MATH-677

From Interacting particle systems to SPDEs

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Cursus	Sem.	Type
Mathematics		Opt.

Language of teaching	English
Credits	2
Session	
Exam	Project report
Workload	60h
Hours	**42**
Courses	12
Exercises	6
TP	24
Number of positions	

Frequency

Only this year

Remark

to take place in Fall 2026

Summary

The aim is to introduce all the necessary tools to understand recent results on the convergence of the fluctuation field of nonequilibrium particle systems to solutions of stochastic partial differential equations.

Content

Basic notions of particle systems, Hydrodynamic limit
Replacement lemma, two block estimates, Convergence of the fluctuation field in equilibrium the Boltzmann-Gibbs principle, Entropy productio, Convergence of the fluctuation field to a critical reaction-diffusion model.

Keywords

Interacting particle systems, hydrodynamic limits, entropy methods, Boltzmann-Gibbs principle, SPDEs

Learning Prerequisites

Recommended courses

Probability theory and PDEs

Learning Outcomes

By the end of the course, the student must be able to:

- Use tools to derive SPDEs from local microscopic dynamics

Resources

Moodle Link

- https://go.epfl.ch/MATH-677