

# Random tilings, free boundary problems and the Beltrami equation

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Scaling limits of random structures in two dimensions often possess some conformal invariance properties, giving ways to methods of geometric analysis.

Among the fascinating questions here are the configurations of random tilings under scaling limits, and the boundaries between their ordered and disordered (or liquid and frozen) limit regions.

The liquid region carries a natural complex structure, which can be described by a quasilinear Beltrami equation with very specific properties. On the other hand, the boundary of the liquid domain can be identified by a (very degenerate) free boundary problem.

In this talk, based on joint work with E. Duse, I. Prause and X. Zhong, I show how these methods lead to understanding and classifying the geometry of the limiting boundaries for different random tilings and other dimer models.

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