The relativistic Fokker-Planck equation

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Abstract

There is a huge physical and mathematical literature on the classical Fokker-Planck equation, but very little has been done on its relativistic counterpart. This situation is quite surprising, as for certain applications of the Fokker-Planck dynamics (e.g., in plasma physics), relativistic effects can hardly be neglected. To remedy this gap in the literature, we initiate here the mathematical study of a relativistic Fokker-Planck equation. Unfortunately it seems that no agreement has been reached yet on the precise form of this equation. Therefore we start by proposing a plausible (in our opinion) argument to justify the relativistic Fokker-Planck equation considered in this talk. We then proceed by proving that homogeneous solutions converge exponentially fast in time to the Jüttner equilibrium distribution.

This talk is based on a joint work (in progress) with Juanjo Nieto, Óscar Sánchez and Juan Soler (University of Granada).