Accelerator Simulation and Parallel Computing

COMPASS – a SciDAC2 Project
Led by Fermilab, the community Petascale for Accelerator Science and Simulation project, funded by the Offices of High Energy Physics, Nuclear Physics, basic Energy Sciences and the Office of Advanced Scientific Computing Research, will develop a comprehensive computational infrastructure for accelerator modeling and optimization.

Synergia2
Developed at Fermilab, Synergia2 is a parallel framework for simulation of collective effects in accelerator physics. The code is C++ and Python for optimum performance and flexibility.

Preparation Synergia2 for Exascale
Hybrid MPI-CUDA Version Under Development
Both approaches utilize communication avoidance for improved scalability in multi-level parallelism.

Hybrid MPI-OpenMP Version In Progress

The hybrid MPI-OpenMP version of Synergia2 is a work in progress. The above results display the speedup vs. plain MPI in a preliminary implementation.