



Contribution ID: 162

Type: **Contributed Poster**

Porting the particle-in-cell code OSIRIS to GPU-accelerated architectures

Tuesday, 8 November 2022 17:00 (2h 30m)

Furthering our understanding of many processes in plasma physics, including laser-wakefield acceleration and laser-driven ion acceleration, requires large-scale kinetic simulations using particle-in-cell (PIC) codes. However, these simulations are extremely demanding, requiring that contemporary PIC codes be designed to efficiently use a new fleet of exascale computing architectures, which are increasingly GPU based. We discuss a GPU algorithm for PIC codes which we implemented on the code OSIRIS [1]. A limited-feature production code based on CUDA C is complete. Our implementation features dynamic GPU-GPU load balancing and a custom memory-management scheme which enables safe utilization of maximal device memory.

[1] Fonseca et. al, 2331 LNCS (2002)

[2] Miller et al., Computer Physics Communications, 259, 107633 (2021)

Acknowledgments

Work conducted under the auspices of DOE, LLNL, NSF, LLE, and DEPS

Primary authors: Mr LEE, Roman (UCLA); PIERCE, Jacob (UCLA); Mr MILLER, Kyle (Laboratory for Laser Energetics); Dr TABLEMAN, Adam; Dr DECYK, Viktor (UCLA); Dr FONSECA, Ricardo (GoLP/Instituto de Plasmas e Fusão Nuclear, Instituto Superior Técnico); Prof. MORI, Warren (UCLA)

Presenter: PIERCE, Jacob (UCLA)

Session Classification: Poster Session and Reception

Track Classification: Poster Session: WG2 Poster: Computation for Accelerator Physics