–1991.

He was an outstanding teacher and his textbook on classical mechanics has become a classic. In 2005 he was awarded the 2005 NESTA/Nature Mentoring lifetime achievement award. Kibble was elected Fellow of the Royal Society in 1980 and served as its vice-president in 1988–89. He was awarded the 1981 Hughes Medal of the Royal Society, jointly with Peter Higgs, "for their international contributions about the spontaneous breaking of fundamental symmetries in elementary-particle theory".

Other awards include the 1984 Rutherford Medal and Prize, the 1993 Guthrie Medal and Prize, the 2009 Dirac Medal, the 2010 Sakurai Prize for Theoretical Physics, Honorary Fellowship of the IOP in 1998 and the 2012 Einstein Medal. He received a CBE in 1998 and a knighthood in 2012.

Kibble was also concerned about the nuclear arms race and took leading roles in several organizations promoting the social responsibility of science. These included the British Society for Social Responsibility in Science, Scientists against Nuclear Arms, Scientists for Global Responsibility and the Martin Ryle Trust. Tom Kibble was the personification of stature, dignity and integrity, and will remain so in our memories. His wife, Anne (nee Allan), whom he married in 1957, died in 2005. He is survived by their son, Robert, and two daughters, Helen and Alison.

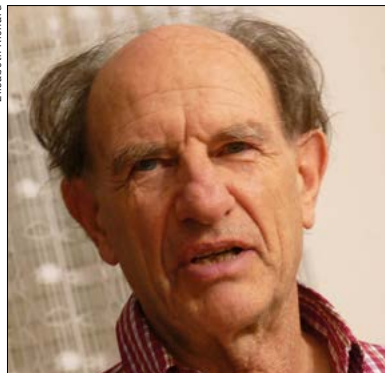
● *Mike Duff, Imperial College London.*

Gérard Mennessier 1943–2016

Gérard Mennessier, a theorist at Laboratoire Charles Coulomb in Montpellier, France, passed away on 8 April. He was much admired by his many colleagues and collaborators, both for his physics achievements and for his human qualities, especially his modesty and cordiality even in adverse circumstances.

After studying at the Ecole Normale Supérieure, Mennessier began his research in Paris before moving to Montpellier. His research in particle physics ranged from phenomenology, experiments and theory to mathematical physics and tended to involve rigorous numerical computations. In phenomenology, he made significant contributions to dispersion relations for photo-production and C-violation in photo-production of pions in proton Compton scattering. He also helped determine total cross-sections for hyperon

Elisabeth Richard



nucleon scattering, three-meson resonances and meson pair production in two-photon processes, and constructed a practical theory of the multi-layered transition radiation detector.

Some of Gérard Mennessier's most important contributions concerned pion–pion scattering.

Mennessier's most enduring contributions are in the field of pion–pion scattering from a rigorous S-matrix framework based on axiomatic field theory, for which he helped improve the bounds by a factor of 40. Another achievement was his role in proving that there are several and even continuous solutions when you try to extract the KM matrix from the moduli of the matrix if there are more than three generations of quarks, contrary to what was believed at the time. More recently, Mennessier's interests moved to the life sciences, in particular genomics.

We send our deep condolences to his daughter Elisabeth and to his many friends and admirers.

● *His friends and colleagues.*

György Vesztegombi 1943–2016

György Vesztegombi, a prominent figure in Hungarian high-energy physics, died on 2 May after a long illness. He was emeritus professor of the Wigner Research Centre for Physics at Eötvös University in Budapest, and a member of several CERN committees as Hungarian delegate or representative. During his career he founded and led several

research groups in experimental particle and nuclear physics, including the Hungarian components of the CERN experiments L3, NA49, CMS, ALICE and NA61.

Gyuri, as he was known to his friends, was born in Mohács and studied physics at the Eötvös University. His diploma work concerned neutron-induced reactions at

KFKI Research Institute for Particle and Nuclear Physics (RMKI), after which he analyzed bubble-chamber data. He joined the related experiment at the Serpukhov accelerator, where he developed methods and software to enable electronic data to be transferred to magnetic tapes, rather than photographic films. In 1974

Vesztergombi moved to CERN and joined Pierre Darriulat's group at the ISR, where he started to work on phenomena associated with large transverse momentum. From 1976 onwards he contributed to the study of the quark structure of the proton at the SPS experiment NA4 in the group of Carlo Rubbia, and he later worked on the detailed study of W and Z bosons as a member of the L3 Collaboration at LEP.

During the 1980s, while at the Max Planck Institute in Munich, Gyuri joined CERN's NA35 streamer chamber experiment – which was among the first attempts to create the quark–gluon plasma. On returning to Hungary he defended his doctoral thesis titled “Interaction of quarks and gauge bosons” in 1992, and in the same year he played a crucial role in Hungary's accession to CERN. His NA49 group contributed to the assembly, operation and analysis of a grid-geometry time-of-flight wall and, encouraged by the successes at RHIC, he proposed a detailed study of large transverse momentum particles. Vesztergombi was co-spokesman of the successor experiment NA61 and chairman of the collaboration board for several years.



György Vesztergombi played an active role in many CERN experiments.

Simultaneously, he started preparatory work for the planned LHC experiments. Under his guidance, KFKI-RMKI built the hadronic forward calorimeter for CMS and his group was partly responsible for the alignment of the CMS tracker. Vesztergombi foresaw that the expected volumes of LHC data could not be handled

with classical computing methods, and got involved in highly parallel and associative computer programming and field-programmable gate arrays. He played a pioneering role in the development of new ideas – among them a proposal to use the waters of Lake Geneva as a gigantic detector for a neutrino beam fired from CERN. In Hungary, he was also the first to recognize the potential of plasma-wakefield acceleration, and hoped that it would one day take us into the PeV energy regime to reveal the internal structure of quarks.

In recognition of his work, Vesztergombi received the Academy Award of the Hungarian Academy of Sciences in 1992 and the Officer's Cross of the Order of Merit of the Hungarian Republic in 2009. He taught experimental particle physics at Eötvös University for more than two decades, and was dedicated to educating young researchers. In Gyuri we have lost an energetic, highly versatile and imaginative scientist. But his activities and enthusiasm have launched the careers of a new generation of physicists.

● *Ferenc Siklér, Wigner Research Centre for Physics, Budapest, and colleagues.*

Irene Vichou 1964–2016

Our ATLAS colleague Irene Vichou passed away in April, after a long career working on CERN experiments, including many years as a member of the ATLAS collaboration.

Irene started to work at CERN's West Area Omega experiment while a PhD student at the University of Athens. From 1993, she worked with the ATLAS liquid-argon calorimeter group from LAL Orsay, during which time she participated in calorimeter-prototype beam tests and carried out the first full simulation of photon and electron identification for the ATLAS calorimeters. In 1996 Irene joined the ATLAS Tile Calorimeter community, initially working with the IFAE Barcelona team, and was involved in the first prototypes of the caesium radioactive source calibration system.

One of the important results of Irene's work was the identification of the long-term degradation of the photomultiplier performance, which led the manufacturer to modify the design.

In 2000, Irene joined the ATLAS team at Athens University and brought into operation an important test bench to qualify the 10000 photomultiplier blocks assembled for the ATLAS Tile Calorimeter.



Irene Vichou led the ATLAS Tile Calorimeter group.

Then, in 2004, she joined the University of Illinois at Urbana-Champaign, where she helped prepare the calorimeter for sub-detector operation within ATLAS. She was responsible for many crucial activities including the implementation of services, the commissioning and refurbishment of electronics, data preparation and detector

performance, and at a broader level coordinated several activities within the Jet/EtMiss group. Irene was also the supervisor of several PhD students and was a highly regarded mentor.

Irene was appointed project leader of the ATLAS Tile Calorimeter system in 2014. Under her leadership, the project saw a major consolidation and repair campaign for the front-end electronics during the long shutdown after the LHC Run 1, enabling the collaboration to start Run 2 with a fully working detector that was more robust against failures. R&D for the Tile Calorimeter upgrade for the high-luminosity LHC also took a large step forward under her supervision.

Irene was a calm and thoughtful colleague and a good friend to many of us in ATLAS. She always looked carefully and deeply into every topic, earning her the appreciation and respect of all. We came to rely on her calmness, quiet wisdom and authority in all Tile Calorimeter matters and beyond.

Our thoughts are with Irene's husband Ilias, and their daughters Paulina and Natalia.

● *Her friends and colleagues in ATLAS.*

Faces & Places

Vadim Volkov 1923–2016

Vadim Volkov, a physicist at the Laboratory of Nuclear Reactions at the Joint Institute for Nuclear Research (JINR), Russia, passed away on 22 April aged 93. Volkov entered Moscow State University in 1940. The following year he volunteered for military service at the front, and his crusade with the Soviet Army from Moscow to Königsberg saw him receive several medals. He fought in the Battle of Moscow near Volokolamsk and in the Battle of Kursk, in addition to battles for the liberation of Belarus and in fighting in East Prussia. When the war was over, Volkov resumed his studies at Moscow State University. In 1946 he married his high-school sweetheart Anna Guskova, and the pair were married for 70 years.

Volkov's PhD focused on studies of the deuterium–deuterium reaction. From 1956 he began working in Georgy Flerov's group at the Laboratory of Measuring Instruments of the Academy of Sciences, and from 1960 until his final days he worked in the Flerov Laboratory of Nuclear Reactions at JINR. As head of the group, he achieved a number of important scientific results that are cited to this day. He carried out pioneering studies on the transfer of a considerable number



Vadim Volkov served in World War II just one year after beginning his studies.

of nucleons from one nucleus to the other, leading to the discovery of a new type of nuclear reaction between complex nuclei. These multi-nucleon transfer reactions were then used to produce new neutron-rich isotopes for the first time, with nearly 30

new isotopes synthesized.

Volkov coined several terms that entered scientific literature: Q ground-ground (Qgg) systematics, double-nuclear system and deep inelastic transfer reactions. He also developed a model of competition between complete fusion and quasi-fission, which was crucial for the later synthesis of heavy and super-heavy elements. Volkov published more than 200 publications and two monographs, and in 1975 was honoured with the USSR State Prize for his groundbreaking research into the synthesis and study of new nuclei. He became the first Flerov Prize laureate in 1993 and was awarded the Russian Order of Honour in 2006.

He was always keen to share his valuable life and scientific experience with young scientists, and his poise, self-discipline and optimism were highly appreciated by his colleagues. Vadim Volkov's life is a vivid example of the contribution to the service of science, and we feel blessed to have known and worked with such a remarkable person and outstanding scientist.

● *His friends, colleagues and the FLNR staff.*

EVENT

Swedish MAX IV light source inaugurated



MAX IV will produce some of the brightest X-ray beams in the world.

On 20 June, coinciding with the Northern Hemisphere's brightest day, the new MAX IV light source in Lund, Sweden, was inaugurated by Swedish prime minister Stefan Löfven, in the presence of the King of Sweden. This state-of-the-art synchrotron light source will deliver narrow beams of intense X-rays towards samples placed in numerous beamlines fanning out tangentially from the ring. The 3 GeV storage ring has a circumference of 528 m, the 1.5 GeV booster a circumference of 9 m and

the injector is a 300 m-long linac.

Construction started in 2010 and the project has received several prizes and awards for its environmental credentials. When fully operational, the facility, which marks Sweden's largest single investment in research, will be able to receive about 2000 researchers a year working across 25 beamlines. Two beamlines are already operational, with a further three experimental stations to be connected to the large ring in the autumn.

EVENT SPOTLIGHT

CERN management has launched a Beyond Collider Physics study, a kick-off workshop for which will take place at CERN on 6–7 September 2016. The aim of the study is to explore the opportunities offered by CERN's accelerator complex and infrastructure via projects complementary to high-energy colliders. Although the scientific focus is on fundamental physics questions that are similar in spirit to those addressed by high-energy colliders, the goal of the Beyond Collider Physics study is to survey the possibilities and stimulate new ideas that might require different types of experiment. Details about the programme, registration and abstract submission, as well as the mandate of the group, can be found on the workshop website at: indico.cern.ch/event/523655/.

