Séminaire de Probabilités et Statistique

Mercredi 07 mars à 14h00

Laboratoire Dieudonné
Salle de Conférences

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The large N melonic limit of O(N) tensor models

Tensor models are generalizations of matrix models which describe the dynamics of fields with r ¿ 2 indices. As discovered some years ago, they enjoy a large N expansion which is (perhaps surprisingly) much simpler than the large N expansion of matrix models. It is dominated by the so-called "melonic" family of Feynman diagrams, which can sometimes be resumed explicitly. Following Witten and Klebanov-Tarnopolsky, this has recently led to the definition of solvable strongly coupled quantum theories, which reproduce the main properties of the celebrated Sachdev-Ye-Kitaev condensed matter models. Most of the literature on tensor models focuses on tensor degrees of freedom transforming under r independent copies of a symmetry group G, one for each index (for definiteness, I will focus on r=3 and G=O(N)). This large symmetry plays a crucial role in the analysis of the 1/N expansion, so much so that it was generally believed to be essential to its existence. After summarizing these results, I will outline the recent proof that irreducible O(N) tensors (e.g. symmetric traceless ones) also support a melonic 1/N expansion. This in particular confirms a conjecture recently put forward by Klebanov and Tarnopolsky, which had only been checked numerically up to order 8 in perturbative expansion.