Mathematics and CS Seminar

The fractal dimension of Liouville quantum gravity: monotonicity, universality, and bounds.

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It is an open problem to construct a metric on γ-Liouville quantum gravity (LQG) for $\gamma \in (0,2)$, except in the special case $\gamma=\sqrt{8/3}$. Nevertheless, the Hausdorff dimension d_γ of the conjectural LQG metric is well-defined in the following sense. For a large class of approximations of γ-LQG distances --- including random planar maps, Liouville first passage percolation, Liouville graph distance, and the Liouville heat kernel --- there is a notion of dimension (in terms of a certain exponent associated with the model) and these exponents all agree with one another.I will give an overview of some recent progress on understanding d_γ. In particular, I will discuss the relationships between different exponents, the proof the $\gamma\mapsto d_\gamma$ is strictly increasing, and new upper and lower bounds for d_γ. These bounds are consistent with (and numerically quite close to) the Watabiki prediction for the value of d_γ for $\gamma \in (0,2)$. However, in an extended regime corresponding Liouville first passage percolation with parameter $\xi >2/d_2$, or equivalently LQG with central charge greater than 1, the bounds are inconsistent with the analytic continuation of Watabiki's prediction for certain parameter values.Based on joint works with Jian Ding, Nina Holden, Tom Hutchcroft, Jason Miller, Josh Pfeffer, and Xin Sun.

Tuesday, March 26, 2019 05:30pm - 06:30pm
Big Seminar room Ground floor / Office Bldg West (I21.EG.101)

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