North-East Midlands Stochastic Analysis Seminar supported by the London Mathematical Society and Department of Mathematics University of York

**Organisers: Z. Brzeźniak (York), K. D. Elworthy (Warwick),
C. Feng (Durham), Z. Qian (Oxford) and H.Z. Zhao (Durham)**

Wednesday, 6th of July, 2022

All talks in room Topos (Mathematics, Heslington West campus, near the lake)

A one-day meeting will be held at the University of York as part of the LMS funded program of the North-East and Midlands Stochastic Analysis (NEMSA).

Speakers:

14:00-14:45   **Sandra Cerrai (Maryland, USA):** Fast flow asymptotics for two-dimensional stochastic incompressible fluids and SPDEs on graphs

14:50-15:35   **Torstein Kastberg Nilssen (Agder, Norway):** A rough path Euler equation

15:40   Tea and coffee break

16:00-16:45   **Roger Tribe (Warwick):** The algebraic structures underlying Markov Dualities

16:50   **Discussion**

17:00   **End of the meeting (***walk and dinner afterwards***)**

For more information on speakers and events, please contact:

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Information for accommodation: http://maths.york.ac.uk/www/VisitorAccommodation

For booking accommodation on campus email: bedandbreakfast@york.ac.uk

Travel information: http://www.york.ac.uk/admin/estates/transport

Abstracts:

Sandra Cerrai: In I will present some results about the asymptotic behavior of a class of stochastic reaction-diffusion-advection equations in the plane. I will show that as the divergence-free advection term becomes larger the solutions of such equations converge to the solution of a suitable stochastic PDE defined on the graph associated with the Hamiltonian. I will deal with the case when the stochastic perturbation is given by a singular spatially homogeneous Wiener process taking values in the space of Schwartz distributions. As in previous works, I will assume that the derivative of the period of the motion on the level sets of the Hamiltonian does not vanish. Time permitting, without assuming this condition on the derivative of the period, I will study a weaker type of convergence for the solutions of a suitable class of linear SPDEs.

Torstein Kastberg Nilssen: In this talk I will present a rough path Euler equation which arise from random (rough path) perturbation of the Lagrangian trajectories. To find the structure of this equation we will use techniques from geometric hydrodynamics as initiated by Vladimir Arnold. We will briefly touch upon well-posedness results for this equation, i.e. Beale-Kato-Majda type results for blow-up. Finally, I will discuss how to estimate parameters in the equations from observations of the Lagrangian trajectories.

Roger Tribe: The generators of some well known one dimensional interacting particle systems on Z are naturally written in terms of two-site operators, where particles at two neighbouring sites react. For the two models ASEP (asymmetric exclusion process) and ARW (annihilating random walks) these two site operators satisfy the relations for a Hecke Algebra, and this can be used to understand the Markov duality functions that make distributional results for these models tractable. Oleg Zaboronski, Alexandre Povolotsky, Pavel Pyatov, Bruce Westbury and I have we have been searching for models with a similar lucky structures.