Shinshu summer workshop on probability theory

日時：2023 年 8 月 12 日（土）
場所：信州大学理学部数学科　自然情報攻究室（A526）
Date：August 12th, 2023 (Saturday)
Venue：A526, Building A of Faculty of Science, Shinshu University

Program:

10:00 ~ 10:50　Jean-Dominique Deuschel (Technische Universitaet Berlin)
An isomorphism theorem for anharmonic fields and scaling limits

11:10 ~ 12:00　Dejun Luo (Chinese Academy of Sciences)
Convergence of stochastic 2D fluid equations with transport type noise to Smagorinsky model

12:00 ~ 14:00 Lunch

14:00 ~ 14:50　Kazuki Okamura (Shizuoka University)
Properties of quasi-arithmetic means of random variables via fractional calculus

15:00 ~ 15:50　Zhen-Qing Chen (University of Washington)
Approximation of Liouville Brownian motion

16:10 ~ 17:00　Tadahisa Funaki (BIMSA and University of Tokyo)
Interface motion from non-gradient Glauber-Kawasaki dynamics

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Abstract:

Zhen-Qing Chen (University of Washington)
Title: Approximation of Liouville Brownian motion
Abstract: Liouville Brownian motion was introduced as a canonical diffusion process under Liouville quantum gravity. It is constructed as a time change of 2-dimensional Brownian motion by the continuous additive functional associated with a Liouville measure, through a regularizing approximation procedure of the Gaussian free field. In this talk, we are concerned with the question whether one can construct Liouville Brownian motion directly from the Liouville measure. We will present a discrete approximation scheme that in fact works for any time-changed Brownian motion by a Revuz measure that has full quasi support.　Based on joint work with Yang Yu.

Jean-Dominique Deuschel (Technische Universitaet Berlin)
Title: An isomorphism theorem for anharmonic fields and scaling limits
Abstract: We introduce a natural measure on bi-infinite random walk trajectories evolving in a time-dependent environment driven by the Langevin dynamics associated to a gradient Gibbs measure with convex potential. We derive an identity relating the occupation times of the Poissonian cloud induced by this measure to the square of the corresponding gradient field, which is not Gaussian. In the quadratic case, we recover a well-known generalisation of the second Ray-Knight theorem. We further determine the scaling limits of the various objects involved in dimension 3, which are seen to exhibit homogenization. In particular, we prove that the renormalized square of the gradient field converges under appropriate rescaling to the Wick-ordered square of a Gaussian free field on R^3 with suitable diffusion matrix, thus extending a celebrated result of Naddaf and Spencer regarding the scaling limit of the field itself.　This is a joint work with Pierre-Francois Rodriguez.

Tadahisa Funaki (BIMSA and University of Tokyo)

Title: Interface motion from non-gradient Glauber-Kawasaki dynamics

Abstract: We recently derived mean curvature flow or Huygens' principle from Glauber-Kawasaki dynamics under gradient condition. In this talk we extend these results to general non-gradient cases.

Dejun Luo (Chinese Academy of Sciences)

Title: Convergence of stochastic 2D fluid equations with transport type noise to Smagorinsky model

Abstract: We show that the vorticity form of 2D fluid dynamics equations, perturbed by nonlinear multiplicative noise of transport type, converges weakly to deterministic Smagorinsky type model in large eddy simulation. In a sense, this result can be seen as a justification of such model. The talk is based on a joint work with F. Flandoli and E. Luongo.

Kazuki Okamura (Shizuoka University)

Title: Properties of quasi-arithmetic means of random variables via fractional calculus

Abstract: We consider complex-valued power means of i.i.d. non-integrable random variables, in particular their expectations. By investigating fractional moments of random variables via fractional derivatives, we characterize one-dimensional distributions in terms of the expectations of the fractional moments. We also compute the expectations of the power means of the Cauchy distribution and the Poincare distribution. This is based on a joint work with Y. Otobe.