

PREFACE

The ninth International Particle Accelerator Conference, IPAC'18, took place at the J.W. Marriott Park Hotel, Vancouver, British Columbia, Canada from Sunday to Friday, April 29 to May 04, 2018. IPAC'18 was attended by 1,276 delegates from 31 countries on all continents. The tally includes 125 industry delegates, but excludes the 88 exhibitor registrations. Hosted by the TRIUMF Laboratory, the conference was organized under the auspices of the Institute of Electrical and Electronics Engineers (IEEE), and the American Physical Society Division of Physics of Beams (APS-DPB). Established in 1968 in Vancouver, TRIUMF is Canada's particle accelerator centre. Delegates and Exhibitors were supported by a 26-member Local Organizing Committee (LOC) volunteered by TRIUMF.

214 young scientists from all over the globe attended the conference. 99 of these students received travel grants thanks to the sponsorship of societies, institutes and laboratories worldwide. The Americas region sponsors are: APS, NSF and TRIUMF. The Asia region sponsors are: ANSTO, IHEP, RIKEN, KEK, SSRF and PAL. The Europe region sponsors are: CEA, CELLS, CERN, Cockcroft, DESY, Diamond, ELETTRA, ESRF, ESS, GANIL, GSI, HZB, INFN, in2p3, KIT, MAXIV, PIS, SOLEIL, STFC. The IPAC'18 budget contributed \$20,000 student grants to each region. The organizers of IPAC'18 are grateful to all sponsors for their valued support of students.

The conference was opened by Shane Koscielniak (TRIUMF), Chair of the Organizing Committee (OC), Kate Young, Federal Parliamentary Secretary for Science, and Bruce Ralston, Minister of Jobs, Trade and Technology, Government of British Columbia, who all made welcoming remarks.

Yukiyoshi Ohnishi (KEK) and Jonathon Bagger (TRIUMF) opened the scientific program with presentations, respectively, on *SuperKEKB Phase 2 Commissioning* and *TRIUMF in the ARIEL Era*. The other plenary talks on Monday morning were presented by Frank Gerigk (CERN), John Galayda (SLAC) and Sergei Nagaitsev (FNAL), respectively, on *Status and Future of Microwave Sources for Accelerators*, *LCLS-II a High-Power Upgrade for LCLS* and *The Path to Long Baseline Neutrino Factory*.

Inspiring closing presentations were delivered by Junko Yano (LBNL), *Review of FEL Science*; Bruce Carlsten (LANL,) *Applications of Compact Accelerators in Space for National Security*; and Stefania Gori (Univ. of Cincinnati), *Hidden Sectors: from Cosmos to Accelerators*.

62 invited and 63 contributed oral presentations of very high quality were made during the week. Given the recent prominence of ring- and linac-based light sources, the program was adjusted to emphasize these machines. The regional distribution of talks was 22% from Asia, 34% from Europe, and 44% from the Americas. The gender ratio for oral presentations was 84% male and 16% female.

The scientific program was developed by the 16-member IPAC'18 Scientific Program Committee (SPC) comprising 8 leads from the Americas and 4 deputies each from Asia and Europe under the leadership of Tor Raubenheimer (SLAC). Valued suggestions for invited talks were contributed by the 200-member Scientific Advisory Board (SAB) representing every accelerator laboratory world-wide. Oral sessions and poster sessions were grouped according to the eight IPAC Main Classes. The conference program spanned four and a half days, with plenary talks on Monday and Friday mornings, and additional plenary sessions on Wednesday afternoon for the Industry Panel and the Entertainment talk and on Thursday afternoon for the Accelerator Awards Ceremony. All other sessions were composed of three invited or contributed talks in parallel.

Seven Poster Sessions were held: Monday afternoon, and morning and afternoon Tuesday through Thursday – during which 1581 posters from 233 institutions were scheduled for presentation. 144 students

from 83 institutions, representing 20 countries, participated in the successful Sunday afternoon student poster session, now a firm tradition of the IPAC series.

These proceedings contain the reports of 1502 total contributions. The regional breakdown is 24% Asia, 35% Americas and 41% Europe. The breakdown by Main Class is as follows: MC1 Circular and Linear Colliders, 112 contributions; MC2 Photon Sources and Electron Accelerators, 279 contributions; MC3 Novel Particle Sources and Acceleration Technologies, 108 contributions; MC4 Hadron Accelerators, 167 contributions; MC5 Beam Dynamics and EM Fields, 230 contributions; MC6 Beam Instrumentation, Controls, Feedback, and Operational Aspects, 233 contributions; MC7 Accelerator Technology, 318 contributions; MC8 Applications of Accelerators, Tech Transfer and Industrial Relations, 55 contributions.

The scientific program was supplemented by a variety of special sessions and events.

The IEEE Women In Science and Engineering (WISE) reception, a feature of IPAC in the Americas region, was held Tuesday evening and focused on best practices for the retention, tenure, and promotion of WISE. The format was a keynote address by Grace Wong-Sneddon (Univ. of Victoria) followed by a dinner during which panelists rotated between tables to facilitate discussion on the theme topics. 109 women and men plus 10 panelists participated in the reception.

The Industry Panel Session was held on Wednesday. Panelists Alberto Degiovanni (ADAM SA), Morgan Dehnel (Buckley Systems Ltd), Michelle Shinn (US Department of Energy) and Nikolaj Zangenberg (Danish Technical Institute), moderated by Kathryn Hayashi (TRIUMF), shared their experiences and opinions on the theme *Moving from Lab to Market: Global Models of Knowledge Translation and Commercialization in the Particle Accelerator Community*.

The industry panel was followed by the entertainment talk *The Kilogram Redefined* by Alan Steele (Director General of Canada's NRC Measurement Science and Standards) wherein the System International kilogram artefact is to be replaced by a combination of fundamental physical constants. After a brief historical introduction to the SI, Steele charted the motivation and conceptual framework for this momentous change, and the technologies being developed for its introduction.

With the younger delegates in mind, the APS offered a "breakfast and learn" tutorial for aspiring authors and referees on Tuesday morning. This was very well attended, about 160 participants. Also oriented toward students, the conference was preceded by a one and half day program of student tutorials organized by Alyson Gold (SLAC) and Oliver Kester (TRIUMF); 51 students attended.

The industrial exhibition took place during the first three days of the conference. Industrial exhibitors (90 companies) occupied 79 booths and 5 tables, at which they presented their high technology products and services to the delegates in an excellent atmosphere conducive to discussions wherein exhibits and posters were inter-mingled. It must be acknowledged that the conference would not be possible in its present format without the generous support of the IPAC industry exhibitors and sponsors. 12 learned societies exhibited at desks during the same 3-day period.

IPAC'18 hosted 30 official satellite meetings ranging from SPC meetings of LINAC'18 and IPAC'19, through business meetings of IEEE-NPSS, APS-DPB, EPS-AG, ICFA, IUPAP and PRAB to the 125th anniversary celebration of APS Physical Review (journal) to vendor-sponsored receptions and to French and Spanish delegations.

During the Accelerator Awards Session, the prizes for best student posters were awarded to Alysson Gold (SLAC) for "A 2D Steady-State Space Charge Solver for Azimuthally Symmetric Problems of Arbitrary

Degree”; and Yaoshuo Yuan (GSI): “Space charge limitations for bunch compression in synchrotrons”; and Mario Beck (CERN) for “Studies of horizontal instabilities in the CERN-SPS”.

The APS Robert R. Wilson Prize, recognizing and encouraging outstanding achievement in the physics of particle accelerators was awarded to Alexander Wu Chao (SLAC) “For insightful, fundamental and broad ranging contributions to accelerator physics.”

The IEEE Particle Accelerator Science and Technology (PAST) awards are granted at each Particle Accelerator Conference held in the Americas to two individuals who have made outstanding contributions to the development of particle accelerator science and technology. Hermann Gruner (Director Emeritus ANL) received the IEEE-NPSS PAST 2018 award “For far-reaching contributions to accelerator science and technology” while Sandra Biedron (Univ. of New Mexico) received the PAST 2018 award “For broad impact in accelerator science and technology”.

The IEEE Nuclear and Plasma Sciences Society awards the PAST Doctoral Student Award to individuals who made significant and innovative contributions to accelerator science and technology in a student doctoral thesis. Martina Martinello (FNAL) received the 2018 IEEE-NPSS PAST Doctoral Student Award “For contributions to the physical understanding of limiting factors in SRF cavities”.

The APS Division of Particle Beams Thesis Award recognizes doctoral thesis research of outstanding quality and achievement in beam physics and engineering. The 2017 recipient is Spencer Gessner (SLAC) “For an original theoretical treatment and experimental demonstration of accelerating positrons in a hollow channel plasma wakefield accelerator”. The 2018 recipient is Sergey Antipov (CERN & FNAL) “For experimental studies and analysis of electron cloud build-up and corresponding instability in accelerators with combined function magnets...”

The proceedings of IPAC’18 are published on the JACoW site (www.jacow.org). The processing of the electronic manuscripts was achieved on-site by the 30-strong JACoW team prior to, during and immediately after the conference. The team, led by Todd Satogata (JLAB), Jana Thomson (TRIUMF) and Volker Schaa (GSI), includes “seasoned experts” who also trained less experienced volunteers. The JACoW Collaboration is formed of electronic publishing experts and technicians volunteered by laboratories worldwide. Tasks performed by the proceedings office include: author reception, processing of contributions and transparencies, checking that references are formatted to journal standards, and cross-checking of titles and authors. Setting up the computers and internet network, presentations management and poster session management were a collaborative effort between the LOC and JACoW. Thanks to the work of this dedicated team, a pre-press version with almost 1500 contributions was published on the last day of the conference. The final version was published at the JACoW site just weeks after the conference. This is yet another impressive record set by the JACoW Collaboration, which is sincerely grateful to the supervisors of each of the team members for releasing them from their usual duties.

A new feature of IPAC, introduced on a trial basis at IPAC’17, is light peer review of a limited number of papers for publication in a volume of an Institute of Physics conference proceedings. A white paper defining the review criteria and process was developed by Koscielniak & Bogacz. Papers are reviewed by the SAB, while the SPC under the leadership of the Scientific Publication Board chair, Alex Bogacz (JLAB), performed the function of editorial board. Candidate papers were submitted two weeks in advance of the normal deadline to allow a cycle of review, revision, and final review. 190 papers were submitted, many were revised, and 177 were approved. Todd Satogata managed the review process within the JACoW database.

The success of IPAC'18 was due in great part to the truly excellent collaboration between the international teams of the OC and the SPC, and the LOC. Membership of the LOC, under the leadership of Shane Koscielniak included the following TRIUMF staff:

Cornelia Hoehr and Marco Marchetto: LOC Co-chairs
Silke Bruckner: Conference Secretary
Jana Thomson: Proceedings Office Coordinator and Deputy Chief Editor
Aurelia Laxdal: Industry Exhibits & Sponsors Liaison
Yetvart Hosepyan: Booths and Posters Logistics
Francis Pau: Accountant
Cynthia Reis: Hotel liaison, On-site registration, Visas, Events and companions
Oliver Kester: Student Grants & Student Posters
Geoff Hodgson: Audio-Visual Coordinator
Angela Hoiem & Nic Zdunich: Laboratory Tour
Kathryn Hayashi: Industry Panel Coordinator
Anna Kiatkowski: WISE Reception
Dana Giasson: Website Support
Diana Castaneda: Graphic Design
Davis Swan: IT Management
Bob Chow: JACoW IT Support
Hassan Tahir: Cell-phone App
Valentine Wu: MIS Registration
Steve McDonald: Wireless Internet
Yuri Bylinsky and Mindy Hapke: Signage
Spencer Kiy: Poster Police Coordinator
Laura Lambert: Photographer
Nancy Breedveld (Simon Fraser Univ.): Website Development and IPAC Marketing Assistant
Thu-Anh Vu (Simon Fraser Univ.): Conference Management Assistant.

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Tor Raubenheimer (SLAC): Scientific Program Chair
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Alex Bogacz (JLAB): Scientific Publication Board Chair
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The high levels of participation and enthusiasm shown at IPAC'18 clearly confirm the strong mandate for the International Particle Accelerator Conference series from the worldwide accelerator community. May future events be even more successful than this one! The tenth IPAC will return to the Asia super-region that includes Australia, and will take place in Melbourne, Victoria, Australia, hosted by Australian Synchrotron-ANSTO and the Univ. of Melbourne.

We are convinced that the collaboration among the three regions, steadily enhanced in recent years, will continue to grow to the benefit of IPAC and the accelerator community worldwide.

Shane Koscielniak, TRIUMF Laboratory, Chair of the IPAC'18 Organizing Committee