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**LAURE SAINT-RAYMOND**, ENS Paris

*From molecular dynamics to kinetic theory and hydrodynamics*

A gas can be considered either as a large system of microscopic interacting particles, or as a continuous medium governed by fluid equations. A natural question is therefore to understand whether both kinds of models give consistent predictions of the dynamics.

In this lecture, we will focus on the validity of the fluid approximation in the particular case of rarefied gases, using kinetic theory as an intermediate level of description as suggested by Hilbert in his sixth problem. We will present landmark partial results, both on the low density limit and on the Navier-Stokes limit of the Boltzmann equation, giving an hint of the mathematical tools used to establish these convergences, and discussing the challenging open questions.