Stochastic Partial Differential Equations Talk Schedule

Events for:
Monday, May 16th - Friday, May 20th

Monday, May 16th

10:30am **Coffee Break**

11:00am **Ivan Corwin (Columbia University, Clay Mathematics Institute)**

Title: A drunk walk in a drunk world

Abstract: What happens to a simple random walk if its jump probabilities are taken to be random in space and time (e.g. uniformly distributed on [0,1]). In this talk we will describe the effect of this random environment on a random walk, and elucidate a new connection to the Kardar-Parisi-Zhang universality class and equation.

12:00pm **Lunch**

2:00pm **Sandra Cerrai**

Title: Large deviations for the 2D Navier-Stokes equation perturbed by rough noise

Abstract: We present some recent results on the validity of a large deviation principle for the two dimensional stochastic Navier-Stokes equation, when both the strength of the noise and its correlation are vanishing.

3:30pm **Tea Time - SCGP Lobby**

4:00pm **Yuri Bakhtin**

Title: Burgers equation with random forcing

Abstract: I will talk about the ergodic theory of randomly forced Burgers equation (a basic nonlinear evolution PDE of Hamilton-Jacobi type related to fluid dynamics and growth models) in the noncompact setting. The basic objects are one-sided infinite minimizers of random action (in the inviscid case) and polymer measures on one-sided infinite trajectories (in the positive viscosity case). Joint work with Eric Cator, Kostya Khanin, Liying Li.

Tuesday, May 17th

9:00am **Ismael Bailleul - SCGP 102**

Title: Unbounded rough drivers

Abstract: I will introduce in this talk the setting of unbounded rough drivers, that is convenient for studying a number a rough PDEs. I will discuss the basic features of the theory, given by a priori estimates and tensorization technics for proving uniqueness.

10:00am **Coffee Break**

10:30am **Ajay Chandra**

Title: An Analytic BPHZ Theorem for Regularity Structure

11:30am **Lunch - SCGP Cafe**

1:00pm **SCGP Weekly Talk: Martin Hairer "Random loops" - SCGP 102**

Title: Random loops

Abstract: A "rubber band" constrained to remain on a manifold evolves by trying to shorten its length, eventually settling on a closed geodesic, or collapsing entirely. It is natural to try to consider a noisy version of such a model where each segment of the band gets pulled in random directions. Trying to build such a model turns out to be surprisingly difficult and generates a number of nice geometric insights, as well as some beautiful algebraic and analytical objects. We will survey some of the main results obtained on the way to this construction.

2:15pm **Hakima Bessaih**

Title: Homogenization of stochastic models in porous media.

3:30pm **Tea Time - SCGP Lobby**

4:00pm **Boris Rozovsky - SCGP 102**

Title: On Distribution Free Skorokhod-Malliavin Calculus

Abstract: The starting point of the presentation is a sequence of uncorrelated random variables. The distribution functions of these variables are assumed to be given but no assumptions on the types or the structure of these functions are made. The above setting constitutes the so called "distribution free" paradigm. Under these assumptions, a version of Skorokhod-Malliavin calculus is developed and applications to stochastic PDEs will be discussed

5:45pm **Directors House Spring Welcome - Directors House**

Wednesday, May 18th

9:00am **Giuseppe Cannizzaro**

Title: Malliavin Calculus for Regularity Structures: the case of gPAM

Abstract: The theory of Regularity Structures allowed to solve a number of ill-posed stochastic partial differential equations. In this presentation, we want to show how it is possible to introduce Malliavin Calculus tools in this context in order to investigate probabilistic properties of the solutions to such equations. We will focus on one standard example of the theory, namely the generalized Parabolic Anderson Model (gPAM), and prove that its solution, when evaluated at a space-time point, admits a density with respect to the Lebesgue measure.

10:00am **Coffee Break - SCGP Cafe**

10:45am **Carl Mueller - SCGP 102**

Title: Hitting questions and multiple points for stochastic PDE in the critical case

11:45am **Peter Friz - SCGP 102**

Title: Support Theorem for the (generalized) parabolic Anderson model

12:45pm **Lunch**

2:15pm **Etienne Pardoux**

Title: Homogenization of a parabolic PDE with singular random noise

3:30pm **Tea Time - SCGP Lobby**

4:00pm **Jim Nolen - SCGP 102**

Title: Gaussian fields in stochastic homogenization

Thursday, May 19th

9:00am **Davar Khoshnevisan**

10:00am **Coffee Break**

10:30am **Konstantin Matetski - SCGP 102**

Title: Discretizations of rough stochastic PDEs

11:30am **Short Break**

11:45am **Nicolas Perkowski - SCGP 102**

Title: A martingale problem for the KPZ equation

Abstract: Energy solutions provide a way of formulating the equilibrium stochastic Burgers equation as a martingale problem. They were introduced in 2010 by Gonçalves and Jara as a tool to study the equilibrium fluctuations of weakly asymmetric particle systems, but until recently it was not known whether they are unique. In this talk I will show that the stronger formulation of Gubinelli, Jara (2013) gives rise to unique solutions and apply this to study the equilibrium fluctuations of weakly asymmetric Ginzburg-Landau dynamics. Based on joint works with Joscha Diehl and Massimiliano Gubinelli.

12:45pm **Lunch**

2:15pm **Marco Romito**

Title: Densities for solutions of stochastic PDEs

Abstract: We present a general method to prove existence and minimal regularity of the density with respect to the Lebesgue measure of solutions of stochastic differential equations with non-smooth coefficients. We give some examples of application to suitable finite dimensional functionals of solutions of stochastic PDEs

3:30pm **Tea Time - SCGP Lobby**

4:00pm **Leonid Mytnik**

Title: On the boundary of the support of super-Brownian motion

Friday, May 20th

9:00am **Jonathan Mattingly**

Title: Scaling limits of a model for selection at two scales

Abstract: The dynamics of a population undergoing selection is a central topic in evolutionary biology. This question is particularly intriguing in the case where selective forces act in opposing directions at two population scales. For example, a fast-replicating virus strain outcompetes slower-replicating strains at the within-host scale. However, if the fast-replicating strain causes host morbidity and is less frequently transmitted, it can be outcompeted by slower-replicating strains at the between-host scale. Here we consider a stochastic ball-and-urn process which models this type of phenomenon. We prove the weak convergence of this process under two natural scalings. The first scaling leads to a deterministic nonlinear integro-partial differential equation on the interval [0,1] with dependence on a single parameter, ?. We show that the fixed points of this differential equation are Beta distributions and that their stability depends on ? and the behavior of the initial data around 1. The second scaling leads to a measure-valued Fleming-Viot process, an infinite dimensional stochastic process that is frequently associated with a population genetics.

10:15am **Coffee Break - SCGP Cafe**

10:45am **Hendrik Weber - SCGP 102**

Title: An Eyring–Kramers law for the stochastic Allen–Cahn equation in dimension two

Abstract: We study spectral Galerkin approximations of an Allen–Cahn equation over the two-dimensional torus perturbed by weak space-time white noise of strength \sqrt{?}. We introduce a Wick renormalisation of the equation in order to have a system that is well defined as the regularisation is removed. We show sharp upper and lower bounds on the transition times from a neighbourhood of the stable configuration ?1 to the stable configuration 1 in the asymptotic regime ? ? 0. These estimates are uniform in the discretisation parameter N, suggesting an Eyring–Kramers formula for the limiting renormalised stochastic PDE. The effect of the "infinite renormalisation" is to modify the prefactor and to replace the ratio of determinants in the finite-dimensional Eyring–Kramers law by a renormalised Carleman–Fredholm determinant. Based on joint work with N. Berglund and G. Di Gesu.

11:45am **Hao Shen**

Title: Some convergence results for KPZ and stochastic quantization equations

Abstract: We discuss in this talk some discrete models - such as interacting particle system, Glauber dynamics of spin system, lattice quantum field theory model - and show that under certain scalings they converge to singular stochastic PDEs in the continuum limit.

12:45pm **Lunch**

3:30pm **Tea Time - SCGP Lobby**