S-embeddings of planar graphs and conformal invariance of the critical Ising model

Dmitry Chelkak [1]

[1] Département de mathématiques et applications de l'ENS, Chaire ENS–MHI,

École Normale Supérieure PSL Research University, CNRS UMR 8553, Paris 5ème.

On leave from St. Petersburg Department of Steklov Mathematical Institute RAS.

During the last decade, a number of results on conformal invariance of the critical planar Ising model were obtained, both for correlation functions and collections of interfaces. Nevertheless, in sharp contrast to random-walk based models, all these results remained limited to 'nice' lattices and interaction constants (namely, to the Z-invariant Ising model on isoradial graphs) until recently.
The main purpose of this talk is to discuss a new way of embedding planar graphs into the complex plane – s-embeddings – which plays a role of Tutte's barycentric embedding for the critical Ising model. The technique developed so far allows to prove the convergence of FK-Ising interfaces to SLE(16/3) on arbitrary periodic graphs and has a clear potential for generalizations. When time permits, we also discuss similar embeddings of weighted bipartite graphs, introduced recently by Kenyon and others in the dimer model context.