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Embeddability of Liouville quantum gravity metrics

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Introduced by Polyakov in the 1980s, Liouville quantum gravity (LQG) is in some sense the canonical model of a random fractal Riemannian surface. LQG can be defined as a path integral over fields corresponding to the Liouville action, or equivalently as a random metric measure space that turns out to describe the scaling limit of a host of two-dimensional discrete objects. In particular, certain discrete conformal embeddings of random planar maps converge to canonical (up to conformal reparametrization) embeddings of LQG surfaces into 2D Euclidean space. Though one might expect these metric embeddings to retain some vestige of conformality, in fact no embedding of an LQG surface into $\mathbb{R}^n$ can be quasisymmetric. This generalizes a result of Troscheit in the special case of $\sqrt{8}/3 - LQG$ (corresponding to uniform random planar maps). Time permitting, I will also discuss future directions in the study of metric embeddability for LQG.

Author: Dr HUGHES, Liam (Aalto University)

Presenter: Dr HUGHES, Liam (Aalto University)