Report from the APS Division of Physics of Beams (DPB)

HEPAP Meeting, December 1, 2017

Tor Raubenheimer
SLAC National Accelerator Laboratory
Chair, APS Division of Physics of Beams
Outline

• What is the Division of Physics of Beams?
• Whom do we represent?
• What is the relationship between DPB and HEP?
• Issues and topics of importance to our members
• Physical Review Accelerators and Beams
From the APS DPB website:

The objective of the Division of Physics of Beams is the advancement and diffusion of knowledge regarding the nature and behavior of beams and the instruments for their production and use. It provides to its members, and to all members of the American Physical Society, an opportunity for coordination and a forum for discussion and communication.

- Promotes research and development in the science of beams
- Promotes applications of the science of beams
- Encourages scholarly publication
- Promotes education in beam science and technology
- Enhances the professional standing of its members
DPB and Particle Accelerators

- DPB is primarily focused on beams in particle accelerators and on Accelerator Science and Technology (AST)
  - Particle accelerators range from some of the largest and most complex scientific tools known to mankind to micron-sized accelerators pumped by lasers
  - Applications include discovery science, medicine, industry, national security, and more
  - Topics in AST range from nonlinear dynamics and collective effects in non-equilibrium plasmas to radio-frequency engineering to ultra-fast and nonlinear optics, to beams created by lasers or lasers created by beams, to engineered materials as superconductors or for extreme environments
  - Advances in AST stem from collaborations between universities, national laboratories and industries around the globe while directions in the field are ultimately motivated by the accelerator users
  → DPB facilitates this communication
DPB has a diverse membership of 1125 (January 2017) members, representing broad national and international constituency for particle accelerator science and technology.

Roughly 1/3 of members are also members of DPF; 20% are members of DPP; 15% are members of DNP.
DPB Membership Numbers

DPB Membership in APS

DPB members

APS Division Membership ~limit

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DPB membership levels

- DPB has been hovering around minimum APS Division level of 2.1% for years
  - Absolute number of members roughly constant but APS increasing
- Starting efforts to increase pipeline of students entering graduate programs in AST and getting students to join DPP
- Improving newsletter, web site, communications, etc.
- Looking for better engagement at APS April mtg
  - Ideas welcome!!
- Field is evolving and looking to increase interest at APS March mtg
  - Accelerators as radiation sources are growing fraction of AST program but not of DPB membership
Diversity in DPB

Active programs to increase student participation in AST and then in DPB
Many incoming students in PS

WISE event at NA-PAC’16 appeared to be quite successful
Increasing female % for invited talks and other opportunities
Chair: Tor Raubenheimer  (01/17 - 12/17)  Stanford University
Chair-Elect: Vladimir Shiltsev  (01/17 - 12/17)  Fermilab
Vice Chair: Michiko Minty  (01/17 - 12/17)  Brookhaven Natl Lab
Past Chair: Stephen Gourlay  (01/17 - 12/17)  Lawrence Berkeley Natl Lab
Councilor: Thomas Roser  (01/15 - 12/18)  Brookhaven Natl Lab
Secretary/Treasurer: Stanley Schriber  (01/16 - 12/17)  Michigan State University
Deputy Secretary/Treasurer: Marion White  (01/17 - 12/17)  Argonne Natl Lab

Member-at-Large: Roger Dixon  (01/15 - 12/17)  Fermilab
Member-at-Large: Norbert Holtkamp  (01/15 - 12/17)  SLAC - Natl Accelerator Lab
Member-at-Large: Heather Andrews  (01/16 - 12/18)  Los Alamos Natl Lab
Member-at-Large: Anna Grassellino  (01/16 - 12/18)  Fermilab
Member-at-Large: Wim Leemans  (01/17 - 12/19)  Lawrence Berkeley Natl Lab
Member-at-Large: Alexander Zholents  (01/17 - 12/19)  Argonne Natl Lab
Student Member: Alysson Vrielink  (01/17 - 12/18)  Stanford University

Education, Outreach & Diversity Committee Chair: Swapan Chattopadhyay (NIU/FNAL) (01/17 - 12/17)
Publications Committee Chair: Alex Bogacz (JLab) (01/17 - 12/17)
Doctoral Research Award Committee Chair: Rui Li (JLab) (01/17 - 12/17)
Wilson Prize Committee Chair: John Seeman (SLAC) (01/17 - 12/17) – shared between DPF and DPB
DPB Newsletter Editor: Sam Posen (FNAL) (01/15 - 12/17) & Alysson Vrielink  (01/17 - 12/18) Stanford Univ.
Particle Accelerator Conferences (PAC’s)

- DPB supports the Americas IPAC conferences every 3rd year as well as the NA-PAC conference series which occur between IPAC-Americas
- DPB business meetings are held at IPAC-Am and NA-PAC as well as APS April meetings
Limited attendance by DPB members (PAC is also in Spring)

Joint sessions in April mtg with DPF, DNP, DPP, and DCOMP

Exploring options for future APS meetings

Joint session in 2017 March mtg with FIP on future synchrotron radiation sources
Student Involvement in DPB and Support

- DPB is working to better engage and support the student/early career accelerator physics community
- Recently added one and now two student/early career members to DPB Executive committee:
  - Sam Posen (FNAL, formerly Cornell University)
  - Alysson Vrielink (Stanford University)
  - Nihan Sipahi (Colorado State University)
- Student thesis awards selected annually and presented at IPAC (or NA-PAC) meetings
- Support for Student travel to IPAC and NA-PAC ~$36k/year
- Student tutorial/networking at IPAC’18 and NA-PAC’s ~$10k/yr
- Starting undergraduate seminar series in Spring/Fall 2018 ~ $10k
Restarted the DPB Newsletter in 2015. Improved each year!

Student/Early Career members are editors and take charge.

Great experience for them (I hope) and relieves the rest of us of a ton of work!

Will be posted mid-December.
DPB relationships with broader community

- IEEE
- U.S. Particle Accelerator School
- European Physical Society Accelerator Group (EPS-AG)
- International Committee on Future Accelerators (ICFA) and Asian Committee on Future Accelerators (ACFA)
- APS Division of Particles and Fields
- Other APS Divisions that depend on accelerators for discoveries within those fields (DPP, DNP, DCMP, …)
DPB relation to HEP

- We represent many communities … but we have a special relationship with the particle physics community
  - DPF was integral to the launch of DPB and many members are in both Divisions
- The accelerator community is an indispensable element of high-energy physics experimentation and the DPB is a unifying force within that community
  - Advances in accelerators drive advances in HEP directly and main funding for accelerator R&D comes from OHEP
  - Accelerators and experiments together make discoveries in HEP possible
- DPB Leadership and members provide important voices in most community planning activities of importance to HEP
Issues of importance to our members

- Funding for research and construction
- DOE travel restrictions for conferences and international collaborations
- Role of the April and March APS Meetings in the life of DPB
- Growing the next generation of accelerator scientists and engineers
- Status of Accelerator Science as a distinct academic discipline
- Enhancing the quality and impact of publications within the accelerator community – particularly important in tenure/staff scientist decisions
Faculty Positions and Student Pipeline

AST has been largely based in national laboratories around the world
- Important to have continuous influx of students for health of field
- University faculty critical for student pipeline

New faculty programs have begun in many places supported by DOE and NSF funding
- University of Chicago, MIT, UNM, CSU, Stanford, University of Maryland, Cornell, UC Davis, NIU, ITT, SUNY Stony Brook, …
- National lab/university faculty collaborations growing
- Strong international growth as well: China, Europe, Japan

Started efforts to increase student awareness of AST (mentioned before)
- Further growth of faculty opportunities
DPB helped launch Physical Review: Special Topics, Accelerators & Beams (PR-STAB) in 1998 with an international editorial board and a pool of referees

- Goal of a scholarly, peer-reviewed international journal for AST
- Joint effort of Bob Siemann (DPB chair) and Marty Blume (APS Editor)
- Supported by sponsors: free to authors and readers
- Was a test-bed for electronic publication at Phys. Rev. and broke new ground as an all electronic, open-access scientific publication

After 18 years, journal was renamed Physical Review: Accelerators and Beams
PRAB: geographical trends in publications
PRAB: Impact factors

- PRAB: 1.5
- RSI: 1.5
- NIM: 1.5
- PLB: 1.5

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PRAB: Peer-review and impact factors

- AST does not have a history of peer-reviewed publication and referencing limiting the impact factor of PRAB.
- Focus on training younger generation with ‘light-peer review’ of some papers in IPAC conferences
- Trial at IPAC’17, implementing at IPAC’18, and plans for IPAC’19
- Published in IOP journal
- Should also increase PRAB impact factor
Summary

Division of Physics of Beams is part of the APS focused on AST

- Developed PRAB and supports international PAC conference
- Increasing student outreach and activities including seminars, tutorials, grants, USPAS, …
- Increasing impact of publications and ‘training’ community in refereed publications
- Want to maintain ongoing relationship with DPF and OHEP

Challenges

- Facing membership challenges as focus evolves
- Role in the APS April and March meetings is evolving
- Support for PRAB is important
Funding for Accelerator S&T
Relatively stable; OHEP funds majority of Acc. R&D

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Source:
- Colby
- Len
- Lessner
- Farkhondeh
- Lukin

- High power e-linacs
- Adv. Acc R&D
- Acc Phy
- SRF
- acc s&t

- Ultra-fast laser research
- SC mag
- Sources
- Acc Phy & comp

- Proton/ion therapy
- SRF & NCRF
- Detectors
- Sources
- Cornell center for BB

- Acc Phy & comp
- Instr
- Fundemental acc. research

- Sources
- Instr
- Ramping towards EIC R&D with 7M$ FOA

New sources of R&D funding from OBES, ONP, and NSF