

# Lecture Series

**Monday, 6 May 2024, 14:30 – 16:00**

**Max-Planck Institute for Mathematics**

**Wednesday, 8 May 2024, 13:15 – 15:45**

**Lipschitz-Saal (LWK 1.016)**

**Yilin Wang**

**IHES, Bures-sur-Yvette**

## **From the universality to the Kähler geometry of random curves**

In probability theory, universality is the phenomenon where random processes converge to a common limit despite microscopic differences. For instance, the random walk, under mild conditions, converges to the same Brownian motion seen from afar, regardless of the law of each independent step. This phenomenon underlies the appearance of the random simple curve, called SLE, as the universal scaling limit of interfaces in conformally invariant 2D systems. On the other hand, a subfamily of relatively regular simple curves forms the Weil-Petersson Teichmüller space and has an essentially unique Kähler geometry. To describe these geometric structures we invoke the group structure and Kähler structure which is described via infinitesimal variations of the curves. Although these two worlds look very different we will explain how they are tied together via the Loewner energy.

The first lecture on May 6 will give an introductory overview of the link.

The second lecture on May 8 will focus on the applications and further development in exploring this link, in particular, the holography of the Loewner energy as a renormalized volume in hyperbolic 3-space. Attending the first lecture will be helpful, but not necessary, and the second lecture will be self-contained.