# ATHENS *Pr*OBABILITY COLLOQUIUM

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## Math Dept, University of Athens

### "Law of large numbers and central limit theorem for interacting particle systems: The effect of boundary conditions"

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**Abstract**:

A common practice in the theoretical study of physical phenomena is the design of mathematical models that are complex enough to retain the desired features, but at the same time simple to be amenable to rigorous analysis. In particular, in multi-scale phenomena, atomistic thermal fluctuations are modelled by stochastic processes. In this framework we study the response of a system of interacting particles in contact with the environment: steady currents flow through the system as a response to external forces. We model this process by considering the Simple Exclusion Process (SEP) in one space dimension with appropriate boundary mechanisms which create particles on the one side and kill particles on the other. The system is designed to model Fick's law which relates the current to the density gradient. We study the hydrodynamic limit (law of large numbers) as well as the fluctuations around it (central limit theorem). The main technical difficulty relies on controlling the correlations induced by the boundary action.

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