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**Final Scientific/Technical Report on**

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***Support for the 2018 Advanced Accelerator Concepts Workshop***

# Organization of the 18th Advanced Accelerator Concepts (AAC) Workshop by the IEEE, August 12–17, 2018

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# Executive Summary

Advanced accelerator R&D covers long-term research and development in accelerator physics and engineering applicable to progress in scientific research, medical treatment modalities and industrial processes. It includes R&D directed at discovering and developing new concepts that lead to new devices and technologies in accelerator and beam physics. For 36 years, the biennial Advanced Accelerator Concepts (AAC) Workshop has been the premier forum for interdisciplinary discussions on advanced accelerator and beam physics/technology concepts covering a wide range of potential applications.

We organized the 18th Advanced Accelerator Concepts (AAC18) Workshop at the Beaver Run Resort and Conference Center in Breckenridge, Colorado on August 12–17, 2018. Since 1982, the community doing research in long-term Accelerator and Beam Physics R&D topics has met biennially at the AAC Workshops to provide an overview of current progress in these topics, exchange ideas, promote research in this field and provide a forum for publication of new ideas and R&D progress. The 2018 meeting was devoted to cross-disciplinary discussions of advanced accelerator concepts, including progress in various plasma acceleration methods, new methods of particle acceleration and high energy photon generation, techniques for production of ultra-high accelerating gradients in media other than plasmas, diagnostics and control of particle and photon beams and various associated particle beam, RF and energy sources.

AAC18 was organized under the sponsorship of the IEEE Council on Superconductivity and managed under the supervision of IEEE 2018 Advanced Accelerator Conference Committee. Workshop day-to-day management, including financial, was handled by a qualified conference management company, Centennial Conferences, under contract to the IEEE. This is the second in the workshop series to be sponsored by a professional society, and it reflects the growth in impact and importance of very long-range accelerator R&D, a program long supported by the DOE Office of Science, High Energy Physics.

The Workshop had 278 attendees, including a record 96 students. Attendees came from 12 countries representing a wide range of institutions. The workshop format consisted of plenary sessions in the morning with topical leaders from around the world presenting the latest breakthroughs to the entire workshop. In the late morning and afternoons attendees broke out into eight different Working Groups for more detailed presentations and discussions that were summarized on the final day of the workshop. In addition, there were student tutorial presentations on two afternoons to provide in depth education and training for the next generation of accelerator scientists, as well as a poster session one evening. This is the final technical report on the organization and outcome of AAC18.

# Summary of Major Results

## Leadership and management

AAC18 was co-chaired by Benjamin Cowan (Tech-X) and Evgenya Simakov (LANL). In accordance with the AAC Bylaws, Drs. Cowan and Simakov served as co-chairs of the 19 member Organizing Committee (OC) made up of the seven members of the Core Committee, an ex-officio representative from the DOE Office of High Energy Physics, and other persons chosen to ensure a wide spectrum of expertise in the fields that are the focus of the Workshop. The OC has been carefully selected to include wide representation from U.S. Universities and National

Laboratories, and one representative each from Europe and Asia. The members are listed on the "Committees" page of the AAC18 website [1].

The Local Organizing Committee (LOC) consisted of The Workshop Chair, Dr. Benjamin Cowan, who also served as the LOC Chair. Other LOC members included the following persons: Heather Andrews (LANL), Ryan Fleming (LANL), Adam Higuera (University of Colorado), Michael Litos (University of Colorado), Dmitry Shchegolkov (LANL), Peter Stoltz (Tech-X), and Seth Veitzer (Tech-X).

The LOC Chair organized the activities of the LOC, developed a timeline for critical tasks, delegated tasks to LOC members, participated in preparation of conference budget, organized poster sessions, and determined funding sources. The LOC Chair also provided liaison with the Organizing and Program Committees; coordinated with the Conference Management firm (Centennial Conferences) on day-to-day and onsite workshop organization and execution, coordinated requests for Workshop attendance, and oversaw solicitations for support from industry.

AAC18 was organized under the sponsorship of the IEEE Council on Superconductivity and management of IEEE 2018 Advanced Accelerator Conference Committee. IEEE contracted with a professional conference management firm, Centennial Conferences, for the day-to-day conference administration, including budget preparation and control, web site development, invitation/registration management and on-site support. Centennial is best known in the accelerator physics community for successfully managing the biennial Applied Superconductivity Conferences for many years and the 2013 North America Particle Conference in Pasadena, CA. Centennial also helped with the conference management for the AAC16.

The IEEE 2018 Advanced Accelerator Conference Committee contracted with Centennial Conferences for preparation of budgets, day-to-day financial management and reporting. All financial reporting to the DOE on grant expenditures, financial control, and budget matters are the direct responsibility of the IEEE. The IEEE and Centennial work closely with the Workshop Chair and Treasurer. Dr. Peter Stoltz (Tech-X), an IEEE member, served as the Workshop Treasurer to monitor and coordinate budget activities and in this capacity worked with the IEEE, Centennial Conferences, and the Workshop Chair to write and submit a proposal to DOE for support of the Workshop.

The AAC18 website [1] was managed by Eye9 Design of Denver, CO under contract with the IEEE 2018 Advanced Accelerator Conference. It will remain online indefinitely as a resource to the advanced accelerator community, future workshop organizers, and the general public. It contains detailed information about all aspects of AAC18, and links to the previous AAC workshop websites. The AAC18 program was managed through an Indico website hosted by Tech-X Corporation, and linked from the main AAC18 site.

## Working Group Structure

The Working Groups (WG's) formed the basic program structure of the AAC Workshop. Each WG had a Leader and at least one Co-Leader who developed a WG charge and organized and managed the WG sessions during the Workshop. The OC selected WG Leaders and Co-Leaders for AAC 2018, and they together with the OC members comprised the AAC 2018 Workshop Program Committee. The Program Committee guided the scientific program of the Workshop, including selection of plenary talks and the overall themes of individual WG's. The WG leaders selected talks from submitted abstracts for oral presentations in their WG's, and also solicited invited oral presentations for their WG's that enhance the mission of the WG. Most important,

the WG leaders presented an oral summary of the deliberations of their WG on the last day of the workshop and submitted a written summary to be published in the Workshop Proceedings.

The Working Groups, their leaders, and their charges are documented on the "Working Groups" page of the AAC18 website.

## Workshop Venue & Schedule

Meeting Space and housing arrangements for all participants were contracted with the Beaver Run Resort and Conference Center located at Breckenridge, Colorado, in the Rocky Mountains just west of Denver, CO, and 2 hours by shuttle from Denver International Airport. A contract between the IEEE 2018 Advanced Accelerator Conference Committee and the hotel was put in place for hosting the Workshop, including a highly affordable negotiated room rate of $121 per night, below the 2018 approved Government per diem rate. Supported students had their rooms subsidized so that they paid a significantly lower rate.

The plenary sessions were held in the Peak 4/5 Ballroom, Breakout rooms for individual Working Groups rooms with varying capacities were reserved for the entire week, all close together on two floors of the Beaver Run Conference Center and a short walk from the hotel rooms. Space at Beaver Run was also used for meals, social events, and displays from industry sponsors.

The AAC18 scientific program schedule consisted of:

- 21 invited plenary talks of 30 minutes each
- 12 hours of Working Group session time
- A 2-hour poster session, predominantly presented by students
- 3 1-hour student tutorials
- 8 12-minute plenary talks by the student poster prize winners
- 8 25-minute Working Group summaries presented by the WG leaders.

The full schedule is on the "Agenda & Timetable" page of the AAC18 website, under the "Program" heading.

There were two satellite meetings held in association with AAC18, a one-day Advanced LinEar Collider Study GROup (ALEGRO) meeting held the day before AAC18 and a FLASHForward Open House held in the early evening on the Tuesday of AAC18.

## Attendance and diversity

AAC18 attracted 278 attendees, with 199 from North America, 67 from Europe, and 12 from Asia. The vitality of the field was evidenced by the record 96 students in attendance. The Workshop leadership concerned itself last year with improving diversity in the area of Accelerator Physics in particular with regard to gender diversity. Sixteen percent of all attendees at AAC18 and 46% of students identified as women. The Organizing and Program Committees made a special effort to improve the representation of women in high-profile roles at AAC18. Ultimately, women represented 19% of the Working Group leaders and 33% of the plenary speakers. This representation far exceeds the proportion of women in the broader areas of physics—women comprise just 10% of the membership of the APS Division of Physics of Beams and 7% of the Division of Plasma Physics—indicated the success of the AAC18 leadership's diversity efforts. We also collected demographic data on race and ethnicity to aid the diversity efforts in future AAC workshops.

## AAC Awards

Since 2008, each AAC has awarded the *AAC Prize* to individuals for outstanding contributions to the science and technology of advanced accelerator concepts. The AAC Prize Committee announced that prize nominations were open, collected the nomination packages, and determined the 2018 awardee. The AAC Prize Committee was composed of C. Joshi (UCLA, Chair), W. Leemans (LBNL, Vice Chair), B. Carlsten (LANL), D. Gordon (NRL), D. Sutter (U. Maryland), and Warren Mori (UCLA). The 2018 AAC Prize was awarded to Eric Esarey of LBNL for his pioneering theoretical research in the physics of laser-plasma accelerators.

In addition to the AAC Prize, awards were given to the best student poster presentations, as judged by a Committee including all WG leaders and chaired by D. Gordon of NRL. Student winners were presented with a certificate and given the opportunity to give a 12-minute plenary talk on the final day of the workshop.

## Proceedings

Dr. Evgenya Simakov served as a Proceedings Editor, and she appointed and oversaw the co-editors, Kenneth Wotton (SLAC) and Nikolai Yampolsky (LANL). They had the lead role in editing, assembling and preparing the written contributions into a format for submission to the IEEE. The proceedings were published by IEEE in February, 2019, and sent to all participants on USB sticks.

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[1] http://aac2018.org