

TAC-HEP: Training to Advance Computational HEP in the Exascale Era

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The complexity, computational needs and data volumes of current and future high energy physics (HEP) experiments are increasing dramatically. This challenge, coupled with the rapidly evolving computing architectures and storage technologies, requires a paradigm shift in software and computing to ensure effective and efficient use of resources in the quest to address the science goals of the HEP experiments. Training the next generation of software and computing experts to successfully take on this challenge is, therefore, absolutely critical for enabling scientific advances in the future.

The proposed traineeship program incorporates targeted coursework and specialized training modules that enable the design and development of coherent hardware and software systems, collaborative software infrastructure, and high-performance software and algorithms. Structured R&D projects, undertaken in collaboration with DOE laboratories and integrated within the program, provide students with hands-on experience with cutting-edge computational tools, software and technology. The training program also includes student professional development including oral and written science communication and cohort-building activities. These components seek to build a cohort of students with the goal of increasing recruitment and retention of a diverse group of graduate students.

This proposal brings together three universities (University of Wisconsin-Madison, Princeton University and the University of Massachusetts-Amherst) and two national labs (Fermi National Accelerator Laboratory and Brookhaven National Laboratory) on three scientific missions (LHC, DUNE, and the Vera Rubin Observatory), across three frontiers (Energy, Intensity, and Cosmic frontiers) to catalyze cross-experiment, cross-frontier and cross-laboratory collaborations that would maximize the impact on computational HEP.