THE PHASE TRANSITION FOR ϕ_3^4

TRISHEN GUNARATNAM

The ϕ_3^4 model is one of the simplest examples of a 3D non-Gaussian Euclidean field theory: a probability measure on distributions on $\mathbb{R}^3$ satisfying the so-called Osterwalder-Schrader axioms. It arises as scaling limits of near-critical Ising-type models and as invariant measures of a certain class of singular stochastic PDEs. Studying it rigorously was one of the high-points of the constructive field theory programme in the '60s-'70s and there has been a lot of recent interest in it from the stochastic analysis community.

My main goal for this talk is to discuss its phase transition. In particular, results related to its low temperature phase obtained in recent work with Ajay Chandra and Hendrik Weber. However, I'll first start with a gentle introduction to ϕ_3^4 and explain some of the key ideas behind the variational approach to its construction due to Barashkov and Gubinelli, the techniques of which are heavily related to those occurring in the treatment of singular stochastic PDEs.