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Statistical treatment of relativistic binary collisions in particle codes FABIO PEANO, MICHAEL MARTI, LUIS SILVA, GoLP/IPFN, Instituto Superior Tecnico, Lisboa, Portugal, GIANNI COPPA, Politecnico di Torino, Italy — In particle-based algorithms, such as the PIC method, the effects of binary collisions are commonly described statistically, using Monte Carlo (MC) techniques. In the relativistic regime, stringent constraints on the sampling techniques are critical to ensure physically meaningful results and to avoid the systematic apperance of qualitatively wrong equilibrum distributions [1]. The general procedure for a physically consistent statistical treatment of relativistic collisions is provided within a general kinetic framework. Results from 3D ultrarelativistic MC simulations with $\sim 10^8$ computational particles are presented, illustrating the technique and reproducing the correct equilibrium distribution, described by the Jüttner function, over several orders of magnitudes in energy and particle number. The systematic origin of conflicting results appeared in the recent literature (cf. [2]) is identified, and a simple interpretation of the numerical results recently presented in [2] is given. [1] F. Peano *et al.*, submitted for publication (2008). [2] D. Cubero *et al.*, Phys. Rev. Lett. **99**, 170601 (2007).

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