Tuesday, September 01, 2020

4:00pm-5:00pm  **Colloquium Series** -- Dmitry Chelkak (École Normale Supérieure) *Bipartite dimer model and minimal surfaces in the Minkowski space* -- Zoom: 988 5364 5484, Passcode 631227 East Hall

Friday, September 04, 2020

11:00am-11:50am  **Representation Stability** -- Jenny Wilson (UM) *TBA* -- Online
Colloquium Series

Tuesday, September 01, 2020, 4:00pm-5:00pm
Zoom: 988 5364 5484, Passcode 631227 East Hall
Dmitry Chelkak (École Normale Supérieure)
Bipartite dimer model and minimal surfaces in the Minkowski space

We discuss a new approach to the convergence of height fluctuations in the bipartite dimer model considered on big planar graphs. This viewpoint is based upon special embeddings of weighted planar graphs into the complex plane known under the name Coulomb gauges or, equivalently, t-embeddings. The long-term motivation comes from trying to understand fluctuations on irregular graphs, notably on random planar maps equipped with the dimer (or, similarly, the critical Ising) model.

When the dimer model is considered on subgraphs of refining lattices, a classical conjecture due to Kenyon–Okounkov predicts the convergence of fluctuations to the Gaussian Free Field in a certain conformal structure. However, the latter is defined via a lattice-dependent entropy functional, which makes the analysis of irregular graphs highly problematic. To overcome this difficulty, we introduce a notion of ‘perfect t-embeddings’ of abstract weighted bipartite graphs and develop new discrete complex analysis techniques to handle correlation functions of the dimer model on t-embeddings. Though in full generality the existence of perfect embeddings remains an open question, we prove that - at least in some concrete cases - they reveal the relevant conformal structure in a lattice-independent way: as that of a related Lorentz-minimal surface in the Minkowski space.

Based upon joint works with Benoît Laslier, Sanjay Ramassamy and Marianna Russkikh.

Representation Stability

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