IPAC26



IPAC 2026

17th International Particle Accelerator Conference

May 17 - 22

Deauville | Normandy | France

PROCEEDINGS

GANIL cea cnrs ESRF The European Synchrotron SOLEIL SYNCHROTRON EPS ACCELERATOR GROUP European Physical Society

IPAC26 PROCEEDINGS PREFACE

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Abstract

The 17th International Particle Accelerator Conference (IPAC'26) was held at the Centre International de Deauville (CID), Deauville, Normandy, France, from Sunday 17 May to Friday 22 May 2026.

The conference brought together over 1,500 participants from 41 countries, representing the largest number of countries ever participating in an IPAC conference and confirming the global reach of accelerator science.

IPAC'26 featured a broad and dynamic scientific programme, extensive poster sessions with more than 1,400 submitted papers, and a large industrial exhibition. The conference highlighted major advances across the field, including first demonstrations, record performances and progress on new and upgraded facilities worldwide.

CONFERENCE OVERVIEW AND PARTICIPATION

IPAC'26 continued the tradition of the IPAC series as the premier annual gathering for the worldwide accelerator community. Chaired by Peter McIntosh (STFC) and hosted by GANIL in collaboration with CEA, CNRS, SOLEIL and ESRF, the conference took place in Deauville on the Normandy coast and provided an excellent environment for scientific exchange and collaboration.

The event attracted more than 1,500 delegates from 41 countries, marking the widest international participation in the history of the conference series. This participation reflects the strength of the global accelerator community and the continued importance of in-person interaction for collaboration and innovation.

Student participation was a key feature, with approximately 240 students attending, including 96 supported through dedicated grants covering conference fees, accommodation and travel costs. In addition, all students participated in a structured tutoring programme prior to the conference, further strengthening skills development and networking opportunities.

Industry participation remained central, with over 113 industrial exhibitors, reinforcing IPAC's role as a major interface between accelerator laboratories and high-technology industry.

The IPAC'26 conference delivery relied extensively on the excellence of the Local Organising Committee, chaired by Hanna Franberg-Delahaye (GANIL), supported by the Scientific Secretariat, led by Sabrina Lecerf (GANIL).

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SCIENTIFIC PROGRAMME

The scientific programme was developed by the Scientific Programme Committee (SPC), chaired by Rogelio Tomas (CERN), supported by the Scientific Advisory Board (SAB) and reflected the breadth and ambition of the field.

The programme included:

- 36 invited and 51 contributed talks.
- A balanced regional distribution (56% EMEA, 23% Americas, 21% Asia).
- A record 35% female representation among speakers, reflecting progress toward improved diversity within the community.

The programme covered all major accelerator concepts and applications, including linacs, storage rings, free-electron lasers, plasma accelerators, and applications spanning particle physics, photon science, neutron science, medicine and industrial applications.

Major Facilities and Global Projects

The programme included extensive updates on major international facilities, covering commissioning, upgrades and future developments, including ESS, HEPS, APS-U, SOLEIL II, FAIR, CLARA and others. These presentations illustrated both successful delivery of large-scale infrastructure and strong forward-looking strategies worldwide.

First Achievements and Highlights

The conference showcased numerous first-ever achievements, representing important milestones across the field:

- First acceleration of positive muons, demonstrated at KEK (Japan), opening new opportunities for muon-based accelerator concepts and precision physics programmes involving controlled μ^+ beams.
- First lasing of a cavity-based X-ray free-electron laser, achieved at DESY/European XFEL (Germany), marking a major step toward fully coherent, high-brightness X-ray sources with improved stability and efficiency.
- First mixed helium/carbon ion beams at a clinical facility, realised at TU Wien/MedAustron (Austria), demonstrating increased flexibility in ion-beam therapy and enabling new treatment strategies in medical applications.
- First direct observation of wakefield generation using structured light, demonstrated at the Weizmann Institute of Science (Israel), providing new insight into advanced plasma acceleration mechanisms and controlled beam–plasma interactions.

These achievements highlight the continued rapid progress of accelerator science across both fundamental research environments and applied domains, bridging laboratory advances and real-world applications.

Records and New Concepts

IPAC'26 also highlighted record-setting performance and emerging concepts, demonstrating both optimisation of existing facilities and innovation in future technologies:

- Record luminosity production at the Large Hadron Collider, achieved at CERN (Switzerland), reflecting sustained improvements in beam control, optics optimisation and machine operation strategies.
- Unprecedented dynamic range in beam halo diagnostics using a fluorescence wire system, demonstrated at the Institute of High Energy Physics (IHEP, China), enabling improved understanding and mitigation of beam losses in high-intensity machines.
- The "Tristron" concept for high-efficiency RF power generation, developed at CERN (Switzerland), introducing a novel architecture with the potential to significantly improve RF efficiency for next-generation accelerators.
- Advanced beam energy measurement techniques using near-resonance polarisation modulation, demonstrated at EPFL (Switzerland), enabling significantly enhanced precision in beam energy calibration.
- Accelerator-driven muon spectroscopy and compact portable muon sources, developed at STFC (United Kingdom) and Hiroshima University (Japan), expanding the reach of accelerator applications beyond large-scale facilities.
- Development of ultrasensitive diagnostic systems for precision muon experiments, carried out at the University of Tokyo/J-PARC (Japan), enabling next-generation high-precision measurements.

These developments illustrate a field that is simultaneously pushing the limits of performance at major international facilities and exploring innovative concepts in advanced laboratory environments, with impact across fundamental science, applied research and industrial applications.

POSTER PROGRAMME AND PROCEEDINGS

Poster sessions remained central to the conference, enabling broad participation and detailed scientific exchange. The JACoW editorial team and systems enabled the processing of more than 1,400 submitted papers (oral and poster contributions), managed extensively by the Editor In Chief, Nicolas Delerue (IJCLab, CNRS). For the first time in IPAC, 40 invited poster presentations were included, providing additional visibility for important contributions.

The present proceedings volume contains papers edited by the proceedings team, some of these papers have been peer-reviewed and will also be published separately in the European Physics Journal (EPJ), Web of Conference and the organisers thank the editorial board and referees for their substantial efforts. For the EPJ and coordinated by Gianluca Geloni (Eu-XFEL), the present peer-reviewed proceedings volume contains only the papers that have been peer-reviewed, about one fifth of papers submitted to the Conference.

SPECIAL SESSIONS AND COMMUNITY ACTIVITIES

Student Programme and Training

A major innovation was the student tutoring programme held for the entire day on the Saturday, attended by all students prior to the conference, combined with a dedicated student poster session on the Sunday afternoon. Coordinated by Eduart Prat (PSI), this initiative proved highly successful in fostering mentoring and knowledge exchange.

Equal Opportunities

The Equal Opportunities session, attended by more than 300 participants on the Wednesday evening, provided an important forum for discussion on diversity and inclusion.

Held under the theme, "Women in Physics: The Ambivalence of Success, Forces of Inertia and Pathways to Equity", the session addressed both progress and persistent structural challenges in achieving equity.

Contributions examined sociological, institutional and career development issues, emphasising the need to move from awareness toward measurable outcomes and sustained systemic change. Coordinated by Atoosa Meseck (HZB), the strong engagement demonstrated the importance of continuing and strengthening such activities in future IPAC conferences.

Industry and Sustainability

The industry session held on the Wednesday afternoon, focused on sustainability and education, brought together perspectives from laboratories, research infrastructures and industrial partners.

Key topics included:

- Sustainable design and efficient operation of accelerator facilities.
- Energy consumption and environmental impact.
- workforce development and training for future projects.

Coordinated by Jean-Luc Revol (ESRF), with over 113 industrial exhibitors, the conference provided a vital platform for collaboration between academia and industry and highlighted the increasing importance of sustainability considerations in future accelerator developments.

Innovation Activities

A new initiative at IPAC'26 was the IUPAP WG14 Accelerator Science Hackathon, involving more than 65 participants from 19 countries working on practical accelerator challenges, demonstrating innovative approaches to

collaboration and training. Coordinated by Christine Derve (ESS), the session was initiated on the Sunday morning, with prize awards culminating on the Wednesday afternoon.

AWARDS

The conference included the EPS-AG accelerator prize session recognising outstanding contributions, coordinated by Ralph Asmann (GSI), with accolades being awarded for the following prizes:

Rolf Wideröe Prize

Elena Shaposhnikova (CERN), for outstanding contributions to RF systems, longitudinal beam dynamics and impedance identification techniques.

Gersh Budker Prize

Wentao Wang (Shanghai Institute of Optics and Fine Mechanics), for pioneering achievements in laser-plasma acceleration and FEL demonstration.

Frank Sacherer Prize

Patrick Rauer (DESY), for the experimental demonstration of cavity-based XFEL lasing and associated simulation developments.

Bruno Touschek Prize

Andrea Frazzitta (Sapienza University of Rome & PSI), for innovative work including the plasma discharge undulator concept.

The student prize award session on the Sunday afternoon, resulted in the following students being recognised with an award:

Charles Zhang, Cornell University, United States for his contribution, “Experimental reconstruction of source 4D phase space without prior knowledge of transfer matrix”.

Yi Wu, École Polytechnique Fédérale de Lausanne, Switzerland for her contribution, “Near Resonance Polarization Modulation (NRPM), a Novel Method for High Precision Beam Energy Measurement in Storage Rings”.

ORGANISATION ACKNOWLEDGEMENTS

The success of IPAC’26 relied on the close collaboration between the Organising Committee (OC), Scientific Programme Committee (SPC), Scientific Advisory Board (SAB) and Local Organising Committee (LOC), together with the host institutions GANIL, CEA, CNRS, SOLEIL and ESRF.

The organisers would like to thank all participants, speakers, sponsors, exhibitors and the JACoW team for their contributions and support for the successful delivery of the IPAC’26 conference in Deauville, France.

OUTLOOK

IPAC’26 has demonstrated the resilience, diversity and innovation of the global accelerator community, reaffirming the importance of international collaboration and in-person exchange.

The wide range of results presented, from first achievements and record performance to new concepts, all of which highlight a strong and forward-looking field. These proceedings provide a valuable and lasting record of these developments and a strong foundation for future advances in accelerator science and technology.

We all look forward to witnessing even more exciting developments during the 18th International Particle Accelerator Conference in 2027 in Michigan, USA.