

Loading Relativistic Maxwell Distributions in Particle Simulations

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Numerical algorithms to load relativistic Maxwell distributions in particle-in-cell (PIC) and Monte-Carlo simulations are presented. For stationary relativistic Maxwellian, the inverse transform method and the Sobol algorithm are reviewed. To boost particles to obtain relativistic shifted-Maxwellian, two rejection methods are proposed in a physically transparent manner. Their acceptance efficiencies are 50% or 100%, respectively. Our simple methods can be combined with arbitrary base algorithms and arbitrary distribution functions.

Keywords: PIC simulation, relativity, Monte-Carlo