Abstract

Oberwolfach Workshop:

Classical and Quantum Mechanical Models of Many-Particle Systems

Dates:

29 Nov - 5 Dec 2020 (Code: 2049)

Organizers:

Eric Carlen, Piscataway
Klemens Fellner, Graz
Isabelle Gallagher, Paris
Pierre-Emmanuel Jabin, College Park

The collective behaviour of many-particle systems is a common denominator in the challenges of a highly diverse range of applications: From classical problems in physics (gas dynamics e.g. Boltzmann's equation, plasma dynamics e.g. various Vlasov equations, semiconductors, quantum mechanics) to current models in biology (kinetic models for collective interaction e.g. swarming, evolution of trait-structured species) to rising topics in social sciences (opinion formation, crowding phenomena) and economics (wealth distribution, mean-field games).

Key mathematical questions concern the analysis (global-in-time wellposedness, regularity), rigorous scaling resp. macroscopic limits (model reduction from many-particle models to mean-field/mesoscopic descriptions to macroscopic evolutions), efficient and asymptotic preserving numerical methods and qualitative results (e.g. large-time equilibration).