Probabilistic Operator Algebra Seminar

Organizer: Dan-Virgil Voiculescu

April 11 **Valentin Feray**, Institut Elie Cartan de Lorraine

Title: *Components of meandric systems and the infinite noodle.*

A meandric system of size n is a non-intersecting collection of closed loops in the plane crossing the real line in exactly $2n$ points (up to continuous deformation). Connected meandric systems are called meanders, and their enumeration is a notorious hard problem in enumerative combinatorics. In this talk, we discuss a different question, raised independently by Goulden-Nica-Puder and Kargin: what is the number of connected components $cc(M_n)$ of a uniform random meandric system of size $2n$? We prove that this number grows linear with n, and concentrates around its mean value, in the sense that $cc(M_n)/n$ converges in probability to a constant. Our main tool is the definition of a notion of local convergence for meandric systems, and the identification of the "quenched Benjamini-Schramm" limit of M_n. The latter is the so-called infinite noodle, a 1D (but difficult to study!) percolation model recently introduced by Curien, Kozma, Sidoravicius and Tournier. Our main result has also a geometric interpretation, regarding the Hasse diagram H_n of the non-crossing partition lattice $NC(n)$: informally, our result implies that, in H_n, almost all pairs of vertices are asymptotically at the same distance from each other. We use here a connection between H_n and meandric systems discovered by Goulden, Nica and Puder. Based on joint work with Paul Thevenin, arXiv:2201.11572.