



universität  
wien



## DK Summer School 2018

July 2-6, 2018

Weissensee, Kärnten, Austria

**Sara Merino Aceituno**

University of Sussex

### **Diffusive limits for the linear Boltzmann equation: PDE and stochastic approaches**

Transport equations for the time-evolution of a probability density are studied using PDE and stochastic tools alike. We will show the equivalence of a simple transport equation, the linear Boltzmann equation, with a random particle process. From this equivalence, we will derive scaling limits giving rise to (fractional) diffusion equations using PDE and stochastic methods. Specifically, from the linear Boltzmann equation we will derive the diffusion equation using the Hilbert expansion method; and from the stochastic process we will derive the fractional diffusion equation using the theory of martingales and Lévy processes. Both approaches, PDE and probabilistic, offer valuable insight into the scaling limit.