MATTER AND TECHNOLOGIES

Contribution ID: **59** Type: **not specified**

Theory and advanced simulation tool for laser-plasma accelerators

Laser-plasma accelerators (LPAs), offering an enormous accelerating gradient of GV/m, have garnered significant attention as a promising avenue to a variety of advanced applications from tabletop radiation sources to high-energy compact accelerators. Here, we present a collection of open-source simulation tools to further our understanding and support experiments on plasma acceleration. In particular, the 3D, GPU-portable quasi-static particle-in-cell code HIPACE++ makes abundant optimization on memory management and computing performance, demonstrating orders-of-magnitude speedups on modern scientific GPUs over CPU-only implementations. The longitudinal parallelization is done through a custom pipeline algorithm, enabling near-optimal strong scaling from 1 to 512 GPUs.
Key words: Laser-plasma accelerator, Particle-in-cell simulation, High performance computing

Speed talk:

I am unwilling/unable to present a speed talk

Primary author: HUI, Xingjian (MPA1 (Plasma Theory and Simulations))

Co-authors: MARTINEZ DE LA OSSA, Alberto (DESY / MPA); SINN, Alexander (MPA1 (Plasma Theory and Simulations)); MAIER, Andreas (MLS (Laser fuer Plasmabeschleunigung)); THEVENET, Maxence (DESY); DIEDERICHS, Severin (MPA1 (Plasma Theory and Simulations)); MEWES, Steven Mathis (MPA1 (Plasma Theory and Simulations))

Presenter: HUI, Xingjian (MPA1 (Plasma Theory and Simulations))

Session Classification: Poster