Cristian Giardinà (Università di Modena e Reggio Emilia, Italy)

Title: Stochastic models of transport

Abstract: A class of stochastic models which can be exactly solved by duality will be reviewed. The class includes both interacting diffusions (so-called Brownian Energy Process) and interacting particle systems (Inclusion and Exclusion Process). The limit of "instantaneous thermalization" of those models will also be discussed. All in all, the exact analysis allows to check in a robust way some of the universal properties which are expected to hold in a non-equilibrium state, e.g., long-range correlations. The presentation will be based on a recent joint work with G. Carinci, C. Giberti and F. Redig.

Markus Heydenreich (Universiteit Leiden, Netherlands)

Title: Spontaneous breaking of rotational symmetry in the presence of defects

Abstract: The formation of crystals, and in particular melting and freezing transitions, are not yet mathematically understood. It is expected that crystallization phenomena are intricately connected with the breaking of certain symmetries. In this talk, we consider a simple two-dimensional model of crystallization with random defects in thermal equilibrium. We prove a strong form of spontaneous breaking of rotational symmetry at low temperatures. (Based on joint work with Franz Merkl and Silke Rolles.)

Mark Holmes (University of Auckland, New Zealand)

Title: Reinforcement of random sets and graphs

Abstract: We consider Polya urn processes with independent mixing. At each step, a subset of the colours is chosen (independent of all previous history), and then one ball is selected from balls of these colours, proportional to the weights. Depending on the distribution of the subset selections, a fascinating array of different possibilities may occur. (Joint work in progress with Remco van der Hofstad and Wioletta Ruszel.)

Yukiko Iwata (Meteorological College, Japan)

Title: Stochastic perturbations of one-dimensional maps

Abstract: We study on additive and multiplicative random perturbations. In this talk, I'll introduce my recent result about sufficient conditions for the spectral decomposition theorem of Markov operators induced by random perturbations of some dynamical system. Moreover I'll talk about statistical differences of Markov operators between additive noise and multiplicative noise for intermittent maps which have an infinite invariant measure.

Wouter Kager (Vrije Universiteit Amsterdam, Netherlands)

Title: The signed loop approach to the Ising model

Abstract: The signed loop approach is a beautiful way to study the two-dimensional Ising model without an external field. Despite the fact that it dates back to the 1950's, the method has received relatively little attention in the literature. The signed loop approach leads to a description of the Ising model in which the measure on spin configurations is replaced by a signed measure on configurations of non-backtracking loops in the plane. In recent work with Marcin Lis and Ronald Meester, we have shown that the method can be used to prove several classical results about the $2D$ Ising model in a self-contained way. The main purpose of the talk is to explain the foundations of the method.