Mathematical Physics

Newtonian limit and trend to equilibrium for the relativistic Fokker-Planck equation

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The relativistic Fokker-Planck equation, in which the speed of light c appears as a parameter, is considered. It is shown that in the limit $c\to\infty$ its solutions converge in L^1 to solutions of the non-relativistic Fokker-Planck equation, uniformly in compact intervals of time. Moreover in the case of spatially homogeneous solutions, and provided the temperature of the thermal bath is sufficiently small, exponential trend to equilibrium in L^1 is established. The dependence of the rate of convergence on the speed of light is estimated. Finally, it is proved that exponential convergence to equilibrium for all temperatures holds in a weighted L^2 norm.

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