

Thursday, March 28, 2024

Refreshments at 3:15pm in PSF 101

Colloquium from 3:30pm - 4:30pm outside PSF 101

Measurement Induced Criticality in Monitored Quantum Systems

Professor Ehud Altman

University of California, Berkeley



Abstract:

A novel aspect of recent experiments with quantum devices is that measurements can play an active role in preparing the state of the system, not just in diagnosing it. Unlike unitary evolution, the quantum collapse induced by local measurements can have a highly non-local impact on entangled quantum states, instantaneously destroying or creating new long distance correlations. This can lead to surprising collective effects such as measurement induced criticality and new kinds of universal structures in the post-measurement wavefunction. I will first review recent progress in understanding these phenomena using mappings to effective statistical mechanical models. Next I will talk about the challenge of diagnosing the post measurement correlations experimentally. These correlations are so difficult to observe because they are conditioned on the outcome of many-measurements with exponentially small Born probability. I will preview a novel approach to resolve this post-selection problem by cross-correlating experimental data with results of classical computations.

Biography:

Professor Ehud Altman received his Ph.D. from the Technion, Haifa in 2002. He was then a postdoctoral fellow at Harvard university for three years before joining the faculty of the Weizmann Institute of Science as a Yigal Alon fellow in 2005. He was promoted to the rank of Associate professor there in 2011. In 2010 he was awarded the young investigator prize from the Israel Physical Society and the Krill prize of the Wolf foundation. During the academic year 2012-2013 he was a Miller visiting professor at UC Berkeley. He joined the Physics department of UC Berkeley as a professor in the summer of 2016.