# Analysis Seminar

## "Directed polymers in random environments"

**By**

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**Abstract:** A rich source of interesting problems in probability has been statistical physics. In this talk, I will introduce a specific model, *directed polymers in random environments*, and some basic concepts from statistical physics such as *partition function, free energy, phase transition, scaling exponents,*...in the context of this model. *Directed polymers in random environments* (DPRE) are typical examples of models used to study the behaviour of a one-dimensional object interacting with a disordered environment. In the mathematical formulation of these models, paths of a directed walk on a regular *lattice* or *tree* represent the *directed polymer* while an independent and identically distributed collection of random variables attached to the vertices of the lattice/tree correspond to the *random environment*. Each path is assigned a *Gibbs weight* corresponding to the sum of the random variables of the visited vertices. The polymer's interaction with the random environment is controlled by a parameter, $\beta$, which represents the *inverse temperature*. The main questions are whether there exist different *phases* in the model depending on the temperature which manifest the effect of the disorder on the large scale behaviour of the polymer, and how the phases can be characterized. This model is also important to understand the *KPZ-universality class* as a toy model belonging to it. The DPRE model was first studied in physics literature by Huse and Henley (1985) and Kardar (1985) as a model of Ising interfaces. The last twenty years have witnessed very significant results on this model.

The talk will be accessible to non-specialist. It will also provide participants with some background material for my second talk in which I will present some new results.

**Date:** Tuesday, February 20, 2018
**Time:** 16:00-17:00
**Place:** Bilkent University Mathematics Seminar Room, SA – 141
Tea and cookies will be served before the seminar.