# Hong Kong Probability Seminar

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

**Date: April 26, 2019 (Friday)**
**Venue: Room 210, Run Run Shaw Building, HKU**

- **2:00 – 3:30pm : Piotr Graczyk (Université d'Angers)**

  *Empirical processes of particle systems*

  **Abstract.** We consider general particle systems $x = (x_1, \ldots, x_n)$ described by $dx_i = \sigma_n^i(x_i)dB_i + \left( b_n(x_i) + \sum_{j \neq i} \frac{H_n(x_i, x_j)}{x_i - x_j} \right) dt, \quad (1 \leq i \leq n),$ and ordered increasingly $x_1(t) \leq \ldots \leq x_n(t)$. The functions $\sigma_n^i, b_n : \mathbb{R} \to \mathbb{R}$ and $H_n : \mathbb{R} \times \mathbb{R} \to \mathbb{R}$ are continuous and $H_n \geq 0$ is symmetric. We consider the corresponding empirical measure-valued processes $\mu_t^{(n)} := n^{-1} \sum_{i=1}^n \delta_{x_i}$, where $\delta_a$ is the unit mass at $a \in \mathbb{R}$. Under very mild assumptions on the growth and convergence of the coefficients of the initial SDE, we show that the family $\mu_t^{(n)}$ is tight (up to the first collision time). The limiting distributions of its subsequences are solutions of an integral equation. The results apply to $\beta$-Dyson Brownian motions and to generalized $\beta$-BESQ particle systems. This is a joint work with Jacek Małecki and José Luis Pérez.

- **3:30 – 4:00pm: Coffee break**

- **4:00 – 5:30pm: Wei Qian (University of Cambridge)**

  *Decomposition of Brownian loop-soup clusters in dimension two*

  **Abstract:** Brownian loop-soups were introduced by Lawler and Werner in 2004 as a Poisson point process of Brownian loops. In dimension two, their distributions are invariant under conformal maps. They are also intimately related to other important random objects that I will first present, such as the Gaussian free field and the conformal loop ensembles. We will then focus on the decomposition of Brownian loop-soup clusters (connected components of loops). In particular, we obtain a surprising decomposition for clusters at the critical intensity in terms of Poisson point processes of Brownian excursions. A large part of this talk is based on joint works with W. Werner.

***All are welcome***

*The event is supported by the Institute of Mathematical Research, The University of Hong Kong*