

Analysis and Applied Mathematics Seminar

Recent progress on global solutions to the homogeneous Landau equation

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Abstract: The Landau equation in kinetic theory is one of the fundamental kinetic equations that describes the evolution of collisional plasmas. The equation includes a quadratic, non-local term that models the effects of binary collisions mediated by the Coulomb force. This collision term introduces substantial mathematical challenges, leaving many fundamental questions—such as the existence of global-in-time smooth solutions—largely open.

In this talk, I will explore recent progress made in understanding a simplified model, the homogeneous Landau equation, which retains the complex collision term. In a recent breakthrough work, Luis Silvestre and Nestor Guillen showed the existence of a new monotone functional—the Fisher information—which is used to construct global-in-time solutions for smooth rapidly decaying initial data. I will discuss joint work with Maria Gualdani and Amelie Loher, where we extend these results to general initial data and obtain new results on global-in-time existence and various forms of uniqueness. I will conclude with a discussion of how these results inform future research of the full model.

Monday, November 4 at 4:00 PM in 636 SEO