

APR17-2016-030055

Abstract for an Invited Paper
for the APR17 Meeting of
the American Physical Society

WARP-X: a new exascale computing platform for Beam-Plasma Simulations

JEAN-LUC VAY, Lawrence Berkeley National Laboratory

Particle accelerators are a vital part of the DOE-supported infrastructure of discovery science and university- and private-sector applications, and have a broad range of benefits to industry, security, energy, the environment and medicine. To take full advantage of their societal benefits, however, we need game-changing improvements in the size and cost of accelerators. Plasma-based particle accelerators stand apart in their potential for these improvements. Turning this from a promising technology into a mainstream scientific tool depends critically on high-performance, high-fidelity modeling of complex processes that develop over a wide range of space and time scales. As part of DOE's Exascale Computing Project, a team from Lawrence Berkeley National Laboratory, in collaboration with teams from SLAC National Accelerator Laboratory and Lawrence Livermore National Laboratory, will develop a new powerful plasma accelerator simulation tool. The new software will harness the power of future exascale supercomputers for the exploration of outstanding questions in the physics of acceleration and transport of particle beams in chains of plasma channels. This will benefit the ultimate goal of compact and affordable high-energy physics colliders, and many spinoff applications of plasma accelerators along the way.