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Mathematical Physics

Asymptotic of grazing collisions and particle approximation for the Kac equation without cutoff

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The subject of this article is the Kac equation without cutoff. We first show that in the asymptotic of grazing collisions, the Kac equation can be approximated by a Fokker-Planck equation. The convergence is uniform in time and we give an explicit rate of convergence. Next, we replace the small collisions by a small diffusion term in order to approximate the solution of the Kac equation and study the resulting error. We finally build a system of stochastic particles undergoing collisions and diffusion, that we can easily simulate, which approximates the solution of the Kac equation without cutoff. We give some estimates on the rate of convergence.

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