

Faces & Places

AWARDS

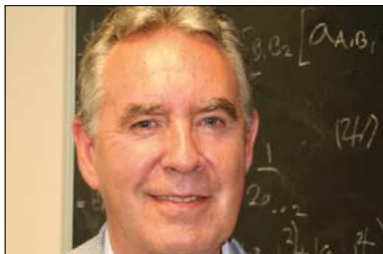
IOP awards for 2017 announced



Each year, the UK's Institute of Physics (IOP) recognises outstanding and exceptional contributions to physics. 2017 sees five awards go to those working in high-energy physics.

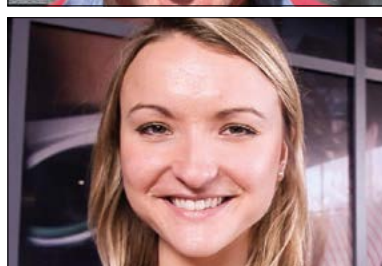
David Charlton of the University of Birmingham in the UK received the Richard Glazebrook Medal and Prize (an IOP gold medal) for his leadership in experimental work on the electroweak standard model, beginning with the study of Z-boson decays at LEP and culminating in the discovery of the Higgs boson at the LHC. He worked on OPAL from 1989 to the end of data taking at LEP, and on ATLAS where he was spokesperson from 2013–2017. Fellow gold medalist, winning the Dirac medal and Prize, is Michael Duff of Imperial College London and Oxford University, for his “sustained groundbreaking contributions to theoretical physics including the discovery of Weyl anomalies, for having pioneered Kaluza–Klein supergravity, and for recognising that superstrings in 10 dimensions are merely a special case of membranes in an 11-dimensional M-theory”.

Former LHCb spokesperson, Guy Wilkinson of the University of Oxford,



has won the James Chadwick Medal and Prize, for his “outstanding contributions to the experimental study of heavy quarks and CP violation, most especially for his leadership of, and his decisive contributions to, the LHCb experiment”. Nigel Glover of Durham University also won a subject medal – the John William Strutt, Lord Rayleigh Medal and Prize – for pioneering new methods for the application of perturbative quantum chromodynamics to high-energy processes involving energetic jets, leading to sophisticated simulation codes that are being used to describe LHC data.

Finally, the Clifford Patterson Medal and Prize, awarded for exceptional early career contributions to the application of physics in an industrial or commercial context, went to Ceri Brenner of the UK Science and Technology Facilities Council, for “driving the development of laser-driven accelerators for applications and for leading collaborative partnerships between academia and industry vital for the transfer of this technology to tackle global challenges”. The awards will be presented at a ceremony in London in November.



Researchers working in high-energy physics were awarded five prizes from the UK Institute of Physics (clockwise from top left): David Charlton, Michael Duff, Guy Wilkinson, Nigel Glover and Ceri Brenner.

Flerov prize for superheavy elements

The 2017 Joint Institute for Nuclear Research (JINR) Flerov Prize has been awarded to Witold Nazarewicz of Michigan State University in the US for his contribution to the theoretical understanding of the properties of the heaviest elements. Nazarewicz's research focuses on rare isotopes, including superheavy nuclei and the heaviest elements that lie at the current borders of the chart of



Witold Nazarewicz.

nuclides, and his calculations have helped to clarify the unusual properties of these elements.

A special Flerov prize for experimental research of heavy nuclei and synthesis of elements with atomic numbers 115 (moscovium) and 117 (tennessine) was also awarded to James Roberto of Oak Ridge National Laboratory, Alexander Shushkin (Elektrokhimpriobor, Russia) and Vladimir Utyonkov (JINR, Dubna). Over the last two decades, collaboration between JINR and US labs has changed our understanding of the upper regions of the period table.

Faces & Places

EVENTS

DUNE breaks ground underground

On 21 July, scientists and dignitaries broke ground 1.5 km beneath the surface of South Dakota, US, to celebrate the start of the construction of the international Long-Baseline Neutrino Facility (LBNF). LBNF will host the international Deep Underground Neutrino Experiment (DUNE), involving around 1000 scientists from more than 160 institutions in 30 countries. The US\$1 billion-plus LBNF/DUNE project will send an intense neutrino beam through 1300 km of rock from Fermilab in Illinois to the DUNE detectors deep underground at the Sanford Underground Research Facility in Lead, South Dakota. More than 800,000 tonnes of rock will be excavated to create the four huge chambers that will host the DUNE detectors.

The DUNE collaboration has begun the process of identifying the scientific institutions that will help build the components for the full-sized detectors. The cryostats and time projection chambers at the heart of the four DUNE detectors will hold almost 70,000 tonnes of liquid argon to detect neutrinos from Fermilab and supernova and search for new subatomic



Representatives from US Congress, the US Department of Energy, the president's office, South Dakota state, CERN, INFN, STFC, and other project partners participated in the ceremony.

phenomena such as proton decay.

Large prototype detectors for DUNE based on liquid-argon technology are already currently under construction at CERN, which is a major partner in the project (CERN Courier March 2017 p19). The CERN neutrino platform was established in 2013 to strengthen European participation

in neutrino experiments worldwide.

Earlier this summer, CERN completed the refurbishment of part of the ICARUS detector, which was recently shipped to Fermilab's short-baseline neutrino facility, and a CERN team is currently testing a detector called Baby MIND for the WAGASCI experiment in Japan.

Langevin-Joliot travels back in time

Physicist Hélène Langevin-Joliot – emeritus research director in fundamental nuclear physics at the CNRS in Orsay, granddaughter of Pierre and Marie Curie, and daughter of Frédéric Joliot and Irène Curie – came to CERN in early July, bringing to life a little-known piece of local history. On 25 July 1930, the International Commission for Intellectual Cooperation (an advisory body to the League of Nations), which included Marie Curie and Albert Einstein, visited a restaurant called Hotel Leger in Thoiry, a small village close to CERN that was often the site of highbrow discussions (image, bottom). On invitation from CMS physicist Chiara Mariotti, Langevin-Joliot, who is 89, retraced the steps of her eminent ancestry during a visit to the local area and CERN. Alongside her academic career, she has campaigned against the deployment of nuclear weapons and championed access to scientific careers for women and others.



(Above) Marie Curie's granddaughter Hélène Langevin-Joliot at the Globe talking about her exceptional family and the current status of women in science. (Left) Marie Curie (seated, far left) at Hotel Leger, with Einstein seated third from the left. Curie was the first female to win a Nobel prize and remains the only person to have won it in two different sciences.

B. Hahn/Fermilab

J. O'Don/CERN

ANNIVERSARIES

10th anniversary of the ERC

On 6 July, the Globe of Science and Innovation hosted an event celebrating the 10th anniversary of the European Research Council (ERC). The ERC awards significant grants to scientists to allow them to carry out cutting-edge research in institutes in the European Union or in associated countries such as Switzerland. For the seven-year period of Europe's Horizon 2020 programme, the ERC's budget is €13.1 billion, 39% of which is directed at physical sciences and engineering, and its advanced grants are highly sought after. The ERC held its plenary meeting at CERN from 4 to 7 July, and the Globe event saw CERN Director-General Fabiola Gianotti join other high-profile figures for a round-table discussion about the role of the ERC and fundamental research in Europe.

J. Ordan/CERN



Reinilde Veugelers of the ERC Scientific Council speaking at an event held in the Globe on 6 July to mark 10 years of the European Research Council.

Brookhaven marks seven rich decades

BNL



Brookhaven site office manager Frank Crescenzo (left) and the lab's director Doon Gibbs kick off celebrations earlier this year.

Brookhaven National Laboratory in the US is marking two anniversaries occurring this year. It is 70 years since Brookhaven lab was founded in 1947 and 100 years since the founding of Camp Upton, the former US Army base where the lab operates today. Brookhaven has been at the forefront of high-energy physics research since its early days, with the Alternating Gradient Synchrotron (AGS) leading to the discovery of CP violation, the Ω^- and charmed baryons, the J/ψ meson and the muon neutrino. Today the lab is home to the Relativistic Heavy Ion Collider (RHIC), which has changed our view of the quark–gluon plasma, and the National Synchrotron Light Source II (NSLS-II).

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CONFERENCES

Venice EPS event showcases the best of HEP

C. Checchia



The Venice conference was attended by more than 1000 physicists from 50 countries.

Major scientific gatherings such as the European Physical Society (EPS) biennial international conference on High Energy Physics offer a valuable opportunity to reflect on the immense work and progress taking place in our field, including the growing connections between particle physics and the universe at large. This year's EPS conference, held in Venice, Italy, from 5–12 July, was also the first large conference where the results from the 2015 and 2016 runs of the Large Hadron Collider (LHC) at 13 TeV were presented.

Setting the bar just a day into the Venice event, LHCb announced the discovery of a new doubly charmed baryon from precision measurements of B decays, with heavy-flavour analyses continuing to offer a rich seam of understanding. LHCb also presented the intriguing anomalies being seen in the ratios of certain Standard Model decays that hint at deviations from lepton universality, with further data from LHC Run 2 hotly anticipated.

The LHC is firmly in the precision business these days. In the last two years, the machine has delivered large amounts of collision data to the experiments and striking progress has been made in analysis techniques. These have enabled measurements of rare electroweak processes such as the associated production of a top quark, a Z boson and a quark (tZq) by ATLAS, for example, and the definitive observation of WW scattering by CMS. Top physics is another booming topic, with new top-mass and single-top production measurements and many other results, including “legacy” measurements from the Tevatron experiments, on show.

At the core of the LHC's analysis programme is the exploration of the Higgs boson, which now enters its sixth year. Particularly relevant is how the Higgs interacts with other particles, since this could be altered by physics beyond the Standard Model. While the Higgs was first spotted decaying into other bosons (W, Z, γ), ATLAS reported the first evidence for the decay of the Higgs boson to a pair of bottom quarks, with a significance of 3.6σ , while CMS presented the first observation by a single experiment of the decay to a pair of τ leptons, with a significance of 5.9σ . The Higgs mass is also narrowing to 125 GeV, while the fundamental scalar nature of the new particle continues to raise hope that it will lead to new insights.

The lack of direct signs of new physics at the LHC is an increasing topic of discussion, and underlines the importance of precision measurements. Direct searches are pushing the mass limits for new particles well into the TeV range, but new physics could be hiding in small and subtle effects. It is clear that there is physics beyond the Standard Model, just not what it is, and one issue is how to communicate this scientifically fascinating but non-headline-worthy aspect of today's particle-physics landscape.

High precision is also being attained in studies of the strong interaction. ALICE, for example, reported an increase in strangeness production with charged multiplicity that seems to connect smoothly the regimes seen in pp, pPb and PbPb collisions. Overall, and increasingly with complementary results from the other LHC experiments, ALICE is closing in on the evolution of the quark–gluon plasma, and thus on understanding the very early universe.

Particle physics, astrophysics and cosmology are closer today than ever, as several sessions at the Venice event demonstrated. One clear area of interplay is dark matter: if dark matter interacts only through gravity, then finding it will be very difficult for accelerator-based studies, but if it has a residual interaction with some known particles, then accelerators will be leading the hunt for direct detection. Cosmology's transformation to a precision science continues with the recent detection of gravitational waves, with LIGO's results already placing the first limits on the mass of the graviton at less than $7.7 \times 10^{-23} \text{ eV}/c^2$. There were also updates from dark-energy studies, and about precision CMB explorers beyond Planck.

Neutrino physics is also an extremely vibrant field, with neutrino oscillations continuing to offer chances for discovery. The various neutrino-mixing angles are starting to be well measured and Nova and T2K are zooming in on the value of the CP-violating phase, which seems to be large, given tantalising hints from T2K. The hunt for sterile neutrinos continues, and for neutrinoless double beta decay, with several searches ongoing worldwide.

In summary, the 2017 EPS-HEP conference clearly demonstrated how we are progressing towards a full understanding both of the vastness of the universe and of the tiniest constituents of matter. There are many more results to look forward to, many of which will be ready for the next EPS-HEP event in Ghent, Belgium, in 2019. As summed up by the conference highlights: the field is advancing on all fronts – and it's impressive.

A quarter century of DIS workshops

With a total of 304 talks, Deep Inelastic Scattering 2017 (DIS17) demonstrated how deep inelastic scattering (DIS) and related topics permeate most aspects of high-energy physics and how we still have a huge amount to learn about strong interactions. Held at the University of Birmingham in the UK from 3–7 April, more than 300 participants from 41 countries enjoyed a week of lively scientific discussion and largely unanticipated sunshine.

The first of this series of annual international workshops on DIS and related topics took place in Durham, UK, in the Spring of 1993, when the first results from the world's only lepton-hadron collider, HERA at DESY, were discussed by around 80 participants. A quarter of a century later, the workshop series has toured the globe, digested data from the full lifetime of HERA and numerous fixed-target DIS experiments, as well as playing a major role in the development and understanding of hadron-collider physics.

The dominant theme of DIS17 this year was the relevance of strong interactions, parton densities (PDFs) and DIS to the LHC. But a wide and eclectic range of other topics was included, notably new results from experiments at the Relativistic Heavy Ion Collider (RHIC), JLab and HERA, as well as theoretical advances and future plans for the field.

Following plenary review talks covering the latest news from the field, there followed two and a half days during which seven working groups operated in up to six simultaneous parallel sessions, covering: PDFs; low proton momentum fraction (Bjorken- x) physics; Higgs and beyond-the-Standard Model (BSM) studies in hadron collisions; hadronic, electroweak and heavy-flavour observables; spin and 3D hadron structure; and future facilities. The Birmingham event included a topical lecture on probing ultra-low- x QCD with cosmic neutrinos at IceCube and Auger, and a special session was devoted to the status and scientific opportunities offered by future proposed DIS facilities at CERN such as the Large Hadron electron Collider, LHeC) and at BNL or JLab in the US (the Electron Ion Collider, EIC).

All aspects of proton–proton collisions at the LHC featured during this year's DIS



Participants at the DIS17 meeting at the University of Birmingham campus.

event, from the role of parton densities and perturbative QCD dynamics in beyond-the-Standard Model searches and Higgs boson studies, through the measurement and interpretation of processes that are sensitive to parton densities (such as electroweak gauge boson production), to topics that challenge our understanding of strong-interaction dynamics in the semi- and non-perturbative regimes. Ten years after HERA completed data-taking, the collider still featured strongly. The final round of combined inclusive DIS data published in 2016 by the H1 and ZEUS experiments have been integrated into global PDF fits, and also for a handful of new measurements and combinations. Heavy-ion collision results from RHIC and the LHC were also well represented, as were insights into 3D proton structure and hadron spin from semi-inclusive DIS and polarised proton–proton collisions at COMPASS, JLab and RHIC, and current and future DIS measurements with neutrinos.

Data from HERA and the LHC have brought a new level of precision to the parton densities of the proton, with associated theoretical advances including the push towards higher order (next-to-next-to-next-to leading order) descriptions. Taming the “pathological” rise of the proton gluon density at low- x in the perturbative domain remains a major topic, which is now being addressed experimentally in ultra-peripheral collisions and forward measurements at the LHC, as well as through theoretical modelling of low- x , low- Q^2 HERA data with nonlinear parton dynamics and resummation techniques. The related topic of diffractive electron–proton scattering and the heavily gluon-dominated diffractive PDFs is benefiting from the full HERA statistics. New insights into elastic and

total cross-sections, such as TOTEM's observation of a non-exponential term in the four-momentum transfer dependence of the elastic cross-section, are emerging from the LHC data. Uncertainties in PDFs remain large at high x , and intense work is ongoing to understand LHC observables such as top-quark pair production, which are sensitive in this region. New data and theoretical work are revealing the transverse structure of the proton for the first time in terms of transverse-momentum-dependent parton densities. The LHC's proton–lead collision data are also constraining nuclear PDFs in an unprecedented low- x kinematic region.

Concerning the future of DIS, potential revolutions in our understanding could be made with polarised proton and heavy-ion targets and with step changes in energy and luminosity becoming abundantly clear. The EIC offers 3D hadron tomography and an unprecedented window on the spin and flavour structure of protons and ions. Its eA scattering programme would probe low- x parton dynamics in a region where collective effects ultimately leading to gluon saturation are expected to become important. The LHeC offers a standalone Higgs production programme complementary to that of the LHC, as well as a new level in precision in PDFs that could be applied to extend the sensitivity to new physics at the LHC. The ep and eA scattering programme also would probe low- x parton dynamics in the region where gluon saturation is expected to be firmly established. Together, the proposed facilities open up an exciting set of new windows on hadronic matter with relevance to major questions such as quark confinement and hadronic mass generation.

The next instalment of DIS in April 2018, to be held in Kobe, Japan, is eagerly awaited.

Faces & Places

HEPTech helps transform ideas into innovations

For a fourth consecutive year, the High-Energy Physics Technology Transfer Network (HEPTech), initiated by CERN in 2006, brought together early stage researchers in high-energy physics and related scientific domains to help them transform their research ideas into marketable innovations. The symposium was hosted by the GSI Helmholtz Centre for Heavy Ion Research in Darmstadt, Germany, from 19–23 June.

Twenty participants from 11 European countries met with entrepreneurs and experienced scientists, learning about technology-push, design-thinking technology characterisation and value proposition. Prominent speakers introduced delegates to the specifics of collaborations in physics, the management of large research projects and decision-making, in a scientific environment. By exploring real cases, the long road from an innovation to a patent or licence and how to deal with intellectual-property rights, was made clear. Basic requirements for public funding and some funding opportunities for start-ups were presented, in addition to tips about how to avoid unexpected traps entrepreneurs might face.

Within the week-long event, the secrets of successful project management were discussed, and the importance of appropriate staffing and negotiation techniques.

The entrepreneurship success story of

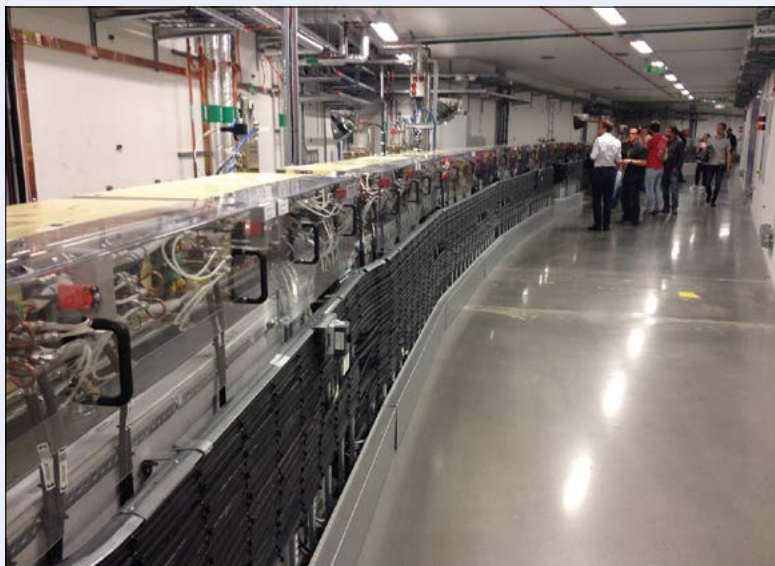


2017 HEPTech Symposium participants at Darmstadt.

Raspberry Pi revealed how developments in research are transformed into successful marketable products and how to develop a commercially sustainable product in a competitive environment. A great challenge for the early stage researchers was to prepare short pitches presenting their research projects to an expert panel, with

the aim of attracting investor attention.

All topics were presented by experienced professionals, entrepreneurs and technology-transfer experts, and participants enjoyed the networking opportunities on offer. The next HEPTech symposium will be held in June 2018 at the extreme light source ELI-ALPS in Szeged, Hungary.



The CERN Accelerator School (CAS) and MAX IV Laboratory jointly organised a specialised course on vacuum for particle accelerators in Glumslov, Sweden from 6–16 June. The course attracted 80 participants of 27 nationalities, comprising 30 hours of lectures and 17 hours of practical tutorial work. Lectures covered material properties, impedance and instabilities, gauges and pumps, surface properties and treatments, beam-induced effects, computational techniques and controls, manufacturing and acceptance, and a look to the future. The practical work included hands-on experience of impedance calculations, residual gas analysis and leak-detection techniques. An advanced accelerator-physics course will be held in the UK in late summer and a joint accelerator school on radio-frequency technologies will be held in Kanagawa, Japan, from 16–26 October. Pictured are CAS participants touring the new MAX IV storage ring.

G. Orto/GSI

R. Bailey

Faces & Places

VISITS

All image credits: S Bennett



Prime minister of Montenegro **Duško Marković** came to CERN on 7 July. He visited the underground area at CMS, during which he signed a memorandum of understanding between Montenegro and CERN with CERN director for research and computing Eckhard Elsen (pictured right).

On 14 July, **Monique T G van Daalen**, ambassador of the Netherlands to the United Nations Office, visited CERN. Before signing the guestbook with CERN Director-General Fabiola Gianotti and president of the CERN Council Sijbrand de Jong (pictured), she visited the Antiproton Decelerator and ATLAS.



Mukhtar Ahmed, chairman higher education commission of Pakistan, pictured with Christoph Schäfer of CERN after signing the guestbook. During the 17 July visit, he took in the synchrocyclotron, ALICE, IdeaSquare, S'Cool LAB and CMS.

Monsieur **Henri-Michel Comet**, préfet de la région Auvergne-Rhône-Alpes, France, was at CERN on 20 July, during which he visited the synchrocyclotron and CMS, and signed the guestbook in the presence of CERN Director-General Fabiola Gianotti.



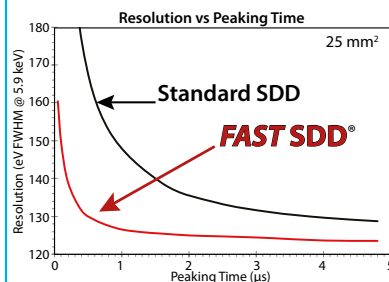
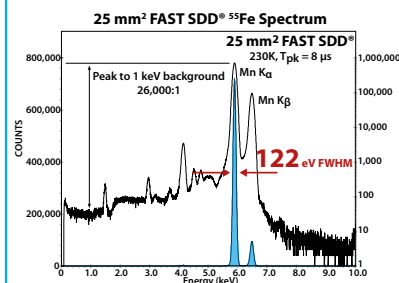
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OBITUARIES

Vinod Chohan 1949–2017

Vinod “Nick” Chohan came to CERN in 1975 as a fellow, then went to SIN (today PSI) near Zürich. In 1980 he returned to CERN as a machine-supervisor in the PS division. At that time, the construction of the Antiproton Accumulator (AA, the world’s first machine to produce, accumulate and store antiprotons) was just finished and the team was busy running it in. The purpose of the AA was to supply antiprotons to the SPS to allow it to function as a proton–antiproton collider, and Nick became a prominent member of the AA operations team that made this possible. His speciality was the controls aspects of the highly complicated processes within the AA and for the transfer of the antiprotons to the SPS. Simon van der Meer, inventor of stochastic cooling, on which the AA was based, had written practically all of the software himself, in his own highly sophisticated style. Nick became the only one to fully understand it, and later extend it to the Antiproton Collector (AC) and convert it for integration into the PS controls system.



Nick Chohan’s charisma will be missed

When, in 1991, the PS Beam Diagnostics (BD) Group was founded, Nick was the natural choice to become the section leader for systems integration with the PS controls.

In 1996, when the high-energy collider part of CERN’s antiproton programme was terminated, Nick took on the additional responsibility of PS divisional safety officer. Then, in 2002, he became heavily involved in the LHC project. Nick moved to the Accelerator Technology (AT) Division, where he led a team that first tested an

LHC prototype-sector and then all of the 1706 superconducting bending magnets. CERN manpower was insufficient, but a collaboration with India, managed by Nick, made it possible.

Once the LHC became operational, Nick returned to his old affinity with antiprotons, now at the low-energy end of the programme, as editor of the ELENA design report. In 2014, the 65 year bell rang in his retirement. But for Nick, that was not a reason to stop work at CERN. He joined the CERN scientific information service and provided highly welcome help on accelerator physics literature, photographic documentation and articles for Wikipedia.

Throughout his years at CERN, we all knew Nick as friendly and easy-going, always helpful and dedicated in his typical competent manner. We are deeply moved by his sudden disappearance and shall hold on to the memory of the many good moments and years of collaboration and friendship that we shared with him.

● *His friends and colleagues.*

Satoshi Ozaki 1929–2017

World-renowned physicist Satoshi Ozaki, who helped design and build accelerators for scientific research across two continents including two of the flagship facilities at Brookhaven National Laboratory (BNL), died on 22 July aged 88. He was a senior scientist emeritus at BNL and a key driver of international collaborations in high-energy and nuclear physics.

Ozaki joined Brookhaven Lab in 1959 with a master’s degree in physics from Osaka University, Japan, and a PhD in physics from the Massachusetts Institute of Technology. He worked in a group he eventually co-led with Samuel Lindenbaum on experiments at Brookhaven’s Alternating Gradient Synchrotron (AGS), developing state-of-the-art electronic detectors and an online data facility for monitoring detector performance by reconstructing subsets of data in real time. This was the first system of its kind and is now a routine component of data-acquisition systems for complex electronic detectors. The Ozaki–Lindenbaum group also developed a multiparticle spectrometer at the AGS that served many



Satoshi Ozaki, builder of accelerators and scientific collaborations across continents.

experimental groups at Brookhaven and collaborating universities. In addition, Ozaki led the development of detectors for ISABELLE, the first design for a dual-ring superconducting collider at Brookhaven.

Ozaki’s work in large-scale detector development led to an invitation in 1981 from KEK to direct the construction of TRISTAN, the first major high-energy particle collider in Japan. Under Ozaki, this \$500 million project was completed on time and within budget to start operations

in 1987, accelerating and storing beams of electrons and positrons at 30 GeV – the highest energy in the world at the time. In 1989, Ozaki returned to Brookhaven to head the Relativistic Heavy Ion Collider (RHIC) project, which achieved first collisions in 2000 and is now the highest energy collider in the US, with many important discoveries about the quark–gluon plasma under its belt. Ozaki was also essential in securing Japanese support for RHIC-related projects.

In 2005, Ozaki joined the National Synchrotron Light Source II (NSLS-II) project. As the initial head of the NSLS-II accelerator division, Ozaki built up the group and remained with the project as a senior advisor even after formally retiring at the end of 2012. He took on the major task of procuring the storage-ring magnets, and attended the formal dedication of the completed facility in February 2015. Ozaki was also involved in the Facility for Rare Isotope Beams (FRIB) currently under construction at Michigan State University.

Ozaki’s accomplishments have been recognised with numerous prestigious

awards, including the 2007 IEEE Nuclear and Plasma Sciences Society Accelerator Science and Technology Award and the 2009 Robert R Wilson Prize of the American

Physical Society, and in 2013 he was recognised with Japan's prestigious Order of the Sacred Treasure.

Ozaki was predeceased by his wife, Yoko,

and is survived by their two children, Keiko Simon and Tsuyoshi Ozaki, their spouses, and four grandchildren.

● *Brookhaven National Laboratory.*

Yassen Stanislavov Stanev 1962–2017

Yassen Stanev of the Bulgarian school of theoretical physics and INFN at the University of Rome "Tor Vergata", passed away on 9 June after a short illness. He was born in Sofia, Bulgaria, on 4 July 1962. After graduating in physics at the University of Sofia, he worked in its theoretical-physics department before joining the Institute for Nuclear Research and Nuclear Energy of the Bulgarian Academy of Sciences in 1992. Stanev defended his PhD thesis on conformally invariant quantum-field theory models in 1994 under the guidance of Ivan Todorov, who has long been a distinguished Bulgarian visitor of the CERN theory department. Since 2004, he had been working at the University of Rome.

Stanev had a wide range of scientific interests, including super-conformal field



Stanev was an expert in conformal field theories

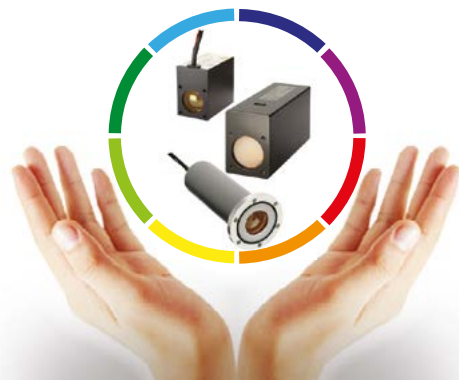
theories (CFTs), quantum groups, string theory and gauge theories. His work on the structure of the conformally invariant three-point correlation of the stress-energy tensor, published while he was a PhD student in his 20s, is still influential today. His pioneering work in the mid 1990s with his Italian colleagues unveiled the general

completeness relations for 2D CFT's in the presence of boundaries and cross-caps, and his related results on open strings (which include the first chiral type-I superstring model in four dimensions) are well known among string theorists. After the advent of the AdS/CFT correspondence, he worked extensively on $N=4$ SYM and its conformal deformations. His last research, on two-point correlators in $N=2$ gauge theories, involved an international team of colleagues and appeared a month before his premature death.

Stanev was also a gifted teacher and, during the last few years, he was a member of the INFN theoretical-physics committee. We will miss his wit, humour, critical views and his friendship.

● *His friends and colleagues.*

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