

“Statistical Mechanics, Integrability and Combinatorics”

Schedule for Week 8, June 29-July 3

Monday June 29, Room B, 14.30

The Robbins number triangle and some of its symmetries

Dan Romik (*University of California, Davis*)

The Robbins triangle is a triangle of positive integers $A_{\{n,k\}}$ that famously appear in connection with the refined enumeration of alternating sign matrices (ASMs), as well as in several other enumeration problems. The numbers $A_{\{n,k\}}$ are known to be given by an explicit formula involving a product of factorials. While the fascinating combinatorial properties of ASMs and their connection to square ice and other statistical physics models have justifiably gotten a lot of attention, the numbers $A_{\{n,k\}}$ themselves possess some very intriguing "hidden" symmetries that seem worth exploring for their own sake, and this will be the focus of this talk. One of the symmetries I will discuss mysteriously appears in connection with the study of the so-called "Witten zeta function" associated with the group $SU(3)$, and has no known relation to the combinatorics of ASMs or other related objects. The talk will be elementary and no knowledge will be assumed.

Monday June 29, Cloister, 17.30

Wine and Cheese “garden party”
Accompanying persons are welcome

Tuesday June 30, Room B, 14.30

Towards a non-equilibrium Bethe ansatz for the Kondo model

Eldad Bettleheim (*The Hebrew University of Jerusalem*)

An application of Slavnov's formula is presented which gives access to non-equilibrium properties in the Kondo model through non-linear integral equations extending such equations encountered in the equilibrium thermodynamic Bethe ansatz.

Wednesday July 1, Room B, 11.30

The crossing probability for directed polymers in random media

Andrea De Luca (*Univeristé Paris-Sud, Orsay*)

We study the probability that two directed polymers in the same random potential do not intersect. We use the replica method to map the problem onto the attractive Lieb-Liniger model with generalized statistics between particles. We obtain analytical expressions for the first few moments of this probability, and compare them to a numerical simulation of a discrete model at high-temperature. From these observations, several large time properties of the non-crossing probabilities are conjectured. Extensions of our formalism to more general observables are discussed.

Thursday July 2, Room B,

11.00-11.45

The dimer model: monomers, Arctic Circle and CFT

Nicolas Allegra (*Université de Lorraine, Nancy*)

In the first part of this presentation, some classical results of the pfaffian theory of the dimer model are introduced in a fermionic framework. The complete and detailed fermionic solution of the dimer model on the square lattice with an arbitrary number of monomers is presented [1] and some important applications will be detailed and compared to CFT results via the so-called height mapping [2]. In a second part, the arctic circle phenomenon will be introduced in a field theory point of view and some properties will be discussed.

[1] N.A, JY.Fortin, Phys. Rev. E 89, 062107

[2] N.A, Nuclear Physics B 894 (2015) 685–732

[3] N.A, J.Dubail, M.Haque, J-M Stephan and J.Viti, (in preparation).

11.45-12.30

Off-critical interfaces in two dimensions. Exact results from field theory

Alessio Squarcini (*SISSA, Trieste*)

We consider phase separation and interfaces of systems of classical statistical mechanics in two dimensions below criticality. While interfaces in 2D at criticality are described by SLE, exact results for the scaling limit of the order parameter profile in the off-critical regime have been obtained only by means of exact lattice computations for the 2D Ising model; a circumstance that raises the question about the role of Ising solvability. We will show how low-energy properties of two-dimensional field theory yield exact results for order parameter profiles, passage probabilities and interface structure in presence of single and double interfaces for different universality classes in 2D. Results available from the lattice solution of the Ising model in the plane and in the half-plane are recovered as a particular case.

[1] G. Delfino and A.S., Interfaces and wetting transition on the half plane. Exact results from field theory, Journal of Statistical Mechanics P05010 (2013)

[2] G. Delfino and A.S., Exact theory of intermediate phases in two dimensions, Annals of Physics 342, 171 (2014)

[3] G. Delfino and A.S., Phase separation in a wedge. Exact results, Physical Review Letters 113 (2014) 066101