Enhancing plasma wakefield and e-cloud simulation performance using a pipelining algorithm[1] BING FENG, TOM KATSOULEAS, University of Southern California, CHENGKUN HUANG, VIKTOR DECYK, WARREN B. MORI, UCLA — Modeling long timescale propagation of beams in plasma wakefield accelerators at the energy frontier and in electron clouds in circular accelerators such as CERN-LHC require a faster and more efficient simulation code. Simply increasing the number of processors does not scale beyond one-fifth of the number of cells in the decomposition direction. A pipelining algorithm applied on fully parallel code QUICKPIC is suggested to overcome this limit. The pipelining algorithm uses many groups of processors and optimizes the job allocation on the processors in parallel computing. With the new algorithm, it is possible to use on the order of 100 groups of processors, expanding the scale and speed of simulations with QuickPIC by a similar factor.

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