

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

DPB Mission and Objectives

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

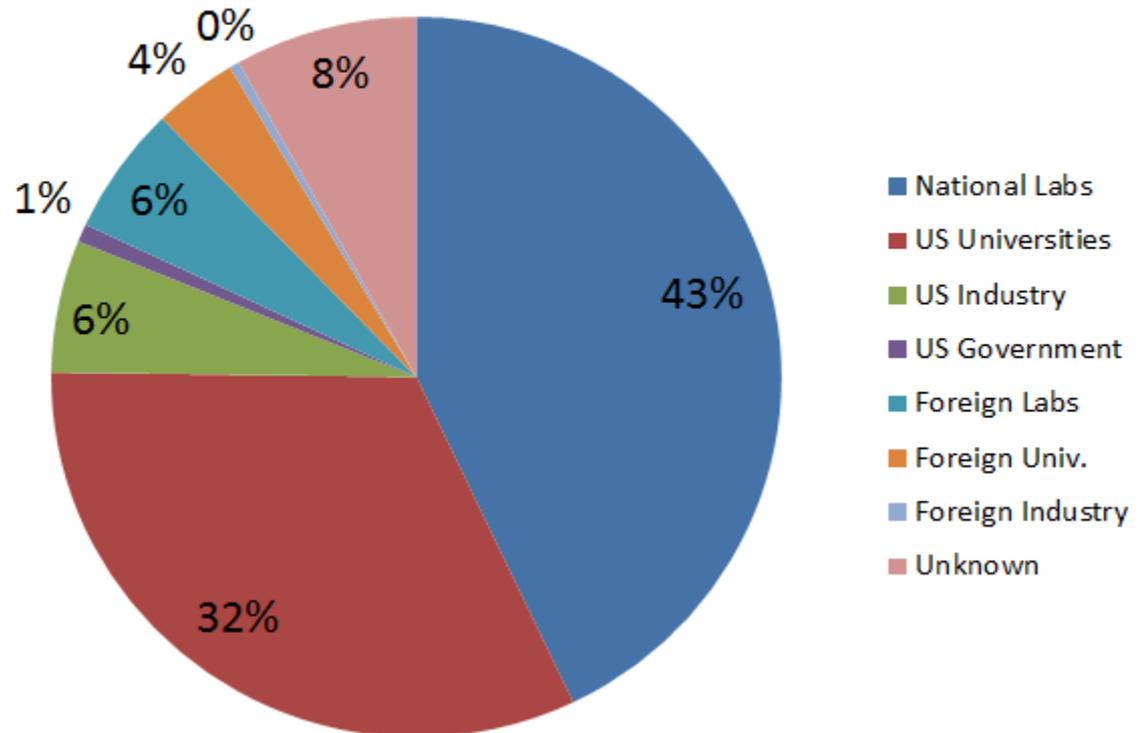
- DPB is primarily focused on beams in particle accelerators and on Accelerator Science and Technology (AST)
 - Particle accelerators range from some of the largest and most complex scientific tools known to mankind to micron-sized accelerators pumped by lasers
 - Applications include discovery science, 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 Membership

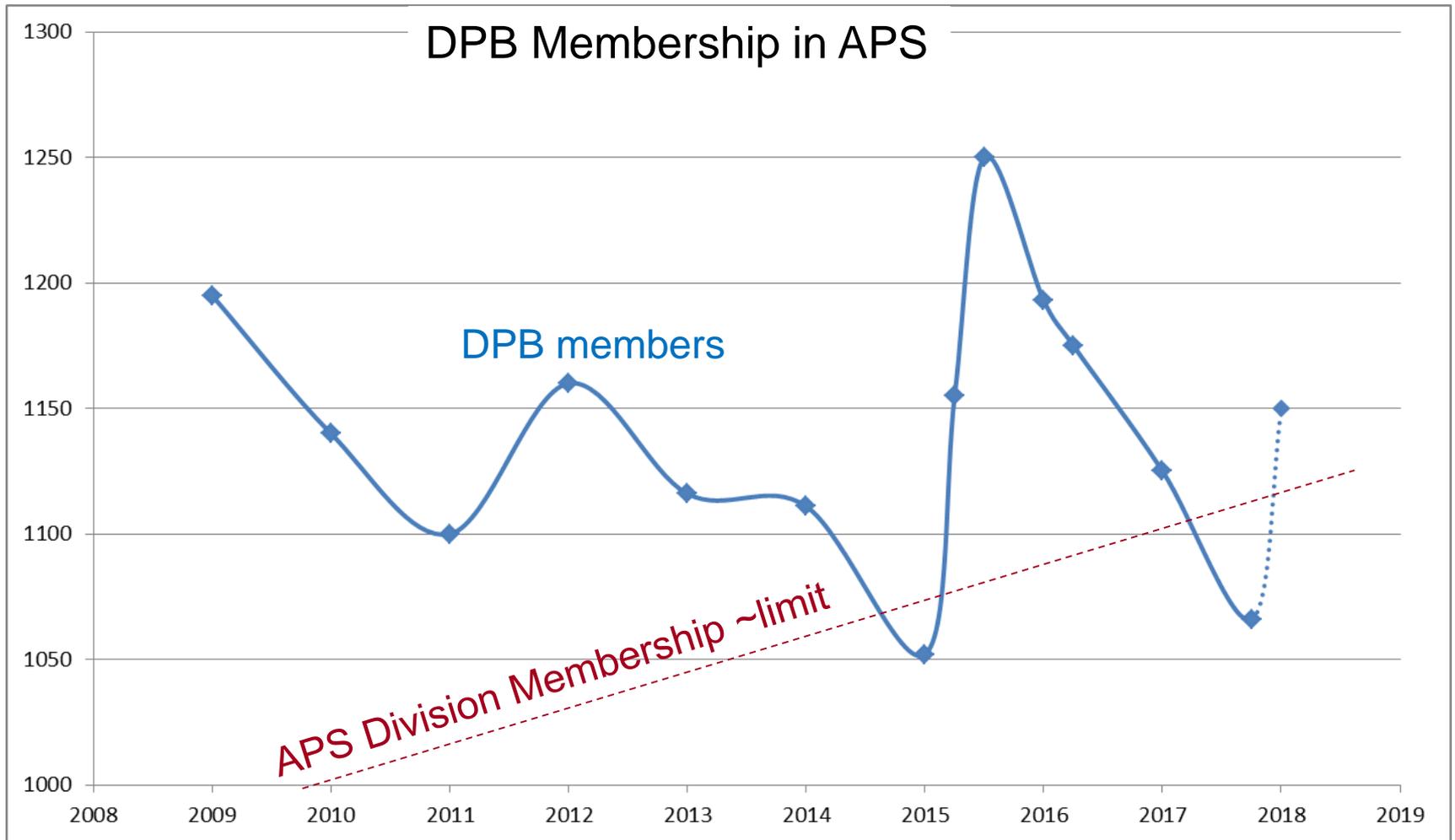
DPB has a diverse membership of 1125 (January 2017) members, representing broad national and international constituency for particle accelerator science and technology

Roughly 1/3 of members are also members of DPF; 20% are members of DPP; 15% are members of DNP

DPB Membership January 2017



DPB Membership Numbers



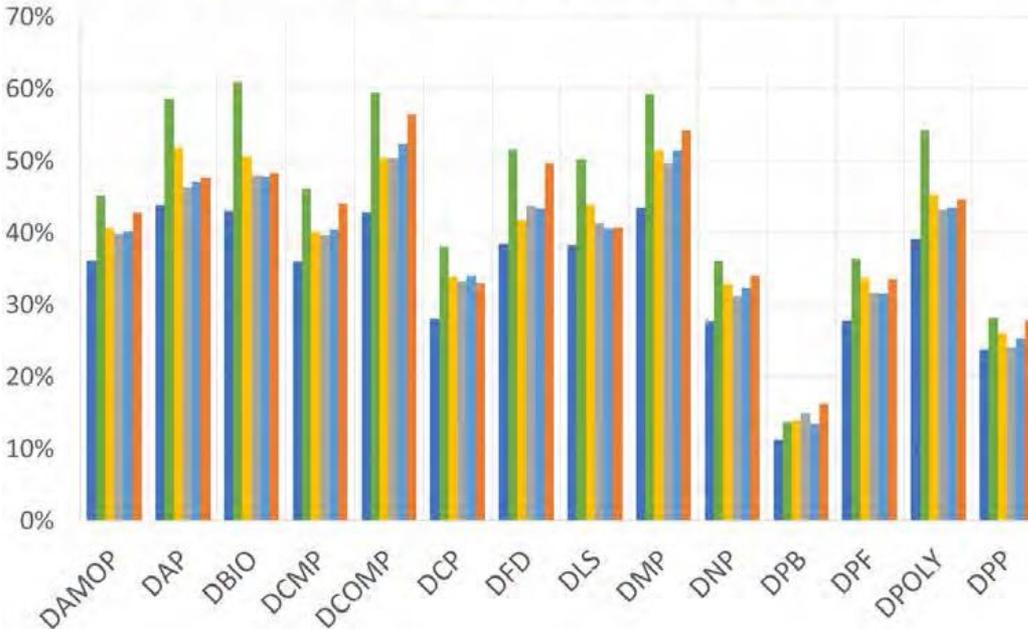
DPB membership levels

- 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

Division % Students

2011 2012 2013 2014 2015 2016

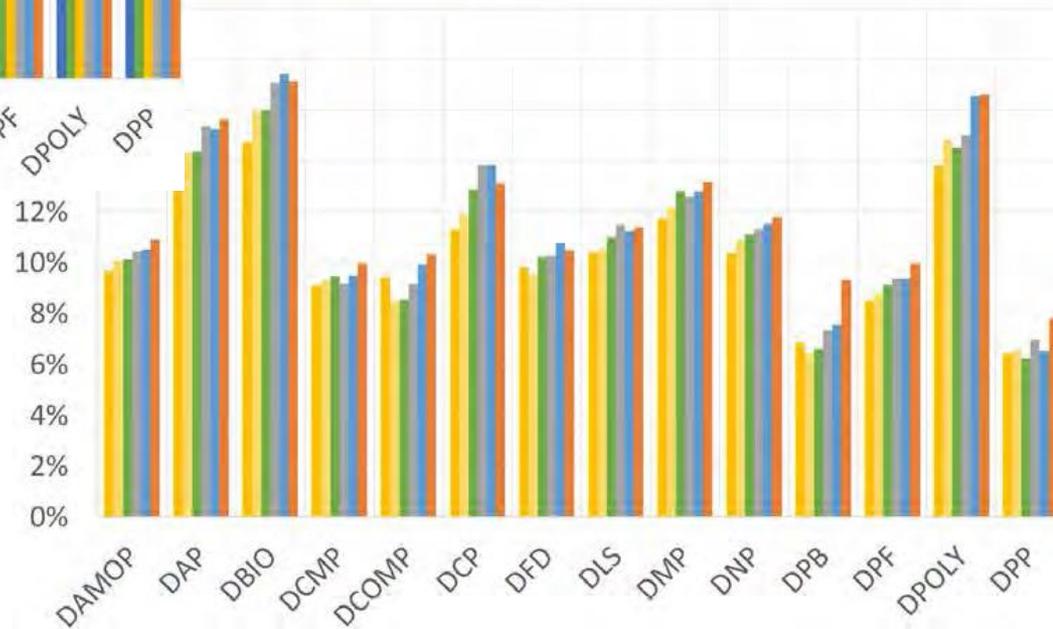


Active programs to increase student participation in AST and then in DPB

Many incoming students in PS

Division % Women

2011 2012 2013 2014 2015 2016



WISE event at NA-PAC'16 appeared to be quite successful
Increasing female % for invited talks and other opportunities

DPB Executive Committee and Structure

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 Vrieling](#) (01/17 -
12/18) Stanford University

Education, Outreach & Diversity Committee Chair: Swapan Chattopadhyay (NIU/FNAL) (1/17 - 12/17)

Publications Committee Chair: Alex Bogacz (JLab) (1/17 - 12/17)

Doctoral Research Award Committee Chair: Rui Li (JLab) (1/17 - 12/17)

Wilson Prize Committee Chair: John Seeman (SLAC) (1/17 - 12/17) – shared between DPF and DPB

DPB Newsletter Editor: [Sam Posen](#) (FNAL) (1/15 - 12/17) & [Alysson Vrieling](#) (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



October 9 - 14, 2016
Chicago, IL U.S.A.



HOME GENERAL INFO ▼ AUTHOR INFO ▼ SCIENTIFIC PROGRAM ▼

EXHIBITION ▼ EVENTS ▼ CONTACT US ▼



NAPAC16 final Proceedings are now available [here](#).

IPAC18

Hosted by
 TRIUMF

9th International Particle Accelerator Conference

April 29–May 4, 2018

JW Marriott parq | Vancouver, Canada

| International Organizing Committee | Scientific Program Committee | Local Organizing Committee |
|------------------------------------|------------------------------|-------------------------------|
| Shana Koscielniak TRIUMF | Tor Raubenheimer SLAC | Shana Koscielniak TRIUMF |
| Armando Antillon Diaz UNAM | Todd Satogata JLab | Jozsef Orszewski TRIUMF |
| Gianluigi Arduini CERN | Philip Bambade LAL | Silke Bergelt-Bruckner TRIUMF |
| Ralph Assmann DESY | Giovanni Bizio INFN | Nancy Breedveld SFU |
| William Barletta MIT | John Byrd LBNL | Andrew Daviel TRIUMF |
| Mark Boland ALS | John Erickson LANL | Dana Giason TRIUMF |
| Marie-Emmauelle Couprie SOLEIL | Wolfram Fischer BNL | Kathryn Hayashi TRIUMF |
| Andreas Jansson ESS | Tadashi Koseki KEK | Yelvarit Hovsepyan TRIUMF |
| In-Soo Ko PAL | Lin Liu LNLS | Oliver Kester TRIUMF |
| Gwo-Huei Luo NSRRC | Qing Qin IHEP | Geoff Krafft JLab |
| Won Namkung PAL | Mike Seidel PSI | Ania Kwiatkowska TRIUMF |
| Fuhvio Pilat JLab | Vladimir Shiltsev FNAL | Aurelio Sordani TRIUMF |
| Brian Richter GMWA | Hitoshi Tanaka SPB | Francis Paol TRIUMF |
| Pavel Snopak IIT | Marion White ANL | Cynthia Ross TRIUMF |
| | Yoshishige Yamazaki MSU | Davis Swain TRIUMF |
| | Frank Zimmermann CERN | Janet Thomas TRIUMF |
| | Hongwei Zhao IMP | Isabel Ttinger TRIUMF |

Members of the Scientific Program Committee are also a part of the International Organizing Committee

Registration and abstract submission opens
September 2017

DPB at APS Meetings

Limited attendance by DPB members (PAC is also in Spring)

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

2017 April (January) APS Meeting in January

Joint session in
2017 March mtg
with FIP on
future synchrotron
radiation sources

Exploring options
for future APS
meetings

| | | | | | | | |
|---------------|---------------|--|--|--|---|--|---|
| Saturday 1/28 | 10:45 - 12:33 | FHP: Transitions in Physics and Related Fields | DNP / DPB: Applications of Accelerators and Nuclear | DAP/ DGRAV: Electromagnetic Signatures of Neutron Star | RESERVED | FPS | GPMFC: Ultralight dark matter |
| | 13:30 - 15:18 | DAP / DPF: Indirect Detection of Dark Matter | DPB / DNP: Light Nuclei Beyond the Standard Model | RESERVED | DGRAV: Extremes of Gravity: From Weak to Strong | FPS: Nuclear Testing Limitations and Monitoring Low | FEd: Forum on Education Excellence in Physics |
| | 15:30 - 17:18 | DPF Prize Session 1 | DNP: Physics of weakly-bound nuclear systems | DAP: DAP Thesis Prize | DPB / DNP: Isotope Production and Accelerator | FGSA: Two out of Five-Hundred Thirty-Five: The Role of | FEd: Online Communities Supporting Physics |
| Sunday 1/29 | 8:30 - 10:18 | DCOMP/DPF | DNP / FGSA: Nuclear Physics Careers Off the Beaten Path | DAP / DPF: Cosmology with Ultra Low Mass Fields | DGRAV: Einstein Prize Talk and Advanced LIGO | DCOMP / DPB: Computational accelerator physics | COM |
| | 10:45 - 12:33 | DPF: Flavor Neutrino Oscillations | GHP / DNP: Investigating Parton Dynamics with | DAP: Extremes of Accretion | FOEP - Outreach and Engaging the Public | FPS: FPS Awards Session | FEd: Using 21st Century Physics to Educate 21st Century |
| | 13:30 - 15:18 | GHP / DPF: Exotic Hadrons from LHC and B-factories | DNP / FHP: Manhattan Project Scientific | DAP / DNP: SN 1987A: 30 Years Later | DGRAV: Observables and Entanglement in Space-Time | DPB / DPF: Future Accelerator Based Dark | FEd / GPER: The Cutting Edge in Physics Education |
| | 15:30 - 17:18 | DPB / DPF: Future Accelerator Based Neutrino | DNP / DAP: Neutron skins, Hypernuclei, and neutron stars | DNP | DCOMP / DGRAV: Numerical GR Simulations of | FPS / FHP: The Social Legacy of the Manhattan project | CSWP: The Role of Community in Recruiting and |
| | 10:45 - 12:33 | DPF: Sterile Neutrinos | DPB/DPF: Future High Energy Hadron Colliders and | GFB: The Future of the Neutron-Neutron Interaction | DGRAV: Gravitational-Wave Observations | FHP / DNP: History of the Manhattan Project | FEd / GPER: Research in Teacher Preparation |

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 Vrieling (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

2017 DPB Newsletter

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.



APS DPB NEWS

APS
physics

APS Division of Physics of Beams Annual Newsletter // 2017

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A Brief History of Fermilab
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Disclaimer: The articles and opinion pieces found in this issue of the APS DPB Newsletter are not peer refereed and represent solely the views of the authors and not necessarily the views of the APS.

Dear Readers,

In the past year, it has been inspiring to see how the accelerator community exemplifies scientific research as a unifying force. Our field, by virtue of the complexity of accelerator design and engineering and the broad range of accelerator applications, brings together a remarkably diverse group of individuals. This year's newsletter highlights research in fields as far apart as art and antiquities, machine learning, and dark matter. In addition to fruitful interdisciplinary collaborations, articles on SESAME (a new light source in the Middle East), MAX IV, Fermilab's 50th anniversary and the European XFEL demonstrate the opportunities afforded by accelerators to bring scientists together from various nations and sociopolitical backgrounds, developing stronger ties and mutual respect between them.

In addition to these inspiring feature articles, we've added some new recurring sections to the newsletter for our early career members, including an interview with the DPB Dissertation Award Recipient and a section highlighting a university lab. This year, we hear from Professors Rosenzweig and Musumeci on high impact research underway at UCLA, from beam manipulation using THz radiation to inverse free electron lasers. Next year... is up to the reader! Please let us know if you would like your university lab featured.

Finally, we'd like to share a new development in the editorial process. As of this year, editing the DPB newsletter will be a little less lonely. In an effort to smooth the transition from one year to the next, the editorial team will consist of the editor and a newly elected early-career member at large. In the following year, this early-career member will take on the role of editor and will be assisted by the new early career member. This new succession plan should enable us to provide you a high-quality newsletter year after year.

Enjoy,

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and Early Career Member-at-Large
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APS DPB Newsletter Co-Editor
Associate Scientist,
FNAL Technical Division
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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

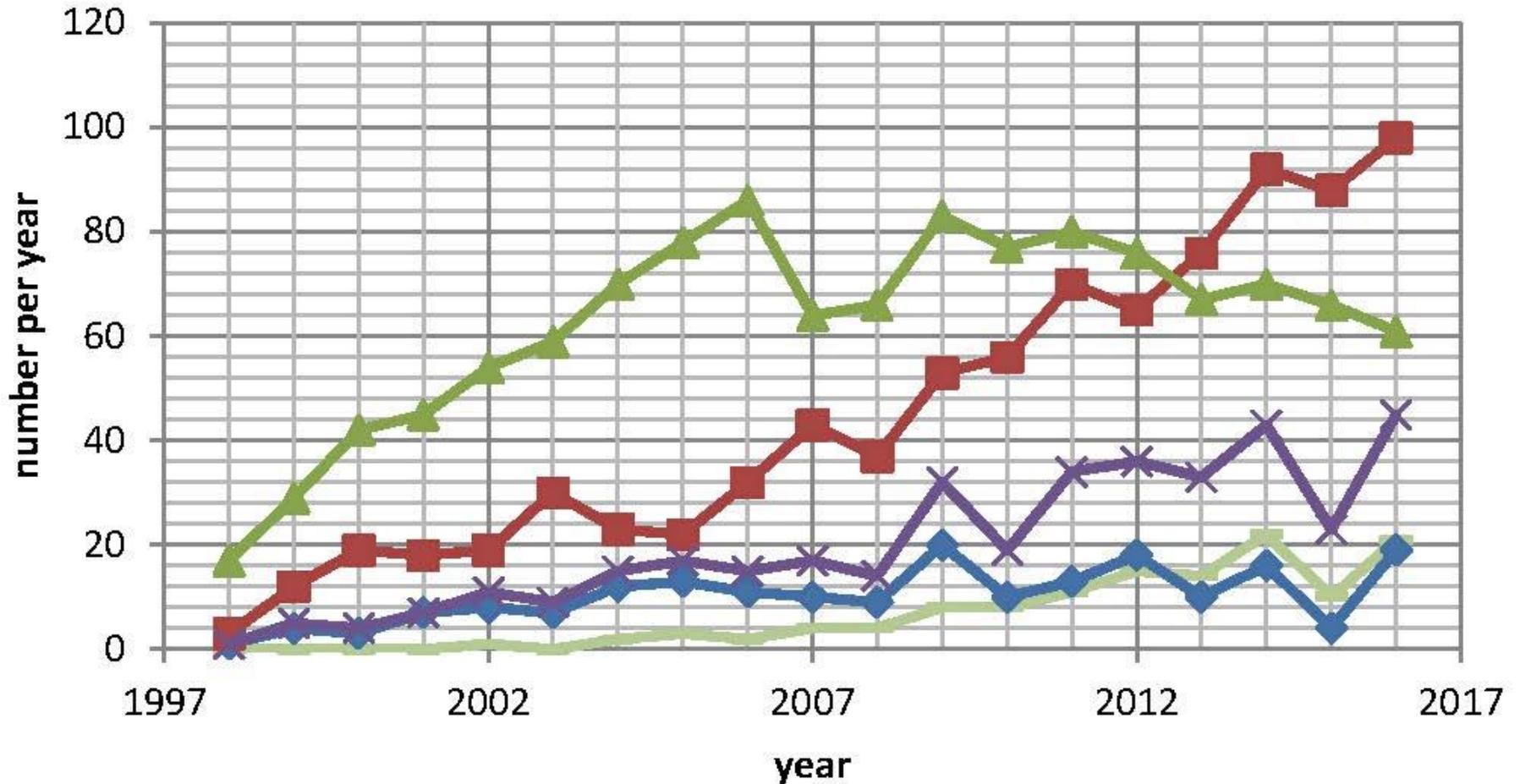
Phys. Rev. Accelerators & Beams (PRAB)

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

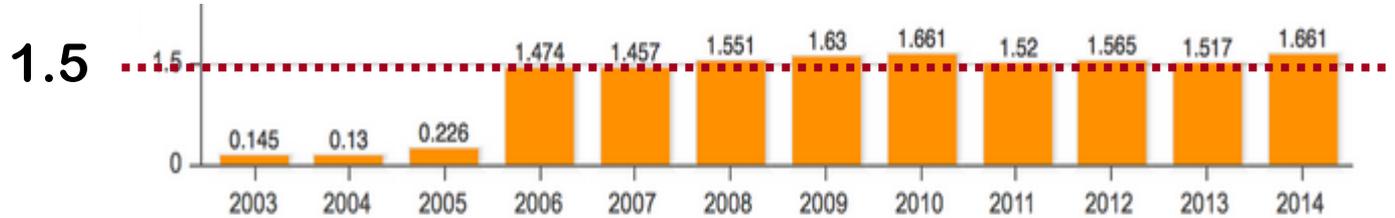
After 18 years, journal was renamed Physical Review: Accelerators and Beams

PRAB: geographical trends in publications

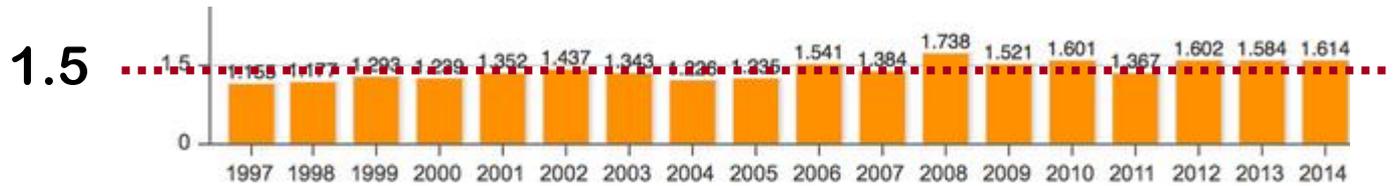


PRAB: Impact factors

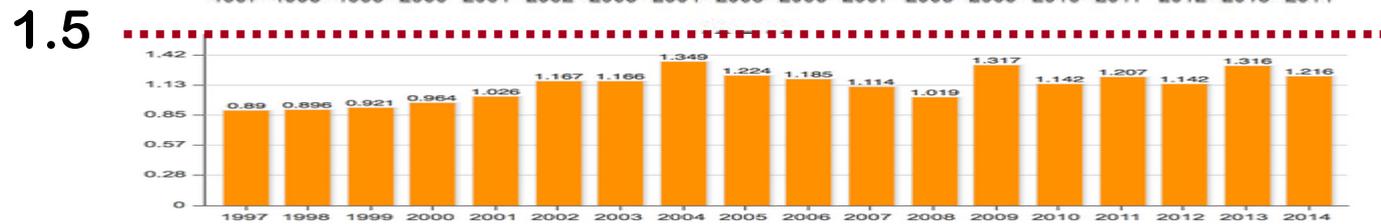
PRAB



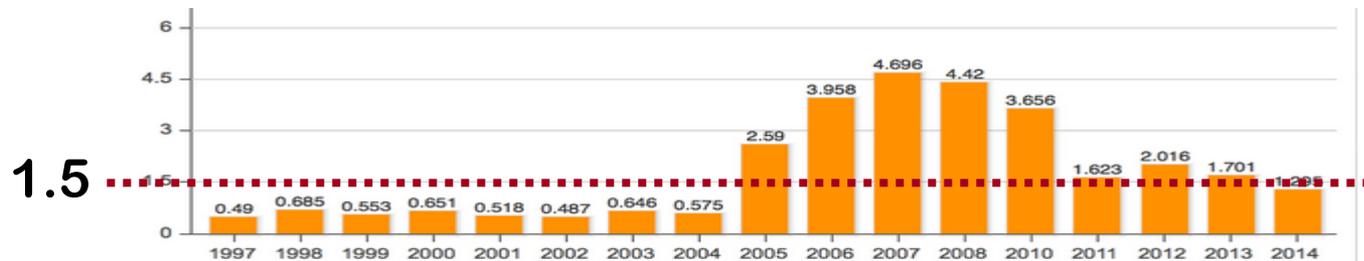
RSI



NIM

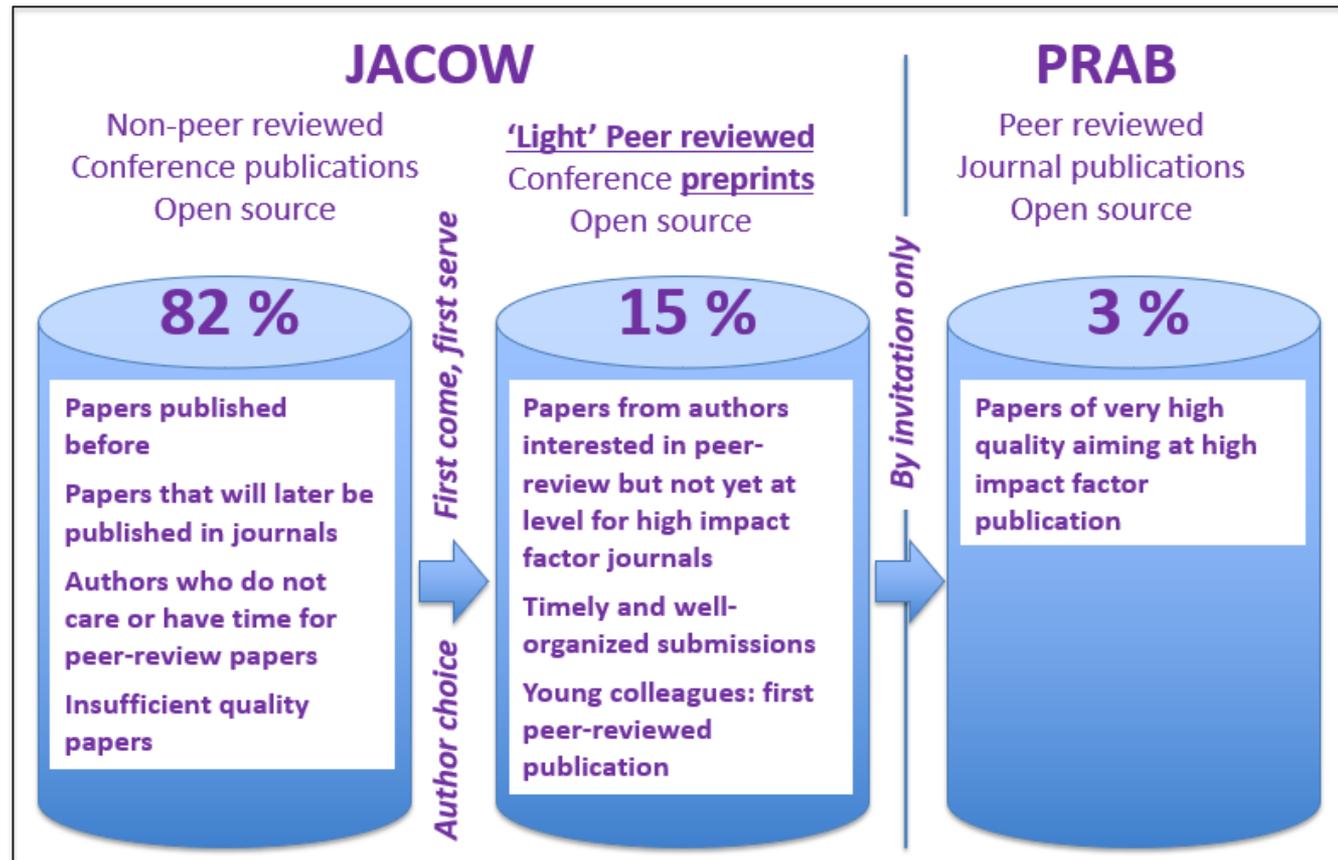


PLB



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

Questions

Funding for Accelerator S&T

Relatively stable; OHEP funds majority of Acc. R&D

| | OHEP | | | | OBES | ONP | NSF |
|--------|---------------------------|----------------|-------|---------|-------------|---------------------------------------|---------------------------|
| | Stewardship | GARD Research | | Fac Ops | Acc&Det R&D | Mid-term R&D | Basic Research |
| | | Thrust Areas | Other | | | | |
| 2017 | 13.1 | 38.5 | 5.8 | 26.6 | 14 ~ 16 | 14.7 | 10.4 |
| 2016 | 10.2 | 39.8 | 4.3 | 26.5 | 14 ~ 16 | 13.5 | 10.8 |
| 2015 | 10.0 | 41.4 | 4.5 | 30.5 | 14 ~ 16 | 12.3 | 9.8 |
| 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 | Fundamental acc. research |
| | | Sources | | | | | |
| | | Instr | | | | Ramping towards EIC R&D with 7M\$ FOA | |

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