Critical Ising Models and Measure Ensembles

Federico Camia
VU Amsterdam / NYU Abu Dhabi

2011 September

Abstract: In statistical physics, systems like percolation and Ising models are of particular interest near their critical points. Critical systems have long-range correlations that typically decay like inverse powers. Renormalization group arguments suggest that their continuum scaling limits, in which the lattice spacing shrinks to zero, are related to Euclidean field theories with universal, dimension-dependent properties. e In this talk, I will focus on the scaling limit of the critical Ising magnetization in two dimensions, and discuss a geometric representation based on an ensemble of cluster area measures with random signs. This approach relates the critical Ising magnetization to the ensemble of Ising-FK clusters, whose boundaries are described, in the scaling limit, by Schramm-Loewner Evolution (SLE) curves. This connection is useful in rigorously proving the expected conformal covariance properties of the critical Ising magnetization, and in studying near-critical scaling limits. (Based on Joint work with C.M. Newman [PNAS 106 (2009) 5457-5463] and on work in progress with C. Garban and C.M. Newman.)