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Performance evaluation of relativistic electromagnetic particle in cell algorithms in CPU and GPU RICARDO FONSECA[1], PAULO ABREU, IPFN/IST Portugal, VIKTOR DECYK, UCLA Plasma Simulation Group — The complexity of the phenomena involved in several relevante plasma physics scenarios, where highly nonlinear and kinetic processes dominate, makes purely theoretical descriptions impossible. Further understanding of these scenarios requires detailed numerical modelling, but fully relativistic particle-in-cell codes such as OSIRIS [1] are computationally intensive. Recently graphics processing units (GPUs), offering peak theoretical performances of ~ 1 TFlop/s for general purpose calculations, have received significant attention as an atractive alternative to CPUs for plasma modeling. In this work we perform a detailed performance evaluation of an electromagnetic fully relativistic particle in cell code in both GPUs and CPUs for production runs, focusing on the relative strengths and weaknesses of both architectures for all major algorithm sections, including particle push, current deposition, field solver, and also diagnostics.

[1] R. A. Fonseca et al., LNCS 2331, 342, (2002)

[1]also @ DCTI/ISCTE-IUL Portugal

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