Physical Review Accelerators & Beams

"Meet the PRAB Editors"

joint reception with Equal Opportunities session

Deauville Casino, theatre & Ambassadors room, ~19h45

Frank Zimmermann, CERN, PRAB Chief Editor

joining us at IPAC'26:

Brad Rubin, APS, PRAB Managing Editor

Sara Casalbuoni, EuXFEL, PRAB Associate Editor

Wolfram Fischer, BNL, PRAB Associate Editor

IPAC26

APS

Physical Review Accelerators & Beams, launched by the APS-DPB

Robert H. Siemann

Founding Editor of PR(ST-)AB,

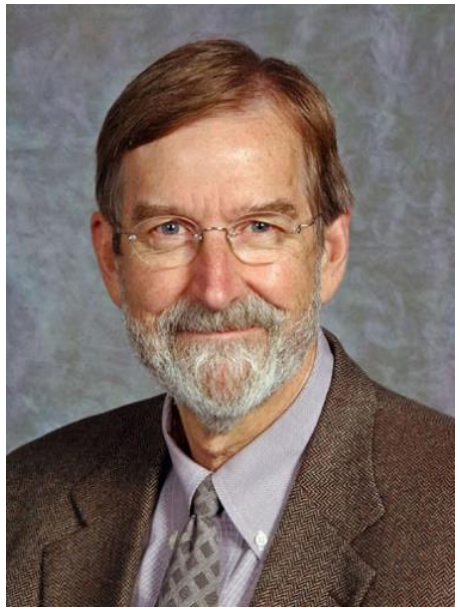
1997-2007

Martin Blume

APS Editor-in-Chief, 1997-2007

understood the connection between accelerator science and technology;

departing from Physical Review tradition, willing to champion a journal covering the full spectrum of accelerator science and technology



Gene D. Sprouse

APS Editor-in-Chief,

2007-2015

Michael Thoennessen

APS Editor-in-Chief,

2017-2022

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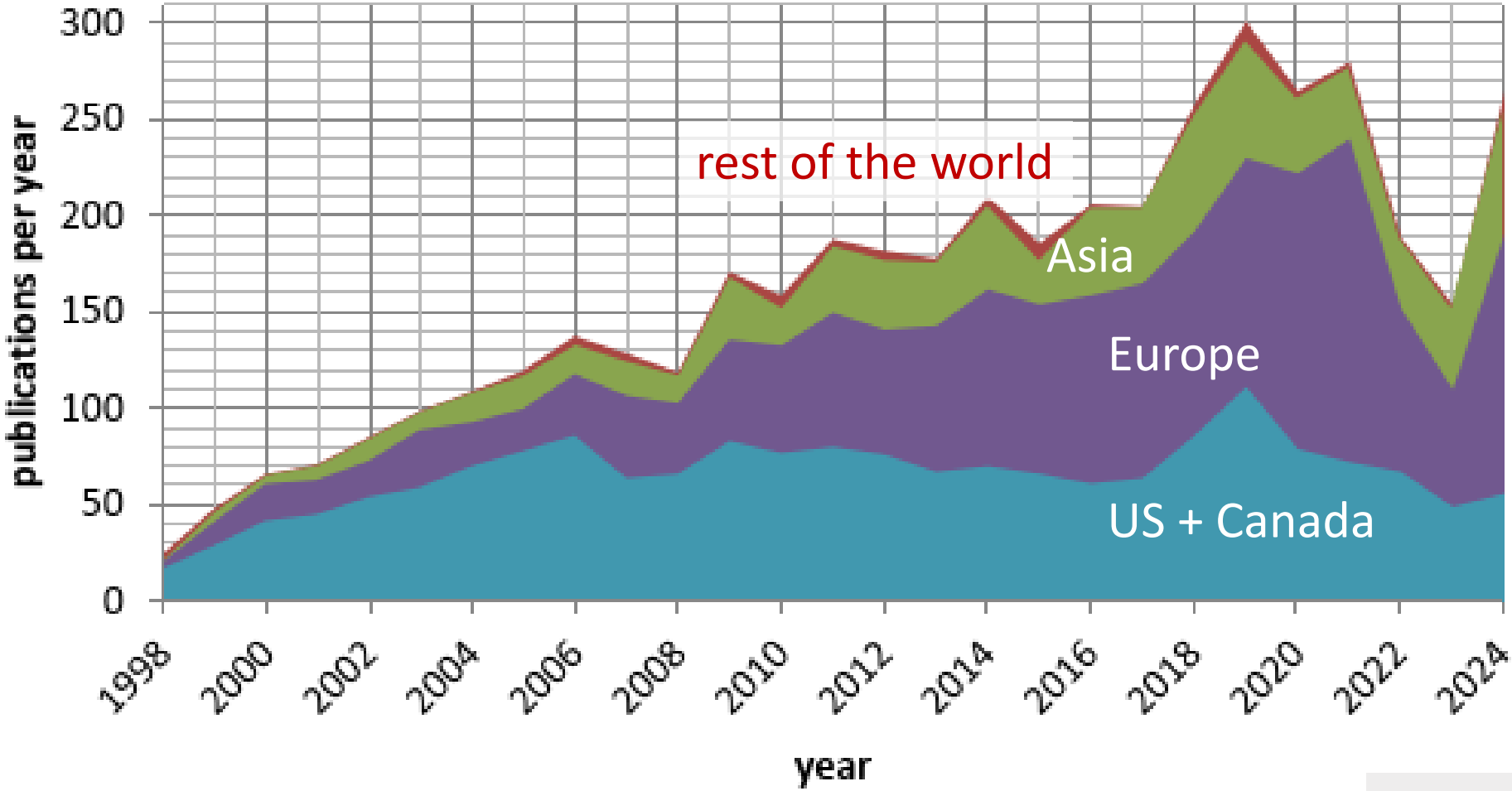
PRAB Evolution & Affiliated Groups

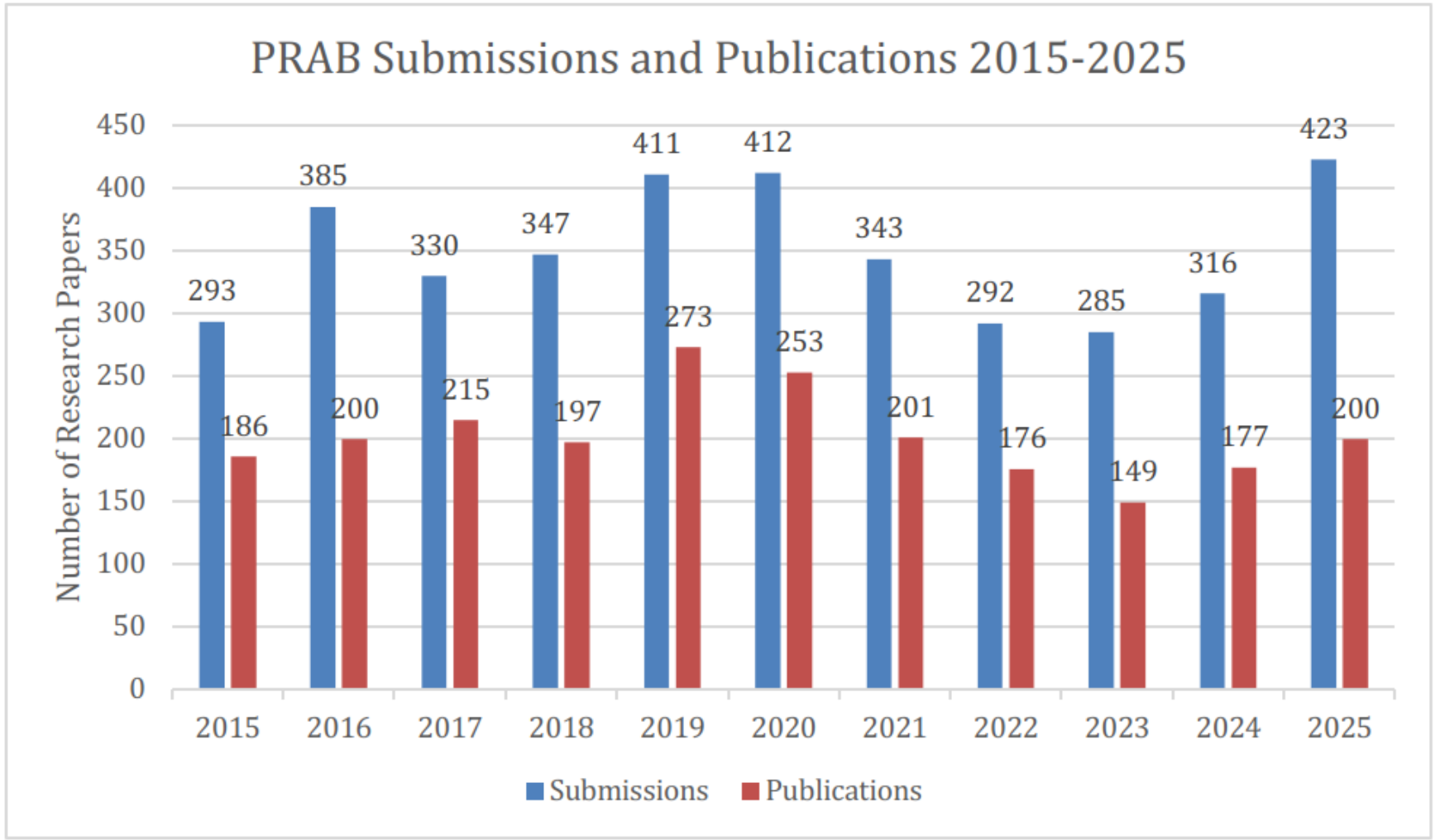
launched by the DPB in 1997 ; for a while the fastest growing APS journal, and ever more international



PRAB is supported by two "**Affiliated Professional Groups," APS-DPB** (Chair *Mark Palmer*, Vice Chair *Mark Boland*) **and EPS-AG** (Chair *Peter McIntosh*), jointly responsible for health and vitality of PRAB

PRAB 2024 Impact Factor: 1.8

PRAB statistics: submissions & publications



Submissions for the first 3 months of this year similar to last year (106 in 2025, 111 in 2026).

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PRAB as the "Community Organizer" (V. Shiltsev)

"**To better serve and nurture the accelerator community, in 1997 the APS Division of Physics of Beams (DPB) recommended establishing a scholarly, peer-reviewed journal** devoted to the science and technology of accelerators and beams. It would cover the full breadth of accelerators and beams, publish quickly, circulate widely, and have an international editorial board and pool of referees [R. Siemann]."

"Through special editions, invited contributions, articles related to the APS Robert R. Wilson Prize for Achievement in Accelerator Physics, editorial outreach, tutorials, Editorial Board meetings, and events during the International Particle Accelerator Conferences, **PRAB has become an important "Community Organizer," thereby realizing one of the intentions of its founders.** For the coming years, PRAB looks forward to further transforming scientific publication in the field of accelerators."

For more details and references see: aps.org/archives/publications/apsnews/201804/beams.cfm
https://journals.aps.org/prab/abstract/10.1103/PhysRevSTAB.11.050003

joint APS-DPB/PRAB Ernest Courant Outstanding Paper Recognition

The Courant recognition was established in 2021 by the Division of Physics and Beams (chaired by *Sarah Cousineau*) in partnership with the Physical Review Accelerators and Beams (PRAB) journal.

Prize recipients:

2022

Carlo Vicario, Simona Bettoni, Alberto Lutman, Andreas Dax, Martin Huppert, and Alexandre Trisorio: "*Two-color x-ray free-electron laser by photocathode laser emittance spoiler*," Physical Review Accelerators and Beams 24, 060703 (2021)

2023

Mamdouh Nasr, Emilio Nanni, Martin Breidenbach, Stephen Weathersby, Marco Oriunno, and Sami Tantawi: "*Experimental demonstration of particle acceleration with normal conducting accelerating structure at cryogenic temperature*," Physical Review Accelerators and Beams 24, 093201 (2021)

2024

P. Raimondi, S. Liuzzo: *"Toward a diffraction limited light source"*, Physical Review Accelerators and Beams 26, 021601 (2023)

2025

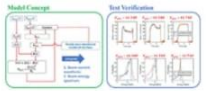
R.A. Margraf et al., "*Microbunch rotation in an x-ray free-electron laser using a first-order achromatic bend*", Physical Review Accelerators and Beams 27, 030702 (2024)

New ! – teasers and key images for all PRAB papers

Low- and Intermediate-Energy Accelerators

Transient study of beam instability due to beam loading in standing-wave low-energy electron linear accelerators

Focheng Liu, Jiaru Shi, Hao Zha, Qiang Gao, Huaibi Chen, and Jiaqi Qiu
Phys. Rev. Accel. Beams **28**, 050101 (2025) – Published 14 May 2025

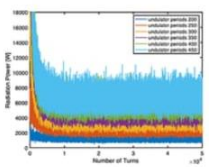


Our work studies the transient beam instability caused by beam loading within the macropulse in standing-wave (SW) low-energy electron linacs. A general model is presented to predict the transient outcomes of SW linacs by combining the power conversion relationship and beam dynamics simulation results under steady conditions, calculating outcomes of current waveform and energy spectrum with arbitrary inputs. The model was verified by a beam test with an X-band (9.3 GHz) 6 MeV SW electron linac, revealing causes of the observed beam instability. This work could provide guidance on the design, commissioning, and operation in industrial and medical low-energy electron linac applications.

Synchrotron Radiation and Free-Electron Lasers

Beam dynamics in a storage ring with a free-electron laser

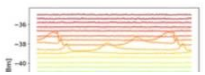
Yunhai Cai and Juhao Wu
Phys. Rev. Accel. Beams **28**, 050701 (2025) – Published 12 May 2025



Simulations are used to investigate electron beam dynamics in a diffraction limited storage ring with a high-gain free electron laser as a combined and coupled system. We found that the exponential radiation power is reduced approximately to linear with respect to the undulator length due to the large increase of the energy spread from the free electron laser, resulting in much less radiative power than the values found in previous works.

Suppression of a detrimental electromagnetic resonance which affects beam position monitor readings at the European Synchrotron Radiation Facility

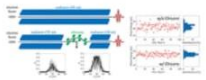
L. R. Carver, N. Benoist, P. Brumund, T. Brochard, F. Ewald, H. P. Marques, B. Roche, K. Scheidt, and S. White
Phys. Rev. Accel. Beams **28**, 050702 (2025) – Published 21 May 2025



Systematic errors were observed on some beam position monitor (BPM) readings at the ESRF. All diagnostic measurements were indicating that an electromagnetic resonance with a frequency of

Stability enhancement of a self-amplified spontaneous emission free-electron laser with bunching containment

Huaiqian Yi, Xiaofan Wang, Li Zeng, Yifan Liang, and Weiqing Zhang
Phys. Rev. Accel. Beams **28**, 050703 (2025) – Published 30 May 2025

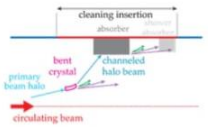


Free-electron lasers (FELs) based on self-amplified spontaneous emission (SASE) are key sources of high-power, coherent radiation. However, pulse energy fluctuations during the exponential growth phase can hinder experimental precision. This study presents a stabilization scheme using a magnetic chicane introduced in this regime to exploit the developed energy modulation of the electron beam for controlling bunching factor variations, thereby significantly enhancing pulse energy stability and ensuring more reliable, consistent SASE FEL output.

High-Energy Accelerators and Colliders

Crystal collimation of heavy-ion beams at the Large Hadron Collider

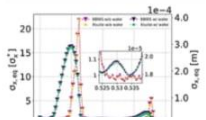
S. Redaelli *et al.*
Phys. Rev. Accel. Beams **28**, 051001 (2025) – Published 1 May 2025



The collimation system of High-Luminosity Large Hadron Collider (HL-LHC) was upgraded to address severe limitations from halo collimation with lead ion beams of unprecedented beam stored energies of 17 MJ at 6.8Z TeV. Planar channeling in bent crystals is effective forhigh-energy heavy ions. Four newly produced bent crystals, installed in state-of-the-art goniometers for sub-μrad angular control, are used as primary collimators of the multi-stage collimation system. For the first time, a crystal collimation scheme was deployed operationally during a lead ion beam run in 2023, demonstrating an improvement by factors of 5 to 13 compared to the conventional collimation scheme.

Incoherent horizontal emittance growth due to the interplay of beam-beam interaction and longitudinal wakefield in crab-waist colliders

Peter Kicsiny, Demin Zhou, Xavier Buffat, Tatiana Pieloni, and Mike Seidel
Phys. Rev. Accel. Beams **28**, 051002 (2025) – Published 27 May 2025

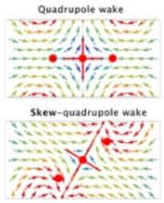


A new theory has been developed to describe incoherent horizontal emittance growth in crab-waist colliders due to the interplay of beam-beam with a large crossing angle and longitudinal wakefield, building upon existing work on synchrobetatron resonances. It has been applied to study incoherent horizontal emittance blowup

New Acceleration Techniques

Analytical theory of the skewed wake effect

A. N. Chuprina and S. S. Baturin
Phys. Rev. Accel. Beams **28**, 051301 (2025) – Published 30 May 2025

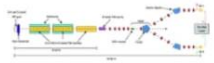


The study analyzes recently discovered skewed wake effect in slab structures, focusing on its dependence on beam tilt (α) and ellipticity (κ). For highly elliptical beams ($\kappa \gg 1$), the skew angle ϕ approaches $-3/2\alpha$, while the scaling factor λ decreases. Low-κ beams show increased λ and ϕ scaling with κ^2 and sin 2α. The skew wake arises geometrically from beam asymmetry and misalignment, persisting even when λ is suppressed. Its stochastic nature, tied to random tilt, complicates mitigation strategies used for quadrupole wakes, posing risks of instabilities and emittance growth in colliders and wakefield accelerators. The findings highlight the need for advanced diagnostics and feedback systems to manage this effect in accelerator design and operation.

Accelerator Facilities and Design Studies

Electron beam source and switchyard design for two-energy operation of x-ray Compton sources

Giovanni Campri, Simone Di Mitri, Anna Giribono, David Alesini, Armando Bazzani, Giorgio Turchetti, and Massimo Placidi
Phys. Rev. Accel. Beams **28**, 051601 (2025) – Published 27 May 2025

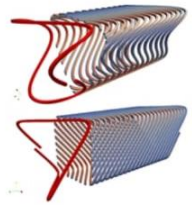


We present a feasibility study, providing guidelines for the design of Inverse Compton Source (ICS)-based compact x-ray sources with large operational flexibility and extended energy tunability range. Applications of these sources range from advanced medical imaging to industrial nondestructive tests. Properties of the electron beam accelerated in an All-C-Band RF structure are optimized, introducing a short X-band RF cavity, while a fast-cycling bunch selection module allows for simultaneous three electron beam–two photon beamlines–operation. The x-ray energy can be doubled in one of the two arms, providing a wide range of tunability by adjusting electron energy and interaction angle.

Magnet Calculations and Technology

Generation of circular field harmonics in quasipolygonal magnet apertures using superconducting canted cosine-theta coils

Jie Li, Kedong Wang, Kai Wang, Xu Zhang, Shixian Cai, Xueqing Yan, and Kun Zhu
Phys. Rev. Accel. Beams **28**, 052401 (2025) – Published 2 May 2025

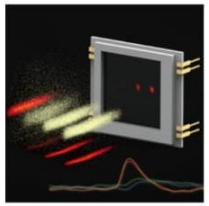


Superconducting magnets with non-circular apertures are crucial for advanced accelerators handling unconventional beam profiles, yet a systematic analytical design approach has been lacking. This paper introduces a novel analytical framework, employing conformal mapping, to design superconducting magnets with quasi-polygonal apertures capable of generating precise circular field harmonics. We apply this derived methodology to the canted-cosine-theta (CCT) coil concept, demonstrating how CCT can be effectively extended to the complex geometries. This work enables the optimized design of magnets for specialized applications demanding enhanced spatial efficiency and beam acceptance.

Particle and Radiation Detectors

Visualizing the three-dimensional shape of a high-energy particle beam using a position-sensitive photodiode

M. Yoshino, T. Uchida, Y. Nikkawa, S. Saito, Y. Shiina, and Y. Nakano
Phys. Rev. Accel. Beams **28**, 052901 (2025) – Published 30 May 2025



We introduce a simple yet powerful method for visualizing high-energy ion beams in three dimensions using a general-purpose position-sensitive photodiode. Integrated with an FPGA-based signal processing system, the detector simultaneously records the time and position of incoming particles, allowing for full reconstruction of the beam's spatiotemporal profile. The technique was demonstrated using 390 MeV/u Ar^{16+}, Ar^{17+}, and Ar^{18+}, beams at the Heavy Ion Medical Accelerator in Chiba (HIMAC). The data reveal the detailed structure of each spill and its shot-to-shot stability.

Particle-Beam Sources

Feasibility study of the GeV-energy muon source based on the High Intensity Heavy-Ion Accelerator Facility

Yu Xu, Xueheng Zhang, Yuhong Yu, Pei Yu, Li Deng, Jiajia Zhai, Liangwen Chen, He Zhao, Lina Sheng, Guodong Shen, Ziwen Pan, Qite Li, Chen Zhou, Qiang Li,

Also New ! – PRAB Letters

New article type: **PRAB Letters**, effective May 1, 2025
https://journals.aps.org/prab/edannounce/prab-launches-letters-article-type

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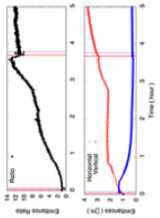
PRAB Letters published so far

7 published (5 PRL transfers),
8 in process



LETTER

Experimental demonstration of accelerating a beam with a large transverse emittance ratio in the relativistic heavy ion collider for the electron-ion collider

BNL

Y. Luo, B. Lepore, K. Mernick, T. Shrey, M. Blaskiewicz, C. Montag, G. Robert-Demolaize, and D. Xu

Phys. Rev. Accel. Beams **29**, L021001 (2026) - Published 17 February, 2026

LETTER

Resonant island trapping in a hybrid multibend achromat synchrotron light source

E. C. Cortés García, N. Carmignani, F. Ewald, S. A. Antipov, K. Scheidt, S. White, and I. V. Agapov

Phys. Rev. Accel. Beams **29**, L020705 (2026) - Published 27 February, 2026

CERN, DESY, ESRF

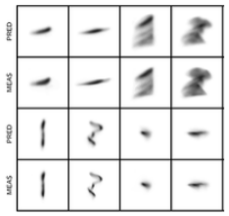
LETTER

Theory and simulation of gap distance transitions in planar magnetically insulated transmission lines

Adam M. Darr

Phys. Rev. Accel. Beams **29**, L040402 (2026) - Published 14 April, 2026

Sandia



EDITORS' SUGGESTION | LETTER

N-dimensional maximum-entropy tomography via particle sampling

Austin Hoover

Phys. Rev. Accel. Beams **28**, L084601 (2025) - Published 7 August, 2025

A modified maximum-entropy algorithm facilitates six-dimensional phase space tomography.

ORNL

LETTER

Energy recovery proton linear accelerator

Ji Qiang

Phys. Rev. Accel. Beams **28**, L090101 (2025) - Published 12 September, 2025

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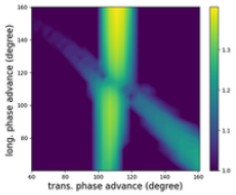

EDITORS' SUGGESTION | LETTER

Study of fully coupled three-dimensional envelope instability using automatic differentiation

Ji Qiang

Phys. Rev. Accel. Beams **29**, L024201 (2026) - Published 6 February, 2026

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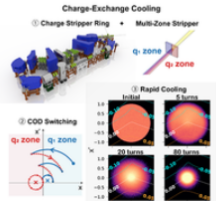

EDITORS' SUGGESTION | LETTER

Charge-exchange cooling of multicharge-state heavy-ion beams

Hiroshi Imao

Phys. Rev. Accel. Beams **29**, L044001 (2026) - Published 14 April, 2026

RIKEN Nishina

PRAB Review articles

1 published in 2025, 1 to date in 2026, 2 still in process -

High gradient rf testing of x-band structures: A comprehensive review (**CERN, PSI** etc.)

Resonant isomeric transmutation via coherent gamma-ray Excitation: A theoretical framework for selective proton emission from ^{196}Hg (unnafil)

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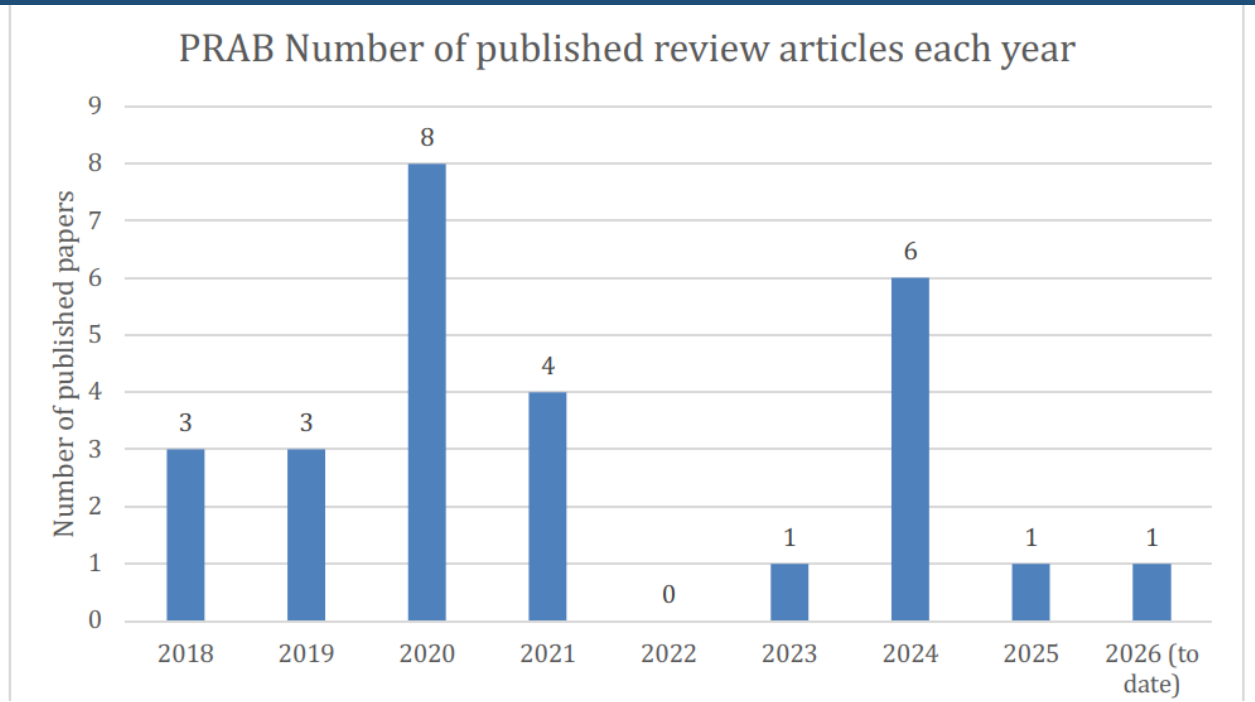
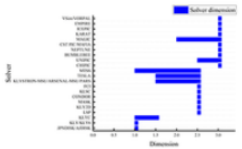
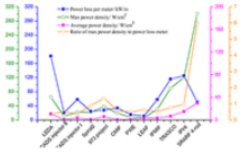




Recent advances in large-signal beam-wave interaction solvers for klystrons — **UESTC**

Wanli Shi, Yulu Hu, Guoxin Ren, Yongping He, Zheng Tan, Haiying Yuan, Luanfeng Gao, Junhui Yin, Xiaofang Zhu, Quan Hu, and Bin Li

Phys. Rev. Accel. Beams **29**, 024801 (2026) - Published 20 February, 2026



High-power radiofrequency quadrupoles: Review of recent developments, common problems, and solutions — **IMP**

Yuan He, Wei-ping Dou, Chen-xing Li, Zhi-jun Wang, Tian-cai Jiang, Zhou-li Zhang, Lie-peng Sun, Zheng Gao, Xiao-feng Jin, Gui-rong Huang, Ran Huang, Feng-feng Wang, Ling-yun Gong, Bin Zhang, Sheng-hu Zhang, and Hong-Wei Zhao

Phys. Rev. Accel. Beams **28**, 064801 (2025) - Published 18 June, 2025

APS / PRAB breakfast/lunch tutorial for authors & referees

great seeing some of you this morning !

Wednesday, 22 May 2024, 7:30-10:30 am

Sunset Grand 1, OMNI Hotel, Nashville

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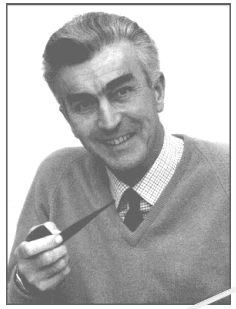

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APS/Phys. Review/PRAB reception at IPAC'23

joint WISE & PRAB reception at IPAC'24

Invitation to join APS & DPB

Division of Physics of Beams (DPB)

Established in fall 1985, the APS Division of Physics of Beams (DPB) is the oldest and worldwide largest professional group in the accelerator field.
Open to all scientists with interest in the application of accelerators, covering wide breadth of sciences and industries.

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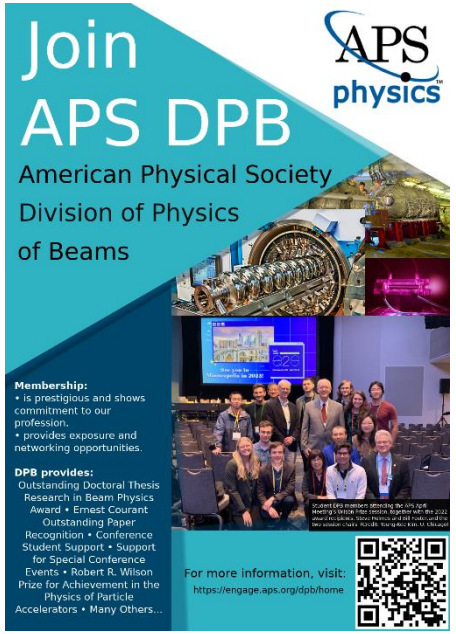
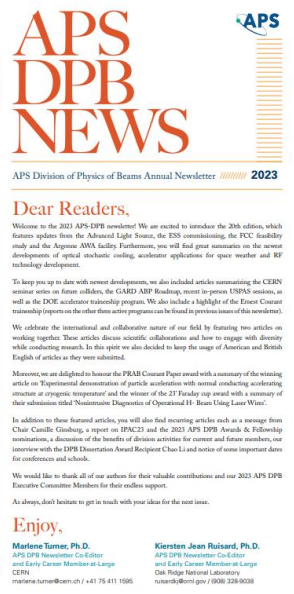
And, especially, join the APS-DPB !!
https://engage.aps.org/dpb (APS student membership is free for the first year).

APS President: Brad Marston (Brown U)

APS-DPB Past Chair Soren Prestemon





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