The CPSC and an Update From the AI Proto-collaboration Blueprint Meeting

Tulika Bose, Peter Elmer, Ian Fisk, Verena Martinez Outschoorn
May 21, 2026

CPSC Mission Statement

The Coordinating Panel for Software and Computing works to strengthen and support the software and computing community that underpins high energy physics (HEP) research in the United States.

Hosted by the Division of Particles and Fields of the American Physical Society, the CPSC brings together researchers, developers, institutions, and industry partners to address shared challenges in computing, foster innovation, and promote collaboration across the HEP community.

- Motivate support for the Software and Computing community to develop, adopt and operate cutting-edge software and computing technologies
- Build bridges between science, academia, and industry
- Support training, recognition, and career development for computing professionals
- Promote participation and access across the US-HEP community in S&C

By connecting expertise and ideas across disciplines, the CPSC helps ensure that the HEP community is prepared to meet the computational demands of today's experiments and tomorrow's discoveries.

Is a result of recommendations from from the 2021 Snowmass report

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Quick Update

The CPSC Activities can be roughly divided into 2 categories, and we are trying to make progress on each

People
- Training
- Recognition
- Retention
- Access and opportunities

Technology
- Best practices
- Assessments and gaps
- How to support critical common software
- Engagement with industry

Rising Star Award


DPF Software & Computing Rising Star(s) Award - Unit - DPF 3/15/26, 11:57 AM

DPF Software & Computing Rising Star(s) Award

Home / Honors / Prizes & Awards / DPF Software & Computing Rising Star(s) Award

DPF Software & Computing Rising Star(s) Award

The DPF Software & Computing Rising Star(s) Award celebrates individuals at an early career stage who have demonstrated exceptional innovation, creativity, technical excellence, and community engagement in developing or applying software and computing solutions. The award serves to recognize emerging leaders whose work enhances data analysis, simulation, computing infrastructure, operations, or collaborative research capabilities.

While the award is nominations-based, self-nominations are permitted.

Nominees must:

- Be within 15 years of their terminal degree
- Have made significant contributions to software and computing with a clear impact on particle physics, with due account for interruptions and other factors in nominees' careers.

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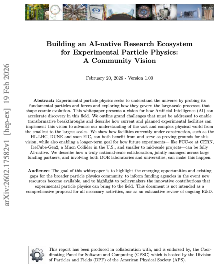
AI White paper and Collaboration


arXiv:2602.17582v1 [hep-ex] 19 Feb 2026

Building an AI-native Research Ecosystem for Experimental Particle Physics: A Community Vision

February 20, 2026 - Version 1.00

Abstract: Experimental particle physics seeks to understand the universe by probing its fundamental particles and forces and exploring how they govern the large-scale processes that shape cosmic evolution. This whitepaper presents a vision for how Artificial Intelligence (AI) can accelerate discovery in this field. We outline grand challenges that must be addressed to enable transformative breakthroughs and describe how current and planned experimental facilities can implement this vision to advance our understanding of the vast and complex physical world from the smallest to the largest scales. We show how facilities currently under construction, such as the HL-LHC, DUNE and soon EIC, can both benefit from and serve as proving grounds for this vision, while also enabling a longer-term goal for how future experiments— like FCC-ee at CERN, IceCube-Gen2, a Muon Collider in the U.S., and smaller to mid-scale projects—can be fully AI-native. We describe how a truly national-scale collaboration, jointly managed across large funding partners, and involving both DOE laboratories and universities, can make this happen.

Audience: The goal of this whitepaper is to highlight the emerging opportunities and existing gaps for the broader particle physics community, to inform funding agencies in the event new resources become available, and to highlight to policymakers the innovative contributions that experimental particle physics can bring to the field. This document is not intended as a comprehensive proposal for all necessary activities, nor as an exhaustive review of ongoing R&D.

This report has been produced in collaboration with, and is endorsed by, the Coordinating Panel for Software and Computing (CPSC) which is hosted by the Division of Particles and Fields (DPF) of the American Physical Society (APS).

Common Software Survey and Support Model

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AI Proto Collaboration Update

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“Building an AI-Native Research Ecosystem” Whitepaper

High Energy Physics – Experiment

[Submitted on 19 Feb 2026]

Building an AI-native Research Ecosystem for Experimental Particle Physics: A Community Vision

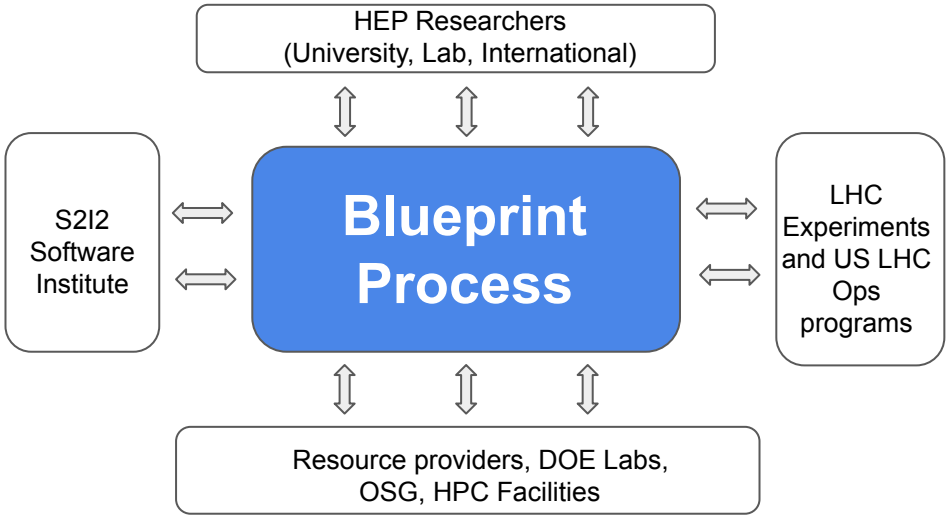
Thea Klaeboe Aarrestad, Alaa Abdelhamid, Haider Abidi, Jahred Adelman, Jennifer Adelman-McCarthy, Shuchin Aeron, Garvita Agarwal, Usman Ali, Cristiano Alpigiani, Omar Alterkait, Mohamed Aly, Oz Amram, Saeed Ansari Fard, Aram Apyan, John Arrington, Marvin Ascencio-Sosa, Mohammad Atif, Aneesha Avasthi, Muhammad Bilal Azam, Bhim Bam, Joshua Barrow, Rainer Bartoldus, Amit Bashyal, Aashwin Basnet, Ayse Bat, Lothar A. T. Bauerdick, John Beacom, Chris Bee, Michael Begel, Matthew Bellis, Rene Bellwied, Rakitha Beminiwattha, Gabriele Benelli, Douglas Benjamin, Catrin Bernius, Binod Bhandari, Avinay Bhat, Meghna Bhattacharya, Saptaparna Bhattacharya, Prajita Bhattarai, Sudip Bhattarai, Wahid Bhimji, Jianming Bian, Burak Bilki, Mary Bishai, Kevin Black, Kenneth Bloom, Brian Bockelman, Johan Sebastian Bonilla Castro, Tulika Bose, Nilay Bostan, Othmane Bouhali, Dimitri Bourilkov, Dominic Brailsford, Gustaaf Brooijmans, Elizabeth Brost, Maria Brigida Brunetti, Quentin Buat, Brendon Bullard, Jackson Burzynski, Paolo Calafiura, Rodolfo Capdevilla, Fabian Andres Castaño Usuga, Raquel Castillo Fernandez, Fabio Catalano, Viviana Cavaliere, Flavio Cavanna, Giuseppe Cerati, Aidan Chambers, Maria Chamizo-Llatas, Philip Chang, Andrew Chappell, Arghya Chattopadhyay, Sergei Chekanov, Jian-ping Chen, Yi Chen, Zhengyang Chen, J. Taylor Childers, Hector Chinchay, Yuan-Tang Chou, Tasnuva Chowdhury, Neil Christensen, Wonyong Chung, Rafael Coelho Lopes de Sa, Simon Corrodi, Kyle Cranmer, Matteo Cremonesi, Roy Cruz, Mate Csanad, Mariarosaria D'Alfonso, Carlo Dallapiccola, Daine Danielson, Sridhara Dasu, Gavin Davies, Kaushik De, Patrick de Perio, Klaus Dehmelt, Marco Del Tutto, Carlos Ruben Dell'Aquila, Sarah Demers et al. (359 additional authors not shown)

Experimental particle physics seeks to understand the universe by probing its fundamental particles and forces and exploring how they govern the large-scale processes that shape cosmic evolution. This whitepaper presents a vision for how Artificial Intelligence (AI) can accelerate discovery in this field. We outline grand challenges that must be addressed to enable transformative breakthroughs and describe how current and planned experimental facilities can implement this vision to advance our understanding of the vast and complex physical world from the smallest to the largest scales. We show how facilities currently under construction, such as the HL-LHC, DUNE and soon EIC, can both benefit from and serve as proving grounds for this vision, while also enabling a longer-term goal for how future experiments -- like FCC-ee at CERN, IceCube-Gen2, a Muon Collider in the U.S., and smaller to mid-scale projects -- can be fully AI-native. We describe how a truly national-scale collaboration, jointly managed across large funding partners, and involving both DOE laboratories and universities, can make this happen.

https://arxiv.org/abs/2602.17582

Commitment to Joint DOE and NSF Blueprint Activity

- Drive the evolution of R&D efforts to address the software & computing challenges of the HL LHC, co-sponsored by:
  - **US LHC Ops program**
  - **S2I2**
  - **OSG**
  - **CCE**
- Involving the DOE facilities, and key personnel at both DOE labs and US Universities.
- Long term sustained set of workshops to drive coherence across projects and experiments.



Monday and Tuesday May 18 and 19th

~60 in person participants

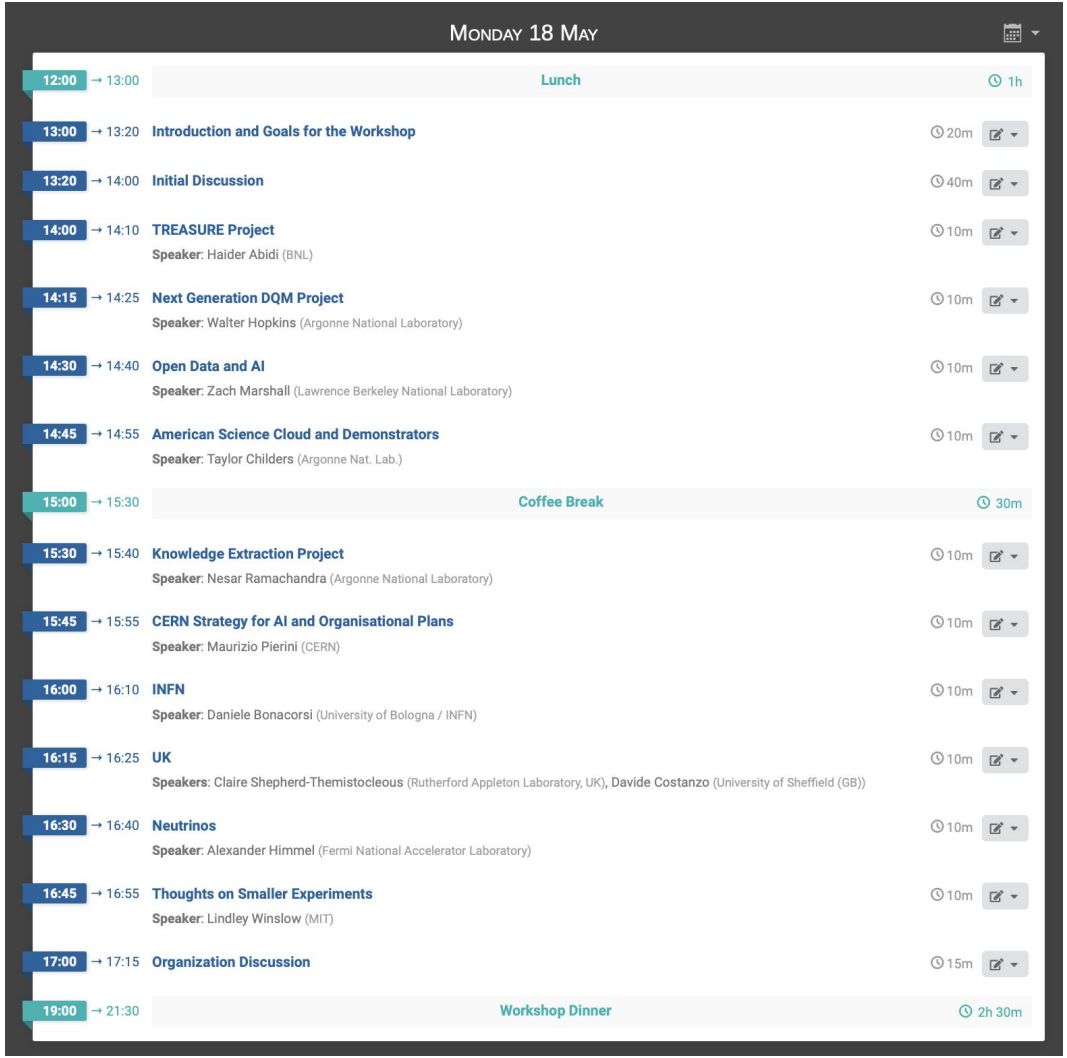
~120 Remote attendees

Strong international participation

- CERN, INFN, UK

Wide ranging discussion of potential areas of collaboration

Indico page: https://indico.flatironinstitute.org/event/4120/



A central focus of the workshop was discussions on how such a national-scale collaboration could be effectively bootstrapped and organized, as well as identifying priorities over the near and medium term. Such a collaboration, including both universities and DOE laboratories, has a number of potential benefits and opportunities, including:

- a forum for developing a shared roadmap toward an AI-native research ecosystem
- a platform for enabling larger-scale efforts while integrating expertise and resources from across the community
- clear pathways to scale and transition promising R&D activities towards deployment within experiments
- a structure to develop and provide the services needed for the experiments to fully leverage evolving national infrastructure (e.g., AmSC, NAIRR) and large-scale data resources
- a means for fostering both collaboration and healthy competition through the development of shared benchmarks and the development and curation of the supporting datasets
- accessible entry points for individual university groups to engage and contribute
- a coherent framework for cross-experiment activities, enabling solutions with impact to deliver benefit to multiple experiments
- a clear structure for US engagement with international efforts, including those at CERN, and other national and regional collaborations
- a community structure for engagement with industry
- a structure for large scale workforce development activities leveraging both lab and university expertise

This first workshop will consider the potential impact of these opportunities, identifying near-term priorities and exploring means to enable additional initiatives as resources become available. We expect that this discussion will continue in subsequent community workshops during 2026.

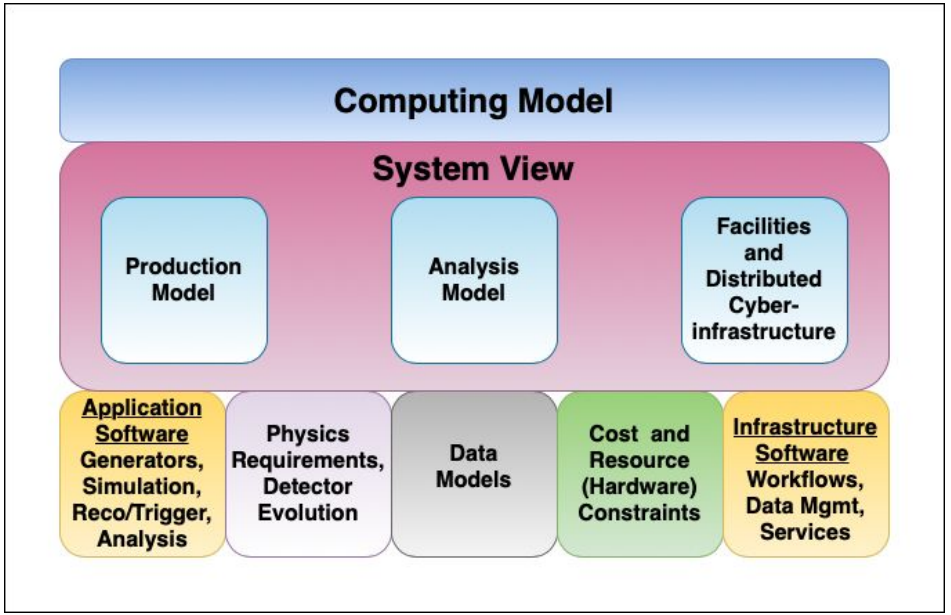
Software, System View & Computing Models

A collaboration to help navigating Disruptive Technology

- AI tools have the potential to accelerate how we do science

What we're seeing is they are virtually guaranteed to disrupt how we work

- Cost and availability of computing (Computing Models)
- Speed, reliability, and participation in code development (Legacy, Customizability Portability, and Validation)



A natively “AI-for-Physics/Physics-for-AI” collaboration

Development of AI benchmarks

Novel multi-modal scaling laws

Validating AI for science

Deployment of updated AI software

New agentic analysis

Automated workflows

Novel approaches and visibility within the AI community

New Physics Capabilities

Leverage FastML experience

Leverage emerging Genesis Mission connections

Leverage HEP students and postdocs now in industry and/or AI research positions

“Proto-collaboration” Near Term Bootstrap Activities

Engage with existing funded projects (and emerging funded projects in the rest of FY26) and create links between them and to the community

Identify a set of priority areas of interest

Identify a set of activities and/or demonstrators within those priority areas that are doable on the time scale of the next six months

Being to create environments to catalyze both working collaborations and connections for eventual proposals

Checkpoint and engage community regarding the proto-collaboration at APS DPF @FNAL in July (parallel session)

Aim for a first “collaboration” meeting in the fall.

Continue discussion about links between this entity and international partners

5 Breakout Areas

- Computing Resource Strategy in the age of AI
- Agentic AI
- Foundation Models
- Open Data & Benchmarks
- Workforce Development

Breakout Area	Core Theme	Key Needs / Questions	Near-Term Actions
Computing Resource Strategy in the AI Era	AI is reshaping scientific computing, requiring HEP to rethink the traditional dedicated CPU-based WLCG model.	Understand how training, tuning, inference, HPC, AI facilities, networks, storage, and data access will change HEP computing needs. Assess the balance between dedicated on-prem resources and externally allocated HPC/AI resources.	Convene a community workshop and develop a white paper on future computing models, common interfaces, shared allocations, and coordinated access to HPC/AI facilities.

Breakout Area	Core Theme	Key Needs / Questions	Near-Term Actions
Agentic AI	Agentic workflows could support analysis, operations, coding, validation, and hardware design across experiments.	Need trusted benchmarks, validation procedures, reusable agents, common skills, and AI-ready knowledge repositories. Need to understand realistic use cases beyond demonstrations.	Build an agentic tutorial repository, curate standard agents and skills, organize hackathons around already-defined problems, and develop open benchmarks with validation.

Breakout Area	Core Theme	Key Needs / Questions	Near-Term Actions
Foundation Models	HEP can benefit from coordinated development of physics-native foundation models, shared representations, and cross-experiment datasets.	Identify HEP-wide needs, relevant datasets, benchmarks, computational resources, physics guardrails, and validation constraints. Clarify how efforts such as TREASURE can provide common tokenized data and representations.	Define scopes of interest across sub-communities, collect existing best practices, identify resources for large-scale training, and develop downstream physics and computational benchmarks.

Breakout Area	Core Theme	Key Needs / Questions	Near-Term Actions
Open Data & Benchmarks	Open data must evolve for the AI era, with better formats, metadata, documentation, provenance, and hosted access.	Need machine-readable documentation, integrated hardware/software/model-serving environments, workflow capture, usage monitoring, and harmonized experiment policies.	Produce a white paper with a new larger vision for open data, aim for a hosted open-data set on a cloud provider, integrate benchmarks and common software solutions, and include neutrino, eIC, and small-experiment communities.

Breakout Area	Core Theme	Key Needs / Questions	Near-Term Actions
Workforce Development	Students and early-career researchers need training to use AI tools effectively while retaining physics intuition and responsibility.	Need guidance on validation, ethical AI use, responsibility for agentic tools, and how to train students who may become “managers” of AI agents.	Develop best-practice materials, add AI modules to HEP software training, create an AI newcomer starter kit, provide an online resource page, and explore access to agentic AI tools.

Next Steps

The vision is a proto collaboration

- Individual supported projects working together toward a broader goal
- As activities progress I am sure we will see areas that aren't covered and we will have good justifications for new proposals
- Aim for a collaboration meeting in the fall

Discussions regarding the proto-collaboration and the near term activities will continue in a dedicated Slack workspace, for which the invite link to join is:

https://join.slack.com/t/clariphyworkspace/shared_invite/zt-3ykafo6le-37Fb5zn0TXQkfSca2AzOlA