Numerical effects in particle-in-cell simulations with Monte Carlo collisions MILES M. TURNER, Dublin City University, Ireland — Particle-in-cell simulations with Monte Carlo collisions are widely used in simulations of low-temperature plasma phenomena. Like all computational methods, particle-in-cell simulations exhibit numerical effects that must be controlled by appropriate choices of numerical parameters, such as cell size and time step. Such numerical effects are unphysical and will induce errors in the simulation result. In particle-in-cell simulations, the main effects are velocity space diffusion phenomena, which typically appear as unphysical heating and as distortions of the particle velocity distribution functions. It has usually been assumed that these effects are not affected by the addition of Monte Carlo collisions, but we recently showed that this is not the case. Numerical effects are in fact enhanced by Monte Carlo collisions. In this presentation, we extend this work to two-dimensional simulations, and we discuss the implications for the choice of numerical parameters for accurate simulations.