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The nesting cascade of the loops in the O(n) model on random planar maps

One approach to understanding Liouville Quantum Gravity is to study random planar maps endowed with a statistical mechanics model. In this talk, I will present a work in progress with Nicolas Curien and Linxiao Chen on a certain model of random loops on random quadrangulations: the critical $O(n)$ model for $n \in (0, 2)$. We prove that after renormalization the branching tree of the perimeters of the nested loops converges towards an explicit continuous multiplicative cascade whose offspring distribution $(x_i)_{i\geq 1}$ is related to the jumps of a spectrally positive α-stable Lévy process with $\alpha = \frac{3}{2} \pm \frac{1}{\pi} \arccos(n/2)$ and for which we can compute explicitly the Mellin transform (a.k.a. the Laplace transform in the context of branching random walks).
An important ingredient in the proof is a new formula on first moments of additive functionals of the jumps of a left-continuous random walk stopped at a hitting time, which might be of independent interest.

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