Institut für Angewandte Analysis
Universität Ulm
89069 Ulm

Prof. Dr. Wolfgang Arendt
Prof. Dr. André Schlichting
Prof. Dr. Anna Dall'Acqua
Prof. Dr. Rico Zacher

Oberseminar im Institut für Angewandte Analysis

Sommersemester 2026

Im Rahmen des Oberseminars spricht am Montag, den **4. Mai 2026**:

Stefanie Winkelmann

Coarse-Grained Modeling of Clustering Dynamics in Interacting Particle Systems

Interacting particle systems with pairwise interactions provide a flexible framework for modeling collective phenomena such as clustering and aggregation. However, their high dimensionality poses significant challenges for both simulation and theoretical analysis, particularly in regimes characterized by stochastic fluctuations and metastable behavior. This talk presents coarse-graining strategies that connect particle-level dynamics to reduced stochastic and operator-based descriptions. Effective stochastic partial differential equations (SPDEs) arise as continuum models that capture fluctuations and spatial clustering beyond deterministic mean-field limits. In parallel, data-driven reductions of transfer operators yield low-dimensional Markov models that identify metastable cluster configurations and characterize transition pathways between them. These approaches provide computationally tractable and mathematically interpretable representations of complex particle dynamics, enabling the study of long-time behavior and large-scale clustering phenomena while preserving key stochastic and dynamical features of the underlying system.

Der Vortrag findet in **Raum E60, Helmholtzstr. 18** statt.
Beginn: 16 Uhr (c.t.). Alle Interessierten sind herzlich eingeladen.

W. Arendt, A. Dall'Acqua, A. Schlichting, R. Zacher.