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Performance Evaluation of the Electrostatic Particle-in-Cell Code hPIC on the Blue Waters Supercomputer[1] RINAT KHAZIEV, University of Illinois at Urbana-Champaign, RYAN MOKOS, National Center for Supercomputing Applications , DAVIDE CURRELI, University of Illinois at Urbana-Champaign — The newly-developed hPIC code is a kinetic-kinetic electrostatic Particle-in-Cell application, targeted at large-scale simulations of Plasma-Material Interactions. The code can simulate multi-component strongly-magnetized plasmas in a region close to the wall, including the magnetic sheath/presheath and the first surface layers, which release material impurities. The Poisson solver is based on PETSc conjugate gradient with BoomerAMG algebraic multigrid preconditioners. Scaling tests on the Blue Waters supercomputer have demonstrated good strong-scaling up to 262,144 cores and excellent weak-scaling (tested up to 64,000 cores). In this presentation, we will make an overview of the on-node optimization activities and the main code features, as well as provide a detailed analysis of the results of the verification tests performed.

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