Cross fertilization between Physics and Mathematics

Roma, Accademia dei Lincei, May 25, 2022

Titles and abstracts

Bernard Derrida: **Large deviation functions of the density and of the current for diffusive systems**

Abstract: After a short review of the different approaches used to determine the large deviation functions of diffusive systems in their steady state, the talk will present a few recent results on the way these large deviations functions are modified by weak contacts with the boundaries and on the influence conditioning on the current on these large deviation functions. It will also mention a few open questions.

Giovanni Gallavotti: **Navier-Stokes equation: how relevant is its existence-uniqueness problem?**

Abstract: Existence-uniqueness theorems may be too strict requirements for many problems in Physics: Statistical Mechanics flourishes studying systems for which no existence-uniqueness is available for most infinite systems to which ideally it should apply in studying thermodynamics. Here it is proposed to establish an analogy between the theory of the thermodynamic limit and the problem of fluids and turbulence discussing pro-and-con for a statistical interpretation of viscosity and reversibility of fluid motion, also with attention to recent computer simulations.

Martin Hairer: **Stochastic quantisation of Yang-Mills**

Abstract: We report on recent progress on the problem of building a stochastic process that admits the hypothetical Yang-Mills measure as its invariant measure. One interesting feature of our construction is that it preserves gauge-covariance in the limit even though it is broken by our UV regularisation. This is based on joint work with Ajay Chandra, Ilya Chevyrev, and Hao Shen.