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THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

SEMINAR ON PDE

Optimal regularity for kinetic equations in domains

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Abstract

The Boltzmann equation is one of the central equations in statistical mechanics and models the evolution of a gas through particle interactions. In recent years, groundbreaking work by Imbert and Silvestre has led to a conditional regularity theory for periodic solutions of the Boltzmann equation. They established that any possible singularity of a periodic solution to the Boltzmann equation must be visible macroscopically. A major open challenge is whether such a theory can be extended to bounded domains with physically relevant boundary conditions.

As a first step toward understanding the boundary case, in this talk I will discuss the smoothness of solutions to linear kinetic Fokker-Planck equations in domains with specular reflection condition. While the interior regularity of such equations is well understood, their behavior near the boundary has remained open, even in the simplest case of Kolmogorov's equation. Finally, I will report on recent joint work with Xavier Ros-Oton, in which we establish sharp boundary regularity results for this class of equations.

Date: 4 September 2025 (Thursday)

Time: 4:00pm

Zoom Meeting: https://hkust.zoom.us/j/99202512373 (Passcode: 129157)

All are Welcome!