Mathematics and CS Seminar

Stochastic formulas for determinants of Laplacians

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Host: M. Beiglböck, N. Berestycki, L. Erdös, J. Maas, F. Toninelli, E. Schertzer

We will talk about the determinant of a Laplacian on a continuous space of dimension 2 or 3. As a motivating example, we will see that this determinant appears naturally as the partition function of a Gaussian free field, and that it is necessary to define these determinants in order to pose properly some more complicated interacting model. We will then define rigorously these determinants, through the so-called zeta-regularization method, and explain why indeed they can be interpreted as determinants. Then, we will define the Brownian loop soup and show that the determinant we have defined can be expressed as the expectation of a product over the Brownian loop soup. If the time allows it, we will then look at a few things this formula allows to deduce about the determinant, and at another application of these determinants to the construction of a very powerful topological invariant (i.e. to show that "spheres and tori don't look alike"). The talk is based on a joint work with P. Perruchaud (University of Luxembourg).

Monday, November 20, 2023 03:45pm - 04:45pm
Mondi 2 (I01.01.008), Central Building

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