Dedicated AI/ML Accelerator Test Facility

Wednesday 15 July 2026 - Friday 17 July 2026

SLAC

Scientific Program

The goal of this workshop is to define and document the components and capabilities required to realize a fully AI/ML-integrated accelerator facility. Of interest are all groups involved in the science output of these complex machines including operations, users, accelerator physicists, control systems, ML ops, computer scientists, etc. Fusion systems are also of interest because the potential for overlap is high.

The scientific program is divided into four topics: Operations Challenges and Needs, User Challenges and Needs, AI/ML and Accelerators, and AI/ML Theory and Complex systems. Each topic includes discussion time to unify the individual talks around common themes and needs and the link to an AI/ML test facility.

AI/ML can impact scientific systems through changes to workflows that enable new capabilities for users, reduce downtime and tuning time, automate complex tasks, improve beam performance and accelerator system designs.

To prompt discussion, example questions to consider are provided for each topic. Responses to these questions are not required. Keep in mind the goal is to determine what is needed for an AI/ML test facility.

Operation of scientific systems: Accelerators and Tokamaks

Where can AI/ML have the biggest impact on operations?
Which (repetitive) tasks should be automated? What is needed to automate them?
What are the challenges with implementing AI/ML on/at your machine?
What infrastructure is needed to fully integrate AI/ML at a test facility?

AI/ML Applications: AI/ML and Accelerators

What is the highest impact AI/ML + accelerator demonstration?
How can control systems better serve the AI/ML community?
How can access to accelerators and data be improved?
What software environment best serves the AI/ML community?
What is the ideal way to deploy ML on scientific instruments?

Operation of scientific systems: User Challenges and Needs

What is needed for Users to more easily access AI/ML tools at a user facility?
What are new or improved tools that would enable or expand current science capacity?
Are there user requests that have traditionally been more difficult to meet than others?
What is the typical workflow for an experiment? Are there pain points?

Artificial Intelligence and Machine Learning: Complex Systems

What research in AI/ML theory and complex system modeling / control could be aided by more accessible testing on real-world systems like particle accelerators?
What limitations do you face at present in advancing AI/ML research? Are availability of real-world data and test stands an issue?
What type of facility infrastructure and staffing would make it easier to test new AI/ML algorithms on real-world systems like particle accelerators?
What are the possible benefits to US competitiveness in providing cross-training on AI/ML research and AI-ready real-world test stands?