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## **Latest advances in the Particle - In - Cell code WarpX for efficient modeling of plasma accelerators at Exascale**

*Thursday, 10 November 2022 11:00 (15 minutes)*

The electromagnetic Particle-In-Cell (PIC) code WarpX has been developed within the the U.S. Department of Energy's Exascale Computing Project toward the modeling of plasma accelerators for future high-energy physics colliders on Exascale Supercomputers. We will present the latest multi-GPU capable physics features, such as a Coulomb collision module and a QED module. We will also report on the latest algorithmic advances that enable full PIC modeling of plasma accelerators with higher efficiency: a time-averaged pseudo-spectral PIC solver that enables larger timesteps, a hybrid nodal-staggered PIC loop that provides improved stability, an algorithm to handle particles crossing Perfectly Matched Layers, application of mesh refinement to the modeling of ion motion in a plasma accelerator. All presented features are fully CPU and GPU (Nvidia/AMD/Intel) capable. The status, examples of applications and future developments will be discussed, and thoughts toward the establishment of a 10-year roadmap for advanced accelerator concepts computation will be given.

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