Guillaume Valette (Universite Libre de Bruxelles)

Title: “A new large N expansion for tensor and matrix-tensor models”

In this talk, we describe a new large N expansion for tensor and matrix-tensor models, based on arXiv:1709.07366. Random tensor models generalize random matrix models in higher dimensions, in the sense that they provide a theory of random discretized geometries in dimensions larger or equal to three in the same way as matrix models does in two dimensions. They also support a large N expansion, which is organized according to the Gurau degree and whose leading sector corresponds to melonic graphs. In many instances, it is interesting to enlarge the leading sector, that is, to work with a larger class of graphs at leading order. We explain how this can be done by enhancing the large N scaling of the coupling constants entering the action. The new large N expansion obtained this way is organized according to a new quantity called the index, which has an interesting combinatorial interpretation in terms of the matrix models embedded in the tensor model. In the second part, we introduce matrix-tensor models, which are obtained by rewriting the tensor in terms of matrices. In these models, there is a new natural parameter D that allows one to define a large D expansion in addition to the large N one. We discuss the interesting features of these expansions and their connection with high-energy physics, more specifically with SYK-like physics.