École d'hiver de probabilités
Semaine 2 : Mécanique statistique des systèmes dynamiques et désordonnés

	Lundi	**Mardi**	**Mercredi**	**Jeudi**	**Vendredi**
09h45 - 10h45	Faggionato	Faggionato	Faggionato	Toninelli	Toninelli
11h00 - 12h00	De Masi	Vares	Toninelli	Saada	Jara
14h00 - 15h00	Gallavotti	Martinelli		Löcherbach	Svejda
15h00 - 16h00	Basile	Fontes		Avena	Gün
16h20 - 17h20	Orlandi	Simenhaus		Pulvirenti	Galves

A. Faggionato & C. Toninelli (6 lectures): Hierarchical coalescence processes: theory and applications.

A. de Masi: Particle system for the Stefan problem.

G. Gallavotti: Synchronization and fluctuations in non-Anosov systems: an example.

G. Basile: Large deviations of the empirical flow for a degenerate Markov jump process.

E. Orlandi: Minimizer for a random nonlocal functional with double-well potential.

M. E. Vares: First passage percolation and escape strategies

Consider first passage percolation on $\mathbb{Z}^d$ with passage times given by i.i.d. random variables with common distribution F. Let $t_\pi(u,v)$ be the time from u to v for a path π and $t(u,v)$ the minimal time among all such paths from u to v. We ask whether or not there exist points $x, y \in \mathbb{Z}^d$ and a semi-infinite path $\pi = (y_0 = y, y_1, ...)$ such that $t_p i(y, y_{n+1}) < t(x, y_n)$ for all n. Necessary and sufficient conditions on F are given for this to occur. This is a joint work with E. Andjel.

F. Martinelli: Glauber dynamics for various models of random surfaces.

L. R. Fontes: Trap models on $\mathbb{Z}^d$.

F. Simenhaus: Stochastic Ising model at zero temperature and Lifschitz law

Consider the stochastic Ising model at subcritical temperature in $\mathbb{Z}^d$ ($d \geq 2$). It has been conjectured by Lifschitz that a droplet of "$-$" in a "$+$" phase evolves in the diffusive scaling limit according to a motion by mean curvature. We are still far from proving such a result. Here we focus on the degenerate case $T = 0$. It has been proven recently that for every $d \geq 2$ the time for the droplet to collapse is of main order L^2 where L denotes the radius of the initial droplet. This result is a first step towards the proof of the conjecture. In the specific case $d = 2$, we go a step further : we derive, from the microscopic random dynamics the exact macroscopic anisotropic mean curvature motion as conjectured by Lifschitz. I will present results about mixing time in all dimensions and give more details about the proof of convergence for $d = 2$. This is a joint work with H. Lacoin and F.L. Toninelli.

E. Saada: Zero dissipation limit in the Abelian avalanche sandpile.

E. Löcherbach: TBA

L. Avena: Symmetric exclusion as a random environment: hydrodynamic limit.

E. Pulvirenti: Cluster expansion in the canonical ensemble.

M. Jara: Non linear fluctuations of interacting particle systems.

The two-blocks estimate is a well-known technical key step in the derivation of hydrodynamic limits and large deviations for interacting particle systems. We propose a version of the two-blocks estimate at the level of fluctuations, which allows to obtain various non-trivial scaling limits of one-dimensional, conservative systems. In particular, we show that fluctuations of conserved quantities of weakly asymmetric, one-dimensional conservative systems are governed by solutions of non-linear stochastic PDE's, among them the celebrated KPZ equation. The proof of the key two-blocks estimate is done through a renormalization scheme. Depending on the composition and/or interests of the audience, we will focus on the renormalization scheme on he simplest possible situation, or we will give a promenade around the different possible scaling limits of observables of the interacting particle system.

A. Svejda: Aging of dynamics in disordered systems.

O. Gün: Aging for dynamics of hierarchical spin glass models.

A. Galves: TBA.