

Faces & Places

APPOINTMENTS

Brookhaven role to focus on technology transfer

Particle physicist David Asner has been appointed deputy associate laboratory director for strategic program development at Brookhaven National Laboratory (BNL), a new role focused on growing Brookhaven's nuclear and particle physics programme in directions outside its traditional areas. Asner, a former spokesperson of the CLEO collaboration at Cornell and leader of the US participation in Belle at KEK, has also been appointed head of BNL's instrumentation division, succeeding Graham Smith. A focus of the strategic BNL role is to identify opportunities for technology transfer and commercialisation in areas such as national security, space science and materials science.



David Asner previously led the high-energy physics programme at Pacific Northwest National Laboratory.

Carlin takes the helm at CMS experiment

Roberto Carlin of the INFN and University of Padova in Italy has been elected spokesperson of the CMS experiment for a two-year term beginning in September, taking over from current spokesperson Joel Butler. Carlin, a longstanding CMS collaborator, studied physics at the University of Padova and completed his thesis on the PS170 experiment at CERN in 1989. Prior to joining CMS in 2005 he worked on ZEUS at HERA, DESY. He is currently deputy CMS spokesperson and has also played important roles in the CMS muon drift-tube detector and trigger.



Roberto Carlin in the CMS control room.

DUNE elects co-spokesperson

Stefan Söldner-Rembold of the University of Manchester in the UK has been elected co-spokesperson of the international Deep Underground Neutrino Experiment (DUNE) collaboration, beginning 1 April, succeeding Mark Thomson (*CERN Courier* March 2018 p41). DUNE will use two neutrino detectors placed in an intense neutrino beam produced at Fermilab to measure CP violation in neutrino interactions. Söldner-Rembold is a former spokesperson of the D0 experiment at Fermilab, where he worked on searches for the Higgs boson. He is a member of the MicroBooNE and SBND collaborations at Fermilab's short-baseline neutrino programme, and also of the SuperNEMO and IceCube-GEN2 collaborations.



Stefan Söldner-Rembold.

AWARDS

Alfvén Prize for cosmic acceleration

The plasma physics division of the European Physical Society has awarded the 2018 Hannes Alfvén Prize to Tony Bell of the University of Oxford for his seminal contributions to cosmic particle acceleration. Bell, a theoretical plasma physicist, has opened up new research



Theorist Tony Bell of the University of Oxford (left) won the Hannes Alfvén award for his work in cosmic particle acceleration.

fields in both astrophysical and laboratory plasmas. He also played a leading role in the development of what is now the standard model of astrophysical particle acceleration and cosmic-ray origins and has been one of the main players over three decades in developing the understanding of electron transport in laser-produced plasmas.

Faces & Places

Five young researchers win ATLAS thesis prize

On 22 February the ATLAS collaboration presented the latest winners of its annual thesis awards. Five winners were selected from a total of 31 nominations spanning all areas of ATLAS physics, from detector development and operations to software and performance studies and physics analyses: Pierfrancesco Butti (Nikhef), Johanna Gramling (University of Geneva), Oleh Kivernyk (University of Paris-Saclay), Philip Sommer (Albert Ludwigs University of Freiburg) and Markus Zinser (Johannes Gutenberg University Mainz). PhD students make up almost a fifth of the ATLAS collaboration's 5500 members and contribute greatly to all areas of the experiment while learning valuable skills for their degrees.

K Anthony



Left to right: Katsuo Tokushuku, Pierfrancesco Butti, Oleh Kivernyk, Karl Jakobs (ATLAS spokesperson), Johanna Lena Gramling, Markus Zinser, Philip Sommer and Max Klein.

MEETINGS

Big science meets industry in Copenhagen

Big science equals big business, whether it is manufacturing giant superconducting magnets for particle colliders or perfecting mirror coatings for space telescopes. The Big Science Business Forum (BSBF), held in Copenhagen, Denmark, on 26–28 February, saw more than 1000 delegates from more than 500 companies and organisations spanning 30 countries discuss opportunities in the current big-science landscape.

Nine of the world's largest research facilities – CERN, EMBL, ESA, ESO, ESRF, ESS, European XFEL, F4E and ILL – offered insights into procurement opportunities and orders totalling more than €12 billion for European companies in the coming years. These range from advisory engineering work and architectural tasks to advanced technical equipment, construction projects and radiation-resistant materials. A further nine organisations also joined the conference programme: ALBA, DESY, ELI-NP, ENEA, FAIR, MAX IV, SCK·CEN – MYRRHA, PSI and SKA, thereby gathering 18 of the world's most advanced big-science organisations under one roof.

The big-science market is currently fragmented by the varying quality standards and procurement procedures of the different laboratories, delegates heard. BSBF aspired to offer a space to discuss the entry challenges for businesses and suppliers – including small- and medium-sized enterprises – who can be valuable business

M Nerul



CERN director for accelerators and technology, Frédéric Bordry, highlighted material expenditure for the HL-LHC upgrade project worth 950 million Swiss francs in the next few years.

partners for big-science projects.

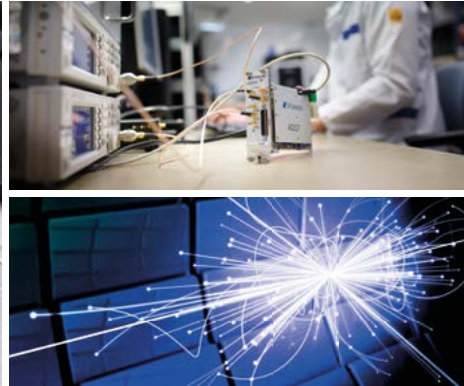
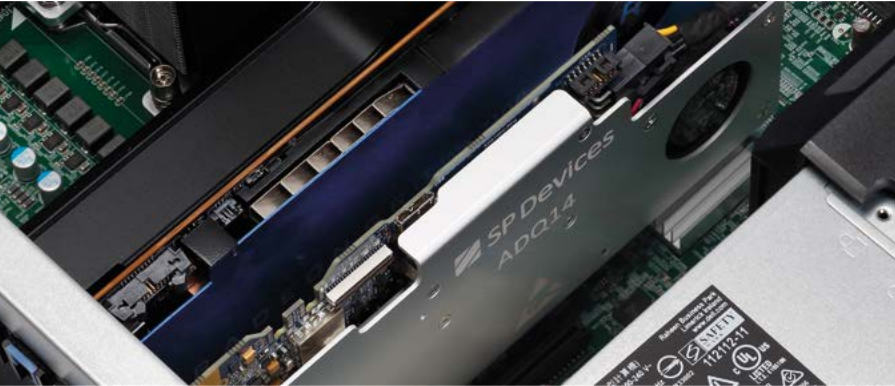
"The vision behind BSBF is to provide an important stepping stone towards establishing a stronger, more transparent and efficient big-science market in Europe and we hope that this will be the first of a series of BSBFs in different European cities," said Agnete Gersing of the Danish ministry for higher education and science during the opening address.

Around 700 one-to-one business meetings took place, and delegates also visited the

European Spallation Source and MAX IV facility just across the border in Lund, Sweden. Parallel sessions covered big science as a business area, addressing topics such as the investment potential and best practices of Europe's big-science market.

"Much of the most advanced research takes place at big-science facilities, and their need for high-tech solutions provides great innovation and growth opportunities for private companies," said Danish minister for higher education and science, Søren Pind.

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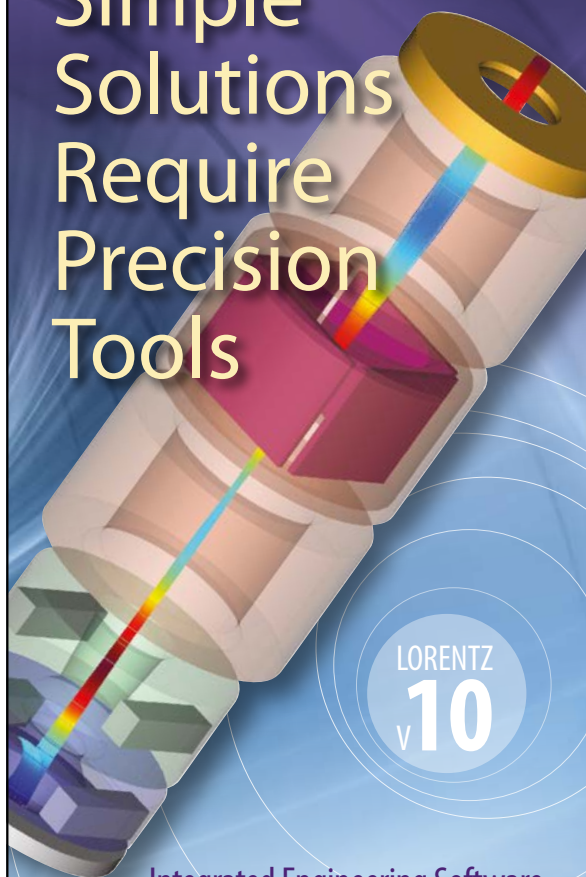


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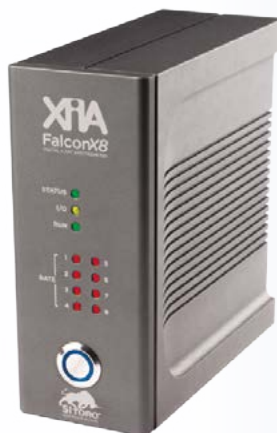
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Nanotechnology: from materials to science

Aiming to bring companies and researchers active in nanotechnology together with experts from other research fields, such as high-energy physics or medical science, the CERN-fostered High-Energy Physics Technology Transfer Network (HEPTech) organised an academia–industry matching event on 15–16 February at Charles University in Prague. The forum was part of the HEPTech's programme in nanotechnology and attracted about 60 participants from 11 European countries. It was co-organised by participants of the EU project ACCELERATE, which aims to support the long-term sustainability of large-scale research infrastructures.

Many conventional techniques and methods for nano-scale characterisation and analysis have reached their limit, requiring further development. Research in high-energy physics has allowed the development of accelerator and detector technology that can be applied in other research fields, and nanotechnology is

E. Getsova/HEPTech



Delegates at the HEPTech event in Prague.

among them.

The Prague event discussed several examples of where particle physics can impact nano-analysis and characterisation, particularly in biological and pharmacological environments. Other examples included X-ray imaging techniques for use in the PETRA III light source to visualise 3D microscopic structures with resolutions down to below 1 μm , while Elettra Sincrotrone Trieste focused on the capabilities for operando characterisation of advanced batteries and fuel cells using X-ray absorption spectroscopy and X-ray photoelectron spectroscopy. The Ruder Bošković Institute in Croatia shared its experience in the production and analysis of nanostructures using ion beams in the MeV energy range.

● HEPTech is mandated by and reports to the CERN Council and its programme is aligned with the directives of the European Strategy for Particle Physics.

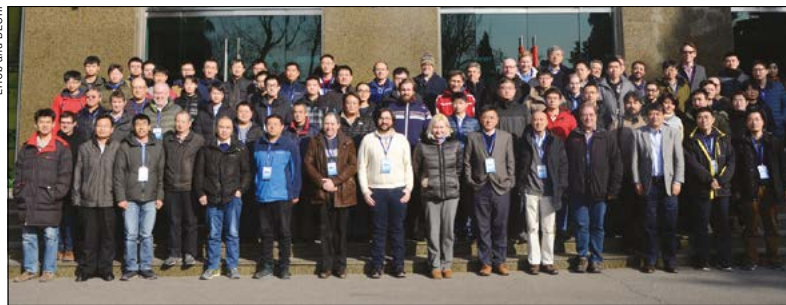
Beauty workshop highlights CERN–China links

At first sight, the LHCb experiment at CERN and the BESIII experiment at the Institute of High Energy Physics (IHEP) in Beijing are different experiments with little in common. The former operates in the fierce environment of 13 TeV proton–proton collisions of the LHC, whereas BESIII collects data from the BEPC accelerator, an electron–positron collider operating at energies of 3–4 GeV. Yet both experiments have been built for flavour physics, which is the study of the properties and decays of hadrons containing a heavy quark (beauty or charm in the case of LHCb; charm in the case of BESIII). As such, there are many topics of common interest between LHCb and BESIII. Moreover, measurements made at one collider can provide useful and essential input to the physics programme at the other.

On 8–9 February a workshop took place at IHEP to explore these synergies – the first such joint meeting between LHCb and BESIII – involving around 70 representatives from the experiments in addition to several invited theorists.

CP violation, which probes the difference in behaviour between matter and antimatter, is a central area of study for LHCb and a clear example of the benefits

LHCb and BESIII



Participants at the first joint LHCb–BESIII physics workshop in Beijing.

of closer collaboration with BESIII. Many CP-violation measurements involve decay processes where a beauty hadron decays into a charm meson, which itself subsequently decays. A clean interpretation of the results requires a complete understanding of the characteristics of the charm decay, and this can be provided by BESIII. Furthermore, many LHCb analyses targeted at testing lepton universality, a very hot topic at present (see p23), can be improved by a more complete survey of charm decays that provide potential backgrounds to the signal samples. BESIII is an ideal experiment for

performing such a survey.

These and related topics were the subject of lively discussions at the meeting, with attention devoted to both the potential of the current BESIII data and the future running plans of the Beijing experiment. It was concluded that future such events should be organised, and that the two collaborations should work closely together. This will enable us to obtain the best possible sensitivity to the key observables in flavour physics and to explore the full potential of this unique synergy between two major high-energy physics facilities.

Faces & Places

Training young researchers in South-East Europe

The Southeastern European Network in Mathematical and Theoretical Physics (SEENET-MTP) organises scientific training and research activities in the Balkan and neighbouring regions. Since it was founded in 2003, the network has promoted the exchange of students and researchers, and contributed to institutional capacity building in physics and mathematics.

In January 2015, with the support of CERN, SEENET-MTP launched a joint PhD training programme aimed at students from southeastern European countries. The main part of the programme was designed to be a series of intense, one-week schools for PhD students, advanced masters students and young postdocs in high-energy physics and related fields. Each school included lectures followed by appropriate exercises, and the programme became part of a general agreement of cooperation between CERN and SEENET-MTP signed in February 2017.

The fourth school, New Trends in High Energy Theory, was held in Sofia, Bulgaria, from 15–22 October 2017, and the main seminar topics were string theory and black holes, with a focus on holography. The opening course, by Timo Weigand of

M. Milosevic



Students at the SEENET mathematical and theoretical physics school.

CERN, gave a comprehensive introduction to string theory, starting from the world-sheet formulation of the bosonic and superstrings, and recalling the main properties of D-branes and the low-energy effective supergravity. Other guest lecturers were Atish Dabholkar (ICTP, Trieste), Anastasios Petkou (AU, Thessaloniki), Veselin Filev (DIAS, Dublin) and Nikolay Bobev (KU Leuven, Belgium), who focused on the systematic introduction of the AdS/CFT correspondence.

The 2017 school was organised by the faculty of physics at Sofia University, and moderated by SEENET-MTP president

Dumitru Vulcanov (West University of Timisoara) and executive director Goran Djordjevic (University of Niš). A total of 26 participants from six SEENET-MTP countries and Belgium attended. Besides CERN, these activities were supported by the ICTP, the European Physical Society, Sofia University and SEENET-MTP. The next school, High Energy and Particle Physics: Theory and Phenomenology, will be held in Niš, Serbia, on 3–10 June 2018, followed by a workshop on field theory and the early universe, and other events to mark 15 years of the network.

● phd.seenet-mtp.info

VISITS

J. Ordan/CERN



The president of Mozambique, **Filipe Nyusi**, and his delegation were welcomed to CERN on 26 February. President Nyusi visited the LHC tunnel (pictured), the ATLAS control room and the underground experiment area. He also signed the CERN guest book.

Correction: A map showing the location of European hadron-therapy facilities (CERN Courier January/February 2018 p34) depicted a centre under construction in Edinburgh that should have been in Northumbria, both in the UK.

Austrian federal president **Alexander Van der Bellen** visited CERN on 27 February, taking in the CMS experiment, the LHC tunnel and the ASACUSA and AEGIS facilities. Van der Bellen also attended a round table with young Austrian scientists. He is pictured (second from left) at CMS with his wife (left) and (right to left) Austria minister for education, science and research Heinz Fassmann and CERN Director-General Fabiola Gianotti.



On 26 February the governor general of Australia, **Peter Cosgrove**, was welcomed to CERN by Director-General Fabiola Gianotti, director for research and computing Eckhard Elsen, head of associate member and non-member state relations Emmanuel Tsesselis, and national contact physicist Geoffrey Taylor. Cosgrove visited the ATLAS control room and the underground experiment area, as well as the LHC tunnel.

J. Ordan/CERN

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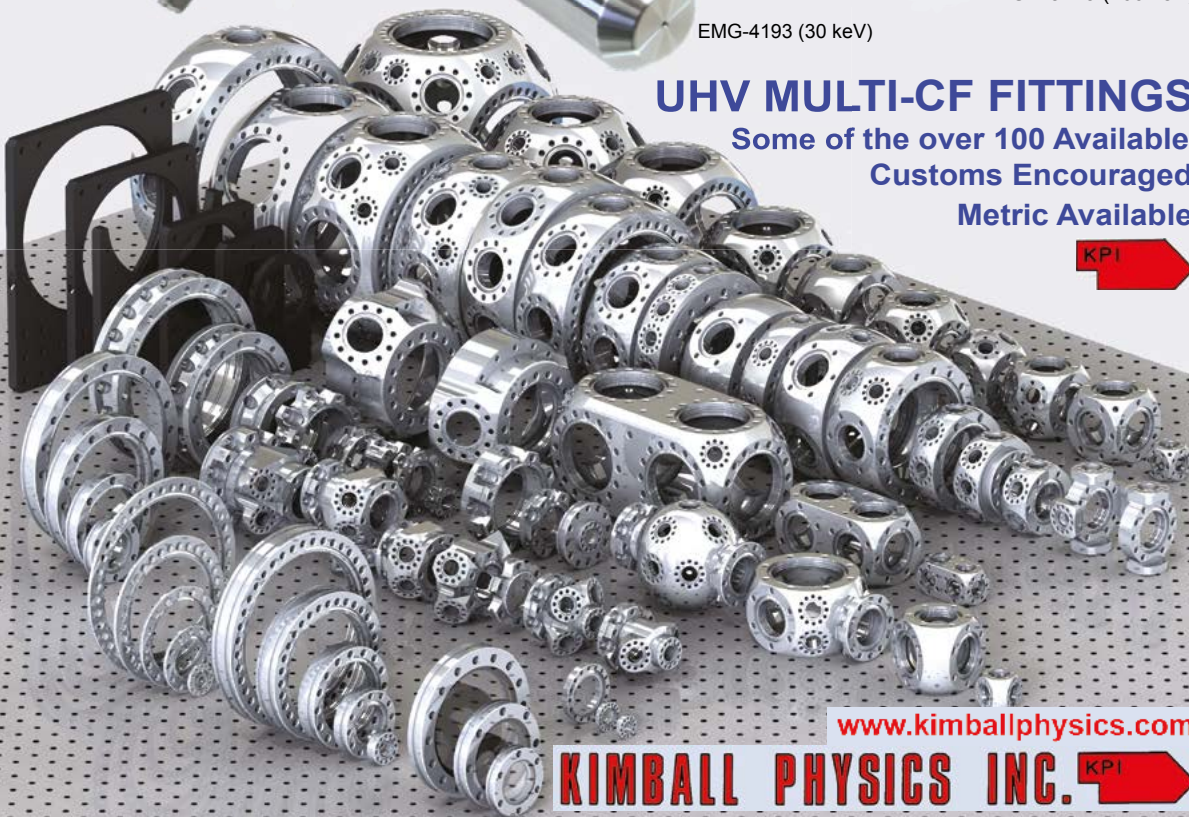
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OBITUARIES

Aharon Casher 1941–2018

Aharon (Rony) Casher was born in Haifa, Israel, and graduated from the Technion where he performed his thesis work on condensed bosonic systems under Micha Revzen. He then went to Yeshiva University in New York, where he wrote a well-known paper with Joel Lebowitz on heat flow in random harmonic chains. This is also where his longstanding collaborations with Yakir Aharonov and Lenny Susskind began.

The Aharonov–Casher effect, which is dual to the Aharonov–Bohm effect, is textbook material and also led to a beautiful result on the number of zero modes in 2D magnetic fields. With Lev Vaidman, Casher and Aharonov developed the mathematics underpinning weak measurements; and in a separate work with Shimon Yankielowicz they introduced the mechanism of magnetic vacuum condensation for confinement in QCD. The early suggestion by Aharon, Susskind and John Kogut that a vacuum polarisation mechanism can account for quark confinement was extremely influential. Additional, important joint papers on strong interactions, partons and spontaneous chiral symmetry breaking appeared in the early 1970s. The collaboration with Susskind also led to Aharon's familiarity with string theories and to the early paper with Aharonov of a dual string model for spinning particles.

In the high-energy physics community, Aharon is best known for his work on spontaneous chiral symmetry breaking



Casher's work included spontaneous chiral symmetry breaking in QCD.

in QCD. In a singly authored paper he provided a beautiful insight into this subject, followed by a famous paper with Tom Banks that related such breaking to the enhanced density of the low eigenvalues of the Dirac operator. These topics dominated Aharon's interest throughout the 1970s and early 1980s. His deep knowledge of topological field theory and understanding of non-perturbative effects enabled him to make key and long-lasting contributions.

Aharon often visited Brussels, where he worked with François Englert and others on supergravity, quantum gravity and studies of the early universe. Englert, in turn, became a frequent visitor at Tel Aviv University, and non-perturbative effects in quantum gravity and possible connections to the physics of

black holes became a shared passion of both. Although Aharon gave a series of influential lectures on string theory at Tel Aviv shortly after the 1984 “string revolution”, and published with Englert, Nicolai and Taormina a paper showing that all superstring theories are contained in the bosonic string, he was critical of strings as the ultimate theory of nature. He was an independent thinker, uncompromisingly honest when analysing novel ideas in theoretical physics.

Aharon stayed at Tel Aviv for almost 50 years, his knowledge and remarkable talents enabling him to teach any subject in theoretical physics from memory alone. He was accessible to students and attracted many who subsequently had independent academic careers, including Neuberger, Nissan Itzhaki and Yigal Shamir. Aharon was an avid reader, interested in literature, history, science fiction, sports and politics. One could have an interesting conversation with him on any topic.

Aharon was highly negligent as a self-promoter and was in science for the sheer pleasure of doing it. He rarely gave talks about his work, preferring to think and calculate at his desk, and his collaborators and many others had the deepest respect for him. His ability to keep challenging us and to relentlessly pursue the subtleties that could harbour fatal flaws helped maintain our own scientific integrity. Aharon will be deeply missed.

● Yakir Aharonov, François Englert, Herbert Neuberger and Shmuel Nussinov.

Adalberto Giazotto 1940–2017

On 17 August 2017 the Virgo and LIGO interferometers recorded the first gravitational-wave signal from the merger of two neutron stars. Their combined data, promptly indicating the direction of the source, made it possible for ground- and space-based telescopes to observe a newly born “kilonova” and for the first time follow its evolution. The data allowed spectroscopic identification of r-process nucleosynthesis, which can explain the abundance of heavy elements such as gold or uranium.

Italian physicist Adalberto Giazotto, who passed away in November, had been a convinced advocate of using gravitational-wave detectors spread around the world as a “single machine” and worked hard to have this vision become reality. Born in 1940 in Genoa, Giazotto graduated in



Giazotto was a driver of the Virgo interferometer.

Rome with a thesis in theoretical physics and then joined the experimental physics group at the electron synchrotron in Frascati led by

Edoardo Amaldi studying π^+ production with an 800 MeV electron beam.

The availability of a higher energy accelerator and the troubled times of 1968 were to prompt his move to Daresbury in the UK with a few colleagues. The NINA electron synchrotron was providing 5 GeV beams, allowing precision studies of the π^+ axial form factor. Subsequently, Giazotto participated at CERN in the NA1 experiment for the photoproduction of charmed particles and lifetime measurements. With the same spectrometer, by scattering π^- off electrons in a liquid hydrogen target, he worked at the NA7 experiment at CERN to measure the π^- and K^- space-like form factor, yielding precise values for their radii.

Since the early 1980s, forced to give up travel to Geneva for health reasons, Giazotto

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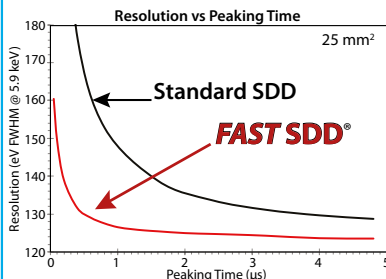
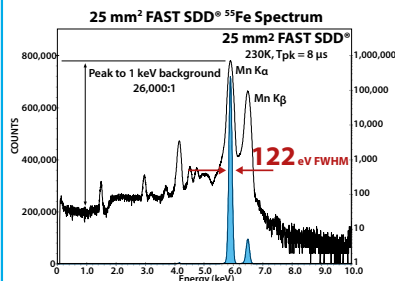
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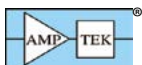


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turned to general relativity, realising that new experimental techniques for the detection of gravitational waves had to be developed. Although pulsars or binary neutron stars could be quite numerous and intense sources, they would produce signals in the range of tens of Hz, where instruments are overwhelmed by microseismic noise. Twenty years of development were necessary for Giazotto and his group to develop an instrument capable of recording those low-frequency oscillations. In the meantime, after joining with Alain Brillet and collaborators, came the proposal to CNRS and INFN to build the Virgo interferometer. In 2002 the infrastructure was delivered, but another 15 years had to pass before the results were seen.

With interests in many fields, Giazotto was also a passionate collector of crystals. He always expressed his wonder at the beauty that can emerge through nature and time, as well as the work of humanity, in particular music. Guided by long-term goals, he was practically impervious to the daily mechanisms of the workings of scientific research and driven only by the search for perfection necessary to undertake “a thing of enormous difficulty”.

Adalberto gave us an extraordinary example of how scientific ideas can be carried forward, without compromise, but always respecting nature, to reach unthinkable objectives. His vision and energy will be missed.

• *Francesco Fidecaro, Fulvio Ricci and Federico Ferrini.*

Sandibek Nurushev 1932–2018

Prominent Russian scientist Sandibek Baitemirovich Nurushev passed away on 16 February after a long disease. Nurushev was born on 25 December 1932 and graduated in physics from Moscow Engineering Physics Institute (MEPhI) in 1955, after which he started to work at JINR in Dubna. From the first days he took an active part in the creation of the first polarised proton beam at the JINR synchrocyclotron and in the earliest studies of spin effects in the interaction of protons with atomic nuclei. Nurushev defended his PhD in 1963.

From 1964 up until the last days of his life, he worked at the Institute of High Energy Physics (IHEP) in Protvino.

Nurushev was the father of experimental spin-physics in Russia. With the use of his ideas and under his leadership, many spin experiments were carried out both in Russia and abroad. He was the spokesperson of the first Russian–French polarisation experiment, HERA, at the U-70 accelerator in Protvino in the early 1970s and also of several other spin experiments there.

He was an exceptionally bright figure in the E581 and E704 experiments in Fermilab during the 1980s and 1990s, using polarised proton and antiproton beams with energies near 200 GeV in spin studies, as well as in the spin programme at STAR and the E925 polarisation experiment at Brookhaven National Laboratory. Nurushev left more than 550 scientific papers to his colleagues and followers, many of which added to our understanding of the structure of matter. Those who worked with him, who knew



Nurushev was a patriarch of spin physics.

and loved him, will continue his work and develop his ideas.

For many years Nurushev was engaged in teaching activities at MEPhI, and he encouraged many students to deal with polarisation effects and spin physics. He is the author of a textbook on polarisation phenomena and in 1990 was awarded the title of professor in high-energy physics. He also actively participated in the work of the international spin community.

Nurushev died peacefully at home in Protvino, leaving his wife, three children, several grandchildren and great-grandchildren. His last words to his granddaughter a few minutes before his death were: “I fulfilled my programme. I leave, I am satisfied”. Sandibek Nurushev will forever live in our memories.

• *His numerous colleagues and students at IHEP and MEPhI.*