Abstract Submitted
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Enhanced quasi-static PIC simulation with pipelining algorithm for e-cloud instability[1] BING FENG, CHENGKUN HUANG, VIKTOR DECYK, WARREN MORI, PATRIC MUGGLI, TOM KATSOULEAS, University of Southern California — Simulating the electron cloud effect on a beam that circulates thousands of turns in circular machines is highly computationally demanding. A novel algorithm, the pipelining algorithm is applied to the fully parallelized quasi-static particle-in-cell code QuickPIC to overcome the limit of the maximum number of processors can be used for each time step. The pipelining algorithm divides the processors into subgroups and each subgroup focuses on different partition of the beam and performs the calculation in series. With this novel algorithm, the accuracy of the simulation is preserved; the speed of the simulation is improved by one order of magnitude with more than 10^2 processors are used. The long term simulation results of the CERN-LHC and the Main Injector at FNAL from the QuickPIC with pipelining algorithm are presented. This work is supported by SiDAC and US Department of Energy

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Bing Feng
University of Southern California

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