Siva Athreya (Indian Statistical Institute Bangalore, India)

Title: Brownian motion and random walks on R-tree

Abstract: The real trees form a class of metric spaces that extends the class of trees with edge lengths by allowing behavior such as infinite total edge length and vertices with infinite branching degree. We will discuss scaling limit of random walks to Brownian motion on locally compact R-trees and related questions.

This is joint work with Anita Winter and Wolgang Lohr.

Federico Camia (Vrije Universiteit Amsterdam, Netherlands/NYU Abu Dhabi, UAE)

Title: $2D$ Ising model in a field: Magnetization critical exponent and near-critical scaling limit

Abstract: Consider the Ising model on the square lattice at the critical temperature with a positive external magnetic field h. I will discuss a surprisingly simple proof of the fact that the average magnetization behaves like $h^{1/15}$ as h tends to zero, and present some recent results and work in progress on the near-critical scaling limit of the magnetization field. (Joint work with Christophe Garban and Charles M. Newman.)

Francesco Caravenna (Università degli Studi di Milano-Bicocca, Italy)

Title: Scaling limits and universality for random pinning models

Abstract: We consider the so-called random pinning model, which may be described as a Markov chain that receives a random reward/penalty each time it visits a given site. When the return time distribution of the Markov chain has a polynomial tail, with exponent larger than $1/2$, the model is said to be disorder-relevant, since an arbitrarily small amount of external randomness (quenched disorder) changes radically the critical properties of the model. In this regime, we show that the partition function of the model, under an appropriate weak coupling scaling limit, converges to a universal quantity, given by an explicit Wiener chaos expansion. This quantity can be viewed as the partition function of a universal "continuum random pinning model", whose construction is part of our approach. (Joint work with Nikos Zygouras and Rongfeng Sun.)

Lung-Chi Chen (Fu-Jen Catholic University, Taiwan)

Title: Critical two-point functions for long-range statistical-mechanical models in high dimensions

Abstract: We consider long-range self-avoiding walk, percolation and the Ising model on $\mathbb{Z}^d$ that are defined by power-law decaying pair potentials of the form $D(x) \asymp |x|^{-d-\alpha}$ with $\alpha > 0$. The upper-critical dimension $d_{\rm c}$ is $2(\alpha \wedge 2)$ for self-avoiding walk and the Ising model, and $3(\alpha \wedge 2)$ for percolation. Let $\alpha \neq 2$ and assume certain heat-kernel bounds on the n-step distribution of the underlying random walk. In this talk, I present that, for $d > d_{\rm c}$ (and the spread-out parameter sufficiently large), the critical two-point function $G_{p_{\rm c}}(x)$ for each model is asymptotically $C|x|^{\alpha\wedge 2-d}$, where the constant $C \in (0, \infty)$ is expressed in terms of the model-dependent lace-expansion coefficients and exhibits crossover between $\alpha < 2$ and $\alpha > 2$.

Hayato Chiba (Kyushu University, Japan)

Title: A spectral theory of linear operators on a Gelfand triplet and its application to coupled oscillators

Abstract: Dynamics of systems of large populations of coupled oscillators have been of great interest because collective synchronization phenomena are observed in a variety of areas. The Kuramoto model is often used to investigate such phenomena. In this talk, an infinite dimensional Kuramoto model is considered, and Kuramoto's conjecture on a phase transition of the system will be proved. For this purpose, a new spectral theory of linear operators based on a Gelfand triplet is established.