

GASTVORTRAG

Die Arbeitsgruppe Numerical Analysis lädt zu folgendem Vortrag ein:

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Inference and Control for Kinetic Equations: Applications to Interacting Particle Systems and Magnetized Plasmas

Kinetic equations and mean-field models are essential for describing large interacting systems, from biological swarms to magnetized plasmas. This talk explores two related challenges within this mathematical regime: inferring interaction kernels in interacting particle systems and controlling instabilities in magnetized plasmas.

First, we investigate the inverse problem of learning interaction kernels from observed system dynamics. Comparing finite-dimensional N -particle ODEs with their continuum mean-field PDEs, we demonstrate that the first variation derived from the N -particle system is a consistent estimator of the continuum limit, converging at a Monte Carlo rate of $O(N^{-1/2})$.

Second, we address the stabilization of plasmas in a uniform external magnetic field governed by the Vlasov-Poisson equation. By explicitly utilizing Larmor trajectories to derive the system's dispersion relation, we design a control mechanism based on applied external electric fields. Guided by linear stability analysis via the Laplace-Fourier transform, this approach eliminates the roots of the dispersion relation, successfully suppressing unstable modes, such as the Dory-Guest-Harris instability, and restoring overall system stability.

Zeit: **Mittwoch, 17. Juni 2026 um 16.00 Uhr**

Ort: **Technikerstr. 13, EG, HSB 8**

Gäste sind herzlich willkommen!

Lukas Einkemmer