



## Mathematics and CS Seminar

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

**Ewain Gwynne (University of Cambridge)**

**Host: M. Beiglböck, N. Berestycki, L. Erdős, J. Maas**

It is an open problem to construct a metric on  $\gamma$ -Liouville quantum gravity (LQG) for  $\gamma \in (0, 2)$ , except in the special case  $\gamma = \sqrt{8/3}$ . Nevertheless, the Hausdorff dimension  $d_\gamma$  of the conjectural LQG metric is well-defined in the following sense. For a large class of approximations of  $\gamma$ -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  $d_\gamma$ . In particular, I will discuss the relationships between different exponents, the proof that  $d_\gamma$  is strictly increasing, and new upper and lower bounds for  $d_\gamma$ . These bounds are consistent with (and numerically quite close to) the Watabiki prediction for the value of  $d_\gamma$  for  $\gamma \in (0, 2)$ . However, in an extended regime corresponding to 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**

IST Austria Campus Big Seminar room Ground floor / Office Bldg West (I21.EG.101)



This invitation is valid as a ticket for the IST Shuttle from and to Heiligenstadt Station. Please find a schedule of the IST Shuttle on our webpage: <https://ist.ac.at/en/campus/how-to-get-here/> The IST Shuttle bus is marked IST Shuttle (#142) and has the Institute Logo printed on the side.