5:45-6:20 Oana Lang (Babes-Bolyai University, Cluj-Napoca, Romania)

Global solutions in stochastic fluid dynamics models

Oana Lang (Babes-Bolyai University) and Dan Crisan (Imperial College London)

We study the global well-posedness of fluid dynamics models under a carefully designed stochastic control. The control is introduced through a multiplicative noise whose intensity grows superlinearly with the solution norm, so that it becomes effective only as the solution approaches a potential blow-up. The resulting quadratic variation provides a stabilising mechanism that counteracts the blow-up. Assuming suitable structural conditions on the drift, we establish the existence of global strong solutions almost surely for three different levels of initial regularity. Our results show that this stochastic feedback yields global existence even in regimes where the corresponding deterministic equations are not known to possess global solutions. This is joint work with Dan Crisan, based on: Lang, O., Crisan, D. Global solutions for stochastically controlled fluid dynamics models. Stochastic PDE: Analysis and Computations (2025).