

Master 2: *International Centre for Fundamental Physics*

INTERNSHIP PROPOSAL

(One page maximum)

Laboratory name: Laboratoire de Physique Théorique

CNRS identification code: UMR 8627

Internship director's surname: Vincent Rivasseau

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Internship location: Laboratoire de Physique Théorique Orsay

Thesis possibility after internship: YES

Funding: NO

If YES, which type of funding:

Title: Random Tensors and SYK Model

The Sachdev-Ye-Kitaev model is a quenched model of Majorana fermions which has attracted considerable attention in theoretical physics since its introduction by Kitaev last year. Indeed it is a finite temperature toy model of holography with a computable infra red limit at strong coupling which saturates the chaos bound expected in a quantum theory of gravity.

Recently Ed Witten has suggested to improve the model, getting rid in particular of the quenched disorder, by rewriting it as a tensor model of the kind invented by R. Gurau and which we developed together with several collaborators during the last five years under the name of the « tensor track » approach to quantum gravity.

The internship will consist in studying several aspects of this improved « SYKW » model. It would suit a well-motivated student with very good skills both in physics and mathematics, willing to enter a fast developing competitive field.

References

R. Gurau, "Invitation To Random Tensors," arXiv:1609.06439

J. Maldacena, S. H. Shenker, and D. Stanford, "A bound on chaos," arXiv:1503.01409

J. Maldacena and D. Stanford, "Comments on the Sachdev-Ye-Kitaev model,"
arXiv:1604.07818

V. Rivasseau, "Random Tensors and Quantum Gravity," SIGMA 12 (2016) 069,
arXiv:1603.07270

E. Witten, "An SYK-Like Model Without Disorder", arXiv:1610.09768

Please, indicate which speciality(ies) seem(s) to be more adapted to the subject:

Condensed Matter Physics: YES/NO Macroscopic Physics and complexity: YES/NO
Quantum Physics: YES/NO Theoretical Physics: YES/NO