



Einladung zur öffentlichen Defensio von  
**Pedro Aceves Sánchez, M.Sc.**

Thema der Dissertation:

**Fractional diffusion limits of kinetic transport  
equations**

Abstract:

This thesis is devoted to the study of macroscopic limits of various kinetic equations featuring a heavy tailed equilibrium distribution. In the classical case in which the equilibrium distribution is a Maxwellian it is a well-known result in kinetic theory that the asymptotic behavior of a linear kinetic transport equation with a parabolic scaling is governed by a heat equation. However, if the Maxwellian is replaced by an equilibrium distribution having a heavy tail then the macroscopic limit is a fractional heat equation.

In this talk we shall concentrate mostly on a kinetic transport equation with a possible motivation coming from the description of ensembles of motile microorganisms subject to a given chemical signal. We shall perform the rigorous macroscopic limit obtaining a fractional-diffusion equation with an advection term. In addition, we will briefly discuss the connection with the asymptotic study of a Vlasov-Boltzmann equation and Vlasov-fractional-Fokker-Planck equation. Finally, we will sketch the derivation of a fractional heat equation in a bounded domain from a kinetic transport equation with zero inflow boundary conditions.

Prüfungssenat:

Univ.-Prof. Dr. Josef Hofbauer (Vorsitz)  
(Universität Wien)

Univ.-Prof. Dr. Christian Schmeiser  
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Prof. Dr. Thierry Goudon  
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Prof. Dr. Pierre Degond  
(Imperial College London)

Univ. Prof. Dr. Anton Arnold  
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