Speaker: Xhek TURKESHI (College de France, France)

Title: **Error-resilience Phase Transitions in Encoding-Decoding Quantum Circuits**

Abstract: Understanding how errors deteriorate the information encoded in a many-body quantum system is a fundamental problem with practical implications for quantum technologies. Here, we investigate a class of encoding-decoding random circuits with coherent errors. The existence of a phase transition separating an error-protecting phase at weak error strength from an error-vulnerable phase is analytically demonstrated. We derive exact expressions showing that this transition is accompanied by an area-to-volume law entanglement transition and a localization transition in the computational basis. The emergence of multifractal features in the considered system is highlighted.