

Speaker: **Pieter CLAEYS (MPQ, Germany)**

Title: **Free Probability and Higher-Order Influence Matrices in Quantum Circuits**

An extension of the Eigenstate Thermalization Hypothesis (ETH) to out-of-time-order correlation functions (OTOCs) has been recently proposed, based on the language of free probability. The approach to equilibrium can here be understood as operators becoming freely independent. In this talk I will discuss two quantum circuit models, one random and one Floquet, in which this approach to free independence can be analytically characterized. In these models the OTOC dynamics can be recast as a Markovian process by explicitly constructing the appropriate influence matrix, capturing the coupling to a memoryless bath. The eigenmodes of this Markovian process correspond to free cumulants from free probability, consistent with predictions from ETH, and I will argue that the proposed framework applies to more realistic models of many-body quantum dynamics.