DK Seminar

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Vienna University of Technology,
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Fractional diffusion limit of a linear Boltzmann equation in a bounded domain

In recent years, the study of evolution equations featuring a fractional Laplacian has received many attention due the fact that they have been successfully applied into the modelling of a wide variety of phenomena, ranging from biology, physics to finance. The stochastic process behind fractional operators is linked to an α-stable processes as opposed to the Laplacian operator which is linked to a Brownian stochastic process. In addition, evolution equations involving fractional Laplacians offer new interesting and very challenging mathematical problems. There are several equivalent definitions of the fractional Laplacian in the whole domain, however, in a bounded domain there are several options depending on the stochastic process considered. In this talk we shall present preliminary results on the rigorous passage from a velocity jumping stochastic process in a bounded domain to a macroscopic evolution equation featuring a fractional Laplace operator. More precisely, we shall consider the long-time/small mean-free path asymptotic behavior of the solutions of a re-scaled linear Boltzmann equation in a smooth convex bounded domain.