

Faces & Places

APPOINTMENTS

New director for Jefferson Lab

Accelerator physicist Stuart Henderson, 53, has been named the fourth director of the Thomas Jefferson National Accelerator Facility in Virginia, US. Currently director of the Advanced Photon Source upgrade project at Argonne National Laboratory, he will start his new role on 3 April. Prior to joining Argonne, Henderson was associate laboratory director for accelerators at Fermilab and before that he spent almost a decade at Oak Ridge National Laboratory's Spallation Neutron Source (SNS), where he led the transition to successful user operations at megawatt-beam power levels.

Henderson replaces Hugh Montgomery,



Argonne National Laboratory

who came to Jefferson Lab as director in 2008 from Fermilab and will continue his association with the facility as director emeritus. Jefferson Lab has enjoyed significant growth in recent years, which

Stuart Henderson has extensive experience with US national laboratories.

includes the \$338 million 12 GeV Upgrade Project and construction of a \$70 million addition to the lab's engineering and design facilities. "I'm thrilled to be taking the helm of Jefferson Lab, particularly at this time of tremendous opportunity and potential," says Henderson. "Jefferson Lab plays a very special role in furthering the Department of Energy mission, both through its operation of a world-class nuclear-physics research facility, and through its world-renowned technology capabilities."

Rüdiger Voss next president of EPS

Former CERN staff member Rüdiger Voss has been appointed president of the European Physical Society (EPS), beginning 1 April and effective for two years. Established in 1968, the EPS represents 42 national physical societies, which in turn represent more than 120,000 members. It has a similar number of associate members – mostly major research institutions such as CERN – and about 3500 individual members.

Voss, who completed a PhD in deep



CERN

inelastic muon–nucleon scattering at CERN's SPS in 1982, joined CERN as a research physicist in 1987. Following various group-leader positions in the experimental-physics division, in 2009 he became a senior adviser for international relations and then head of the unit from 2013 to 2015.

Among his many goals as EPS president,

Voss, the latest voice of the EPS.

Voss wants to strengthen global co-operation and networks and raise the voice of science in the face of Europe's changing political landscape, which he says poses severe threats to cross-border collaboration, the mobility of students and researchers, and equal access to European funding and infrastructures. "The EPS, representing a scientific discipline with a highly developed culture of international collaboration, has a special responsibility to voice a strong opinion in this discussion," he says. "This concern is not unique to physics, and needs to be addressed by the scientific community at large." (See "European organisations uphold scientific values" on p9.)

AWARDS

Neutrino trio wins 2016 Pontecorvo Prize

The Joint Institute for Nuclear Research (JINR) in Dubna, Russia, has selected the winners of the Bruno Pontecorvo Prize, which is awarded each year for significant advances in elementary particle physics. The 2016 recipients, who are recognised for their outstanding contributions to the study of neutrino oscillations and to the measurement of the θ_{13} mixing angle using the Daya Bay, RENO and T2K experiments, are: Yifang Wang of the Institute of High Energy Physics in Beijing, China; Soo-Bong Kim of Seoul National University, South Korea; and Koichiro Nishikawa of the KEK Laboratory in Tsukuba, Japan.

Wang pioneered the Daya Bay neutrino oscillation experiment in China, while Kim is



(Left to right) Yifang Wang, Soo-Bong Kim and Koichiro Nishikawa.

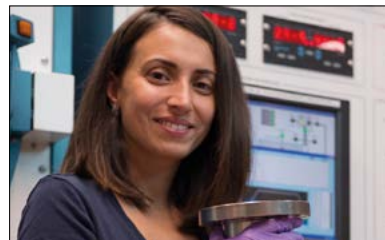
spokesperson for the Reactor Experiment for Neutrino Oscillation (RENO) in South Korea and Nishikawa is the founding spokesperson of the T2K and K2K experiments in Japan. The 2016 prizewinners will receive the award at a ceremony in September.

Bruno Pontecorvo died in 1993 at Dubna, and the prize was instituted in

his memory two years afterwards. It was Pontecorvo who in 1957 suggested that neutrinos might change from one type to another. The experimental discovery of neutrino oscillation half a century later by Super-Kamiokande and the Sudbury Neutrino Observatory was recognised with the 2015 Nobel Prize for Physics.

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Image credits: (left to right) CERN, ESRF, Fermilab



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EPS announces accelerator prizes

The European Physical Society (EPS) accelerator group has announced the winners of the 2017 accelerator prizes, to be presented on 18 May during the International Particle Accelerator Conference (IPAC17) in Copenhagen.

Lyn Evans of CERN receives the Rolf Widerøe Prize for outstanding work in the accelerator field. He is rewarded for his many major accomplishments in the field of accelerator design, construction and operation, in particular his contributions to the SPS and his leadership of the design and construction of the LHC. Research at the SPS led to the discovery of the W and Z bosons, while the LHC uncovered the Higgs boson in 2012.

The Gersch Budker Prize for a recent significant, original contribution to the accelerator field goes to Pantaleo Raimondi of the ESRF in Grenoble in recognition of his invention of a new storage-ring lattice called the “hybrid multi-bend achromat”. The novel design will reduce the emittance of the ESRF light source by a factor of 30 and has also been adopted as the basis for the design of several other next-generation light sources.

Finally, the Frank Sacherer Prize recognising an individual in the early part of his or her career goes to Anna Grassellino of Fermilab, for her major impact on the field of superconducting RF technology. The techniques of nitrogen doping and “nitrogen infusion” developed by Grassellino have already been applied to accelerator projects and have the potential to significantly reduce the cryogenic load and improve the energy efficiency of superconducting linacs.

(Top, left to right) EPS prizewinners Lyn Evans, Pantaleo Raimondi and Anna Grassellino.

AAAS honours Kurt Gottfried

Kurt Gottfried, professor emeritus of physics at Cornell University and a renowned authority on nuclear-arms control, has been awarded the 2016 Scientific Freedom and Responsibility Award from the American Association for the Advancement of Science (AAAS). Gottfried, an expert in quantum theory who was a visiting scientist at CERN in the 1960s, was honoured “for his long and distinguished career as a ‘civic scientist’, through his advocacy for arms control, human rights and integrity in the use of science in public policymaking”.



Gottfried helped to found the Union of Concerned Scientists.

Julius Wess Award for detector work

Robert Klanner of the University of Hamburg and DESY has been nominated for the 2016 Julius Wess Award for outstanding achievements in elementary particle and astroparticle physics. The award, established in 2008 by the KIT Elementary Particle and Astroparticle Physics Center, recognises Klanner's fundamental contributions to the development of silicon-microstrip detectors, in particular for achieving the resolution required to reconstruct secondary vertices from the decay of heavy-flavoured hadrons. In the early 1980s, together with Gerhard Lutz and the late Josef Kemmer, Klanner used planar processes to build a silicon-strip detector, and in doing so initiated the culture of flavour-tagging in particle physics.



Klanner's work led to the rapid development of micro-structured silicon detectors.

CONFERENCES

Highlights from Quark Matter 2017



Quark Matter 2017 participants at the Hyatt Regency Chicago in February.

The 26th Quark Matter conference, devoted to ultra-relativistic nucleus–nucleus collisions, was held in Chicago on 5–11 February. Following a pre-conference student day that attracted nearly 400 young scientists, the main event had more than 700 registered participants. Overviews of the most recent results from experiments, spanning the entire energy range from the SIS 100 accelerator at GSI Darmstadt to the highest energies at CERN's LHC, were followed by almost 200 parallel presentations, 30 plenary talks and a session with more than 300 posters.

Nucleus–nucleus collisions have long been known to display characteristic signatures of collectivity, and this was one of the main themes at the Chicago event. Collectivity is typically quantified in terms of flow coefficients, v_n , where n corresponds to a particular harmonic in the azimuthal distributions of produced particles. Since the first LHC proton–lead run in 2013, it has been known that sizeable v_n are also observed in proton–lead collisions and even in detailed analyses of high-multiplicity proton–proton collisions.

At this year's conference, the LHC's ALICE experiment presented novel results on identified particle flow. The data show that ϕ mesons flow like pions and kaons, that heavy-flavoured D mesons display sizable collectivity above 10 GeV and that even J/ψ mesons partake in collective motion

in lead–lead collisions. Both ALICE and CMS also presented novel analyses of the correlations between different flow coefficients, while CMS quantified the differences between D-meson flow and light-hadron flow for v_2 and v_3 , which inform us about differences in the interactions of light partons and heavy quarks with the hot medium. ATLAS showed new results on heavy-flavour flow in proton–lead collisions. These results were complemented by more detailed analyses from RHIC in the US, revealing the mass ordering of flow coefficients and heavy-flavour flow measured by the STAR experiment, and small-system collectivity including proton–gold, deuteron–gold and helium–gold collisions measured by PHENIX.

Theory-overview talks focused on the validity of relativistic fluid dynamic simulations supplemented with realistic initial conditions and properties of the hot-partonic and the hadronic phases. The extent to which the simulations can account for collectivity in soft-particle production, and in particular how global Bayesian analyses that are novel for this field can be used to zoom in on fundamental properties of the quark–gluon plasma, was the subject of many parallel talks. In addition to details of these analyses, the Chicago conference discussed the new challenges for theory and experimental analyses that arise from characterising and understanding collectivity in smaller systems. ▸

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Another highlight of the event was progress on the topic of hard probes. Since the first experiments at RHIC, it has been known that the yield of high- p_T final-state hadrons is suppressed or “quenched” by a factor of around five in central heavy-ion collisions. Measurements at the LHC have extended the dynamic range of these measurements and have gradually made a whole new set of jet-based probes available. The last two years have also seen a strong push towards analysing jet substructures with modern analysis techniques, and Quark Matter 2017 featured the first detailed public discussion of such developments. For instance, researchers are exploring novel opportunities for characterising jet-medium interactions and medium-induced parton splittings based on so-called “groomed” jet variables, such as the groomed z_g distributions measured by CMS and STAR or jet-mass measurements presented by ALICE.

Apart from these new observables, a

number of well-known measurements have been repeated using the much larger data samples of LHC Run 2 to improve the measured kinematic ranges and statistical accuracy. In particular, ATLAS showed nuclear modification factors for jets that reveal a factor of two suppression for jets with a transverse energy up to 1 TeV, while both ATLAS and CMS presented much improved measurements of the energy imbalance for photon jets and CMS presented Z-boson-jet pairs, which provide precise information about the probability distribution for energy loss. An exciting future perspective is that a detailed analysis of the softening of jet fragmentation may provide experimental access to the microscopic mechanisms underlying equilibration processes in the hot and dense medium.

There were many further highlights at Quark Matter 2017. Results ranged from the ATLAS measurement of dijet photoproduction in ultra-peripheral

collisions, which may yield novel constraints on the nuclear dependence of parton distribution functions, to new precision measurements of the sequential suppression of bottomonium states at CMS. New results from RHIC also included a first measurement of the charmed Λ_c baryon by the STAR experiment, which provides a new way to test hadronisation models. We also saw the first measurements of net particle moments by ALICE, which provide a critical reference for fluctuation measurements in the RHIC beam-energy scan.

Space was also given to discussions of the physics plans for the LHC heavy-ion programme in Run 3 and beyond, as well as the planning for the new “sPHENIX” detector at RHIC that has recently passed an important review and is expected to take first beam in 2022. Participants now have 15 months to consider the presented results and make progress before the next Quark Matter meeting in Venice in May 2018.

Slush brings scientists and entrepreneurs closer

With an astonishing 17,500 attendees, one million livestream viewers and thousands of participating start-up companies and venture capitalists, Slush is Europe's leading entrepreneurship event. Among accredited business founders and investors, CERN was invited to give a keynote speech at the 2016 edition of the annual event, held in Helsinki, Finland, at the start of December. With Slush aiming to aid the next generation of world-conquering companies and CERN aiming to find answers to fundamental questions about the universe, you might wonder what these two organisations have in common.

Although there has traditionally existed a gap between science and entrepreneurship,

P. Kauttu



Marthe Dehli of CERN's Knowledge Transfer Group was a keynote speaker at Slush Science Track in December.

both communities have started to realise that the benefits of co-operating are reciprocal. One of the ways innovations and know-how can be applied more generally

is through starting new ventures, and CERN is committed to building a culture of entrepreneurship among its scientists and engineers to help maximise the impact of CERN on society. Vice versa, new initiatives such as Slush Science Track have brought academic research into the spotlight by gathering top-quality research and offering a €100,000 prize for the best basic research presented. Slush underpins its initiative by remarking that “all inventions come from science, and that today's findings will lead to products years later”.

Antwerp workshop sets reference

At the beginning of November, at the Resummation, Evolution, Factorization (REF) meeting, about 40, mostly young, scientists met in Antwerp in Belgium to discuss limitations in present calculations and simulations concerned with Standard Model processes. These limitations, which concern the physics programme both at the LHC and at future lepton-hadron colliders, come from neglecting the transverse momenta that arise in the QCD evolution of initial-state partons during collisions. Very small



Participants at the 2016 REF workshop.

transverse momenta shed light on the intrinsic hadronic structure, while large transverse momenta can change the kinematics of processes significantly. In the usual

collinear evolution and parton-distribution functions, these transverse momenta are not considered explicitly.

One of the highlights of the workshop

P. Van Mechelen

was the determination of the very first complete transverse-momentum-dependent parton distributions, which are valid over the full range of momentum accessible at the LHC. Progress has been reported in the region of very small longitudinal momenta, where saturation effects typically appear. New tools for transverse-momentum-dependent parton distributions (TMDs) were reported, including a complete library

containing all publicly available TMDs and visualisation tools.

The REF workshop series, which started in 2014, is unique because it addresses questions from high-energy particle collisions together with issues coming from the non-perturbative structure of hadrons. These are very new and exciting attempts to describe in a uniform manner the low- and high-energy behaviour of particle collisions, which has much

impact on the precision of LHC predictions. Although still a small community, the range of applications of TMD approaches cover the most interesting and important regions where resummation to all orders in perturbation theory is relevant, and which is the major focus of new and challenging Standard Model measurements at the LHC. The next edition of the REF workshop will be held in Madrid, Spain, from 13 to 17 November 2017.

Celebrating a decade of high-end computer algebra

Precision calculations of scattering processes at high-energy colliders such as the LHC rely on advances in computer algebra to process the enormous number of higher-loop Feynman integrals. For the past 10 years, the DESY theory group at Zeuthen has collaborated in this field with mathematicians from the Research Institute of Symbolic Computation (RISC) at Johannes Kepler University (JKU) in Linz. During the collaboration, various symbolic summation and integration packages, as well as those for related special functions, have been created. These are publicly available and offer broad automation of analytic Feynman integral calculations for two- and three-loop integrals.

To mark the 10th anniversary of this successful partnership, a one-day workshop took place at Hagenberg



(From left to right) Joachim Mnich (DESY), Peter Paule (RISC), Johannes Blümlein (DESY), Carsten Schneider (RISC) and Alexander Egedy (JKU).

Castle in Austria on 7 February, during which representatives of DESY and JKU extended their collaboration agreement for a further five years. The directors of research at Wolfram Research and MapleSoft also contributed reports on the latest versions of Mathematica and Maple, while special lectures were delivered about summation theory, elliptic solutions,

precision calculations for the LHC and new developments in q-series.

CORRECTION

A photograph on p41 of the March issue shows Claude Trudelle, Québec delegate general for Germany, Austria and Switzerland, and not Rémi Quirion as stated in the caption.

VISITS

S. Bennett/CERN



Director-general of the United Nations Office, **Michael Möller**, visited CERN on 6 February with other heads of United Nations agencies, during which they toured the ATLAS cavern and visited the LHC tunnel.



Marie-Christine Marghem, Belgian minister for energy, environment and sustainable development, came to CERN on 20 February. Following a tour of CMS, she signed the guestbook with (left to right): CERN director for accelerators and technology Frédéric Bordry, Belgian ambassador to the UN Geert Muylle, CERN Director-General Fabiola Gianotti, and CERN director for research and computing Eckhard Elsen.

S. Bennett/CERN



Ofir Akunis, minister of science, technology and space in Israel, visited CERN on 22 February, during which he toured ATLAS with former experiment spokesperson Peter Jenni (left).



Edgars Rinkēvičs, minister of foreign affairs for the Republic of Latvia, came to CERN on 27 February and visited the CMS experiment. He signed the guestbook with CERN director for international relations Charlotte Warakaulle and non-Member State adviser Christoph Schaefer.

C. Koutschan

S. Bennett/CERN

M. Brie/CERN

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OBITUARIES

Ned Goldwasser 1919–2016

Edwin Goldwasser, deputy director of Fermilab when the laboratory was founded in 1967, died on 14 December at the age of 97. Goldwasser oversaw the construction of Fermilab (or the National Accelerator Laboratory, as it was then known), completing it on time and under budget. He also scheduled its experimental programme, managed its programme Advisory Committee and implemented its groundbreaking equal-employment programme. Goldwasser remained as the laboratory's deputy director until 1978, taking an extended leave of absence from the University of Illinois to serve at the new facility.

"When Ned took leave from the University of Illinois to help create Fermilab from green fields, the project took on new dimensions: a truly effective concern for the variety of people to build it, and a dedication to make it both fruitful for its users and attractive for the professional development of its staff," says emeritus professor of the University of Illinois Ralph Simmons. "All this was combined with



Ned Goldwasser in 1967 at the National Accelerator Laboratory.

contagious yet critical enthusiasm for the discoveries made possible."

After setting Fermilab firmly on its feet, Goldwasser returned to the University of Illinois in 1978 as vice chancellor for research and dean of the graduate college. In 1986, he took another extended leave to

join the central design group of the proposed Superconducting Super Collider facility, where he served as associate director until 1988. In 1990, following his retirement from the university, he was appointed a distinguished scholar at the California Institute of Technology (Caltech) to work on the LIGO project.

Goldwasser did his undergraduate work at Harvard University. Following service as a physicist with the US Navy, he received his PhD in physics from the University of California, Berkeley, then served a year on the faculty there before moving to the University of Illinois in 1951.

"Ned was a natural leader, who was instrumental in making Fermilab a place where both physics and physicists thrived," says Barry Barish, professor emeritus of physics at Caltech and the first director of LIGO. "I will personally miss his wisdom and guidance. In every way, Ned was a class act."

● Based on an article written for the Fermilab website, news.fnal.gov.

Hans Jürgen Hilke 1938–2016

Hans Jürgen Hilke, a true experimental physicist and an inspirational colleague, passed away on 15 October. He completed his diploma thesis in 1965 at Hamburg University, then went to CERN to develop a bubble chamber activated by the wave pattern produced from an ultrasonic quartz oscillator. Having earned his doctorate in 1969, he soon became engaged in the construction of the external muon identifier for the Big European Bubble Chamber (BEBC). After completing the project and having operated the detector for its first exposures, Hans Jürgen took a sabbatical at the University of California, Berkeley, where he worked on time-projection chambers (TPCs). While at Berkeley, he became engaged in the most challenging aspect of large-TPC design, leaving his characteristic imprint of good judgment and technical prowess on the complex TPC read-out planes, in particular. Despite the chaotic environment of a pioneering enterprise, Hans Jürgen's unflappable and gracious perspective was highly appreciated by all involved.

The experience he gained in working with



Experimental physicist Hans Jürgen Hilke.

TPCs motivated Hans Jürgen to introduce this technology to the experiments at CERN's Large Electron–Positron Collider, in particular DELPHI (for which in 1980 he became technical co-ordinator). The successes of the complex DELPHI detector are in large part due to Hans Jürgen's drive, care and attention to detail. In 1989, at the start up of data-taking, the collaboration encountered many unexplained cut-offs of the superconducting magnet coils, which

constituted the world's largest solenoid at that time. After many unsuccessful attempts by the constructor, Hans Jürgen discovered and understood the origin of these cut-offs, and in a couple of days DELPHI was able to take data.

From 1991 to 1994 he was deputy leader of CERN's experimental-physics division, with particular responsibility for the mechanical and electronics engineering groups.

In January 1997 he joined the LHCb experiment, where he took over the function of technical co-ordinator and immediately became heavily involved in preparing various Technical Design Reports. Working in his usual energetic and passionate manner, Hans Jürgen quickly became familiar with the experiment and played a crucial role in strengthening its capabilities in several areas such as the magnet, photon detectors in the ring imaging Cherenkov detectors, and the muon system. He also took responsibility in financial matters and safety, and undoubtedly played a significant part in the success of the LHCb experiment.

Besides his scientific qualities, his integrity and honest character were always very

Faces & Places

much appreciated. Hans Jürgen was always ready to hear different opinions and did not hesitate to take difficult decisions. His extensive knowledge and experience with various detector technologies paired with his co-ordination skills earned him credibility and authority. Colleagues who had the pleasure to work closely with Hans Jürgen will never forget him and his intellectual

honesty, directness of speech and dedication to CERN and its experiments.

In his private life, Hans Jürgen's wide interests, his love of classical music and great care in all personal relations were a continuous inspiration to his family and friends. Our deepest sympathy goes to his wife, children, brother and their families.

• *His friends and colleagues.*

Jean Yoccoz 1925–2016

Jean Yoccoz, one of the pioneering directors of the French National Institute for Nuclear Physics and Particle Physics (IN2P3), passed away on 30 December at the age of 91.

Born into a modest peasant family in Savoie, Yoccoz succeeded brilliantly in his studies and was admitted to Ecole Normale Supérieure in Paris. Attracted by theoretical nuclear physics, he entered Frédéric Joliot's laboratory in Collège de France and then joined Rudolf Peierls at the University of Birmingham in the UK, where he undertook a PhD that established the link between the shell and Bohr–Mottelson models of the nucleus. The 1957 Peierls–Yoccoz paper continues to be regularly cited today. Having been appointed professor at the University of Strasbourg, he continued his research and in 1966 moved to Grenoble University. However, it was high-level scientific management to which Yoccoz would orientate his career and invest his intellectual talents to the service of our community.

At the end of the 1960s there was great debate in France concerning the organisation of particle physics and whether a national accelerator programme could still be afforded. After eight years of unsuccessful attempts, the IN2P3 institute was created in 1971 (without a high-energy machine) to co-ordinate and support research done in the many French laboratories involved in nuclear and particle physics. Its first director, Jean Teillac, immediately called on Jean Yoccoz as a deputy, and in 1975 Yoccoz became the next director – a position he held until 1983.

The early years of IN2P3 were very important to establish an efficient structure allowing laboratories to retain their identities while also being integrated within prioritised large projects. One of the aims was to achieve high visibility for French particle physicists on the international scene, and Yoccoz's vision turned out to be correct. It led during his mandate to the launching of large programmes at CERN on the SPS and later on LEP, but also with the



Jean Yoccoz, an exemplary director for IN2P3.

first large-scale experiment to be installed abroad (CELLO at DESY, Hamburg). In 1982, Yoccoz signed an agreement with then CERN Director-General Herwig Schopper for the construction of the LEP linac injector at the Laboratoire de l'Accélérateur Linéaire (LAL, Orsay). Yoccoz was also instrumental in shaping a new landscape for nuclear physics with the creation of the IN2P3-CEA national laboratories Saturne at Saclay and GANIL in Caen with competitive accelerators.

We remember Jean Yoccoz as an exemplary director for IN2P3. He steered the institute through occasionally difficult times when he had to defend its specificity and the need for large resources, including highly qualified technical personnel. His human qualities were recognised by all. He could interact with people whatever their level in the same benevolent spirit. He knew how to listen, but his decisions were always firm and clear.

In the last months of his life, Jean Yoccoz was deeply affected by the loss of his son Jean-Christophe, a mathematician and winner of the Fields Medal who died prematurely last September. Our condolences go to his family, particularly his two sons Nigel Gilles and Serge.

• *Michel Davier.*

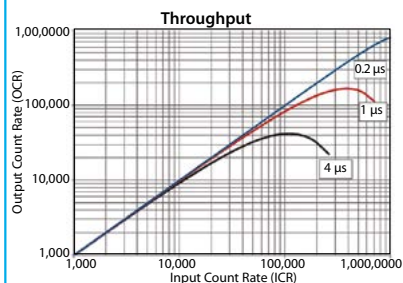
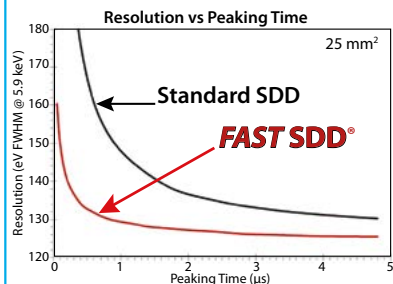
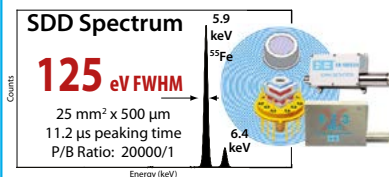
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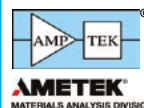
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