Hong Kong Probability Seminar

https://sites.google.com/site/hkprobability/

Date: **Feb 24, 2023 (Friday)**
Venue: **Room 1511 (Lift 27-28), Academic Building, HKUST**

- **2:00 – 3:30pm : Antoine Jego (EPFL, Switzerland)**

Conformally invariant fields out of Brownian loop soups

Abstract: The Brownian loop soup in some two-dimensional domain is a random collection of infinitely many Brownian-type loops. It is sampled according to theta times a certain loop measure, where theta > 0 is a parameter of the model. First introduced by Lawler and Werner, it has become a central object of study in random conformal geometry, in particular due to its connections with conformal loop ensembles (CLE) and the Gaussian free field (GFF). This latter connection, referred to as Le Jan's isomorphism, states that, when theta = 1/2, the occupation field of the loop soup has the same law as the square of a GFF. Remarkably, it is even possible to fully recover the GFF (also its sign) out of the Brownian loop soup with the help of additional coin tosses (Lupu and Aru—Lupu—Sepulveda). The main goal of this talk is to answer the following question: What is the field naturally associated to the loop soup when theta < 1/2? Along the way, we will have to study the percolative properties of the loop soup.

- **3:30 – 4:00pm: Coffee break**

- **4:00 – 5:30pm: Yifan Gao (CityU HK)**

Multiple points on the boundaries of Brownian loop-soup clusters

Abstract: The Brownian loop soup, introduced by Lawler and Werner in 2004, plays a crucial role in understanding two-dimensional models in statistical physics. In this talk, I will present the fractal property of the Brownian loop soup by the Hausdorff dimension of multiple points on the boundaries of clusters. The first part of the talk is to review the well-known results on the Hausdorff dimension of special points of the Brownian motion, which is intimately related to a family of exponents. In the second part, I will explain how to obtain our result via generalizing such exponents to the Brownian loop soup. The challenge is to prove a corresponding separation lemma which is unclear due to the interplay of Brownian motions and the Brownian loop soup. I will highlight this powerful lemma with a final remark on its use in our future work. Based on a joint work (arXiv:2205.11468) with Xinyi Li (Peking University) and Wei Qian (City University of Hong Kong).

All are welcome