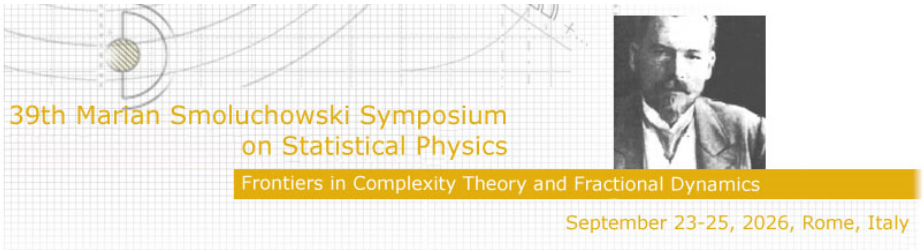


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# Boltzmann equations: From random exchange models for the distribution of wealth to the Lorentz gas

*Wednesday, 23 September 2026 10:00 (30 minutes)*

In recent times, several rigorous results on simple random exchange models were proved. In this talk, after a short review of the literature, I focus on a subset of results in a recent paper in which we discuss various limits of a simple random exchange model that can be used for the distribution of wealth. We start from a discrete state space - discrete time version of this model and, under suitable scaling, we show its functional convergence to a continuous space - discrete time model. Then, we show a thermodynamic limit of the empirical distribution to the solution of a kinetic equation of Boltzmann type.
Lorentz processes are presented in two different settings. Both cases are characterized by infinite expectation of the free-flight times, contrary to what happens in the classical Gallavotti-Spohn models. Under a suitable Boltzmann-Grad type scaling limit, they converge to non-Markovian random-flight processes with superdiffusive behavior. A further scaling limit yields another non Markovian process, i.e., a superdiffusion obtained by a suitable time-change of Brownian motion. Using a technique based on mixtures of Feller semigroups, the governing equations for the random flights and anomalous diffusion are obtained, which represent a non-local counterpart for the linear-Boltzmann and diffusion equations arising in the classical theory.

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