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The GPU Algorithm in QuickPIC

QuickPIC is a parallel 3D PIC code that applies the quasi-static approximation. QuickPIC can simulate both beam driven and laser driven plasma wake field accelerators with a speed that is 1000 times faster than the conventional PIC code without losing accuracy. QuickPIC is developed based on the frame work UPIC, which has a hybrid parallelism algorithm that uses both OpenMP and MPI. Such an algorithm is also suitable for a GPU cluster. In this work, we will introduce the GPU+MPI version of QuickPIC, including the algorithm for deposit, particle mover and sine and cosine FFTs. The comparison of computing time between GPU and CPU versions of QuickPIC is also presented.

Working group

WG3 : Beam-driven plasma acceleration

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