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Verification of high performance two-dimensional particle-in-cell simulations of low-temperature plasmas[1] HUW LEGGATE, MILES TURNER, Dublin City University — We discuss a two-dimensional implementation of the particle-in-cell algorithm with Monte Carlo collisions. This implementation is designed for multiprocessor environments in which each processor is assumed to offer vector capabilities and multiple execution threads. An appropriate implementation therefore combines OpenMP to exploit multithreading with MPI to coupled computing nodes. This approach promises to achieve accelerations of a least a factor of several hundred, relative to to a simple serial implementation. However, the complexity involved also offers many opportunities for error, and makes correctness demonstrations especially desirable. In this presentation we discuss the characteristics of this parallel implementation, and we describe a suite of verification tests that collectively create a strong presumption that the code is correct.

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