

Snowmass AF1

Beam Physics and Accelerator Education

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Outline

- Introduction to AF1
- AF1 Letters of Interest

AF1: Beam Physics and Accelerator Education

Topical Group focuses:

- The relationship of Beam Physics and AST education to the US HEP program, and outreach to the worldwide accelerator communities
- The relationship of AST for HEP to other programs within the DOE Office of Science and other international science and research organizations
- Identify ongoing and potential research topics necessary to advance the frontiers of AST for HEP

Soliciting Letters of Interest from community in 3 tiers:

1. GARD Workshop topics by working group conveners
2. Other accelerator science topics in USA and international collaborators
3. Education and outreach activities

Letters of Interest

- **Letters of Interest (submission period: April 1, 2020 – August 31, 2020)**
Letters of interest allow Snowmass conveners to see what proposals to expect and to encourage the community to begin studying them. They will help conveners to prepare the Snowmass Planning Meeting that will take place on November 4 - 6, 2020 at Fermilab. Letters should give brief descriptions of the proposal and cite the relevant papers to study. Instructions for submitting letters are available at <https://snowmass21.org/loi>. Authors of the letters are encouraged to submit a full write-up for their work as a contributed paper.
- **Contributed Papers (submission period: April 1, 2020 – July 31, 2021)**
Contributed papers will be part of the Snowmass proceedings. They may include white papers on specific scientific areas, technical articles presenting new results on relevant physics topics, and reasoned expressions of physics priorities, including those related to community involvement. These papers and discussions throughout the Snowmass process will help shape the long-term strategy of particle physics in the U.S. Contributed papers will remain part of the permanent record of Snowmass 2021. Instructions for submitting contributed papers are available at <https://snowmass21.org/submissions/>.

1: GARD ABP workshop summary

- **We invite GARD ABP workshop conveners to contribute working group summary as Lols**
- **8 WG conveners + interested participants**

GARD Workshop #1 (Dec, 2019, LBNL)

- ❑ WG1: Single-particle dynamics, including nonlinearities, spin dynamics
- ❑ WG2: High-brightness beam generation (including polarized beams), transport, manipulation and cooling
- ❑ WG3: Mitigation and control of collective phenomena: instabilities, space charge, beam-beam, beam-ion, wakefields, and coherent synchrotron radiation
- ❑ WG4: Connections to other GARD roadmaps

GARD Workshop #2 (April-May, 2019, Zoom)

- ❑ WG1: Advanced accelerator instrumentation and controls
- ❑ WG2: Modeling and simulation tools; fundamental theory and applied math
- ❑ WG3: Early conceptual integration and optimization, maturity evaluation
- ❑ WG4: Connections to other GARD roadmaps; synergies with non-HEP

2: Other accelerator science topics

- GARD funding needs to stimulate HEP accelerator RD
- plasma acceleration theory and simulation needs
- Machine Learning and virtual machines
- IOTA and its experimental program
- Beam physics of extreme beams
 - electrons
 - intense protons: rings & linacs
 - intense hadrons
- Advanced Beam Cooling : status and plans
- eLens for space-charge compensation in hadron rings
- PWA colliders: beam physics challenges
- Advanced collimation schemes: Xtals and elenses
- Beam dynamics challenges for future high intensity ERLs
- Very high energy polarized beams
- Compact proton drivers and related technology
- Cross-cutting Accelerator R&D

3: Education and outreach

- Coordination of USA accelerator workforce training with international schools
- Measurement of workforce needs; both USA and world
- MS programs in Accelerator Science and Engineering structured with USPAS linkages
- Cloud-Based computational resources for education and research
- Outreach to recruit student talent to Accelerator Science & Engineering
- US Particle Accelerator School long range needs to refine accelerator science and engineering education in the USA
- APS Division of Physics of Beams education and outreach activities to support HEAP
- High-level facility paper prominent publication and reference
- Joint network event on advance beam physics: enough conference, new norm?
- Center for Bright Beams
- US vision for NaPAC and other workshops
- Do we have enough good journals, how to publish in high impact journal
- Sustainability of JacoW
- EPS-AG relationship with APS DPB in education and outreach
- Diversity issues
- General status of accelerator sciences: prizes, recognitions, public awareness, etc.