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Toward the Modeling of Chains of Plasma Accelerator Stages with WarpX[1] JEAN-LUC VAY, Lawrence Berkeley National Laboratory — One of the most challenging application of plasma accelerators is the development of a plasma- based collider for high-energy physics studies. Fast and accurate simulation tools are essential to study the physics toward configurations that enable the production and acceleration of very small beams with low energy spread and emittance preservation over long distances, as required for a collider. The Particle-In-Cell code WarpX is being developed by a team of the U.S. DOE Exascale Computing Project (with non-U.S. collaborators on part of the code) to enable the modeling of chains of tens of plasma accelerators on exascale supercomputers, for collider designs. The code combines the latest algorithmic advances (e.g., boosted frame, pseudo-spectral Maxwell solvers) with mesh refinement and runs on the latest CPU and GPU architectures. The application to the modeling of up to three successive muti-GeV stages will be discussed. The latest implementation on GPU architectures will also be reported, as well as novel algorithmic developments.

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