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Seminaires du LPTM , Universite de Cergy Pontoise

Vendredi 29 Octobre 2021, 13 :00
LPTM, 4.13b
Domaines : cond-mat.dis-nn

Titre : *Quantum Cellular Automata, Tensor Networks, and Quantum Chaos*

Orateur : **Lorenzo Piroli (IPT Philippe Meyer, Laboratoire de Physique, ENS Paris)**

Résumé : *The concept of causality, stating that physical actions cannot propagate in space at an arbitrary speed, can be captured for qudit systems by the notion of Quantum Cellular Automata (QCA), defined as unitary maps preserving locality of observables. In this talk, I will present recent results aiming at a general characterization of QCA and propose them as useful theoretical laboratories for the study of quantum many-body systems out of equilibrium. I will first show how QCA can be expressed, in any dimension, by tensor network operators with special contraction properties, thus unveiling a general connection between causality and entanglement production. Focusing on 1D systems, I will then review the topological classification of QCA in terms of a quantized chiral index. I will present a physical derivation of the latter and finally work out its ramifications for entanglement growth and other standard probes of many-body quantum chaos for generic systems.*