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<td>Bipartite dimer model and minimal surfaces in the Minkowski space</td>
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Abstracts for the week of August 30th, 2020 - September 5th, 2020

**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**

*Friday, September 04, 2020, 11:00am-11:50am*

*Online*

*Jenny Wilson (UM)*

*TBA*