

Condensed Matter Seminar

Prof. Pablo Poggi

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“Errors in NISQ era Quantum Simulators: Theory of Robust Observables and Instabilities in Trotterized Evolution”

Monday, October 4, 2021

4:00pm – 5:00pm

Virtual Meeting:

Zoom Link: <https://viriniatech.zoom.us/j/81137351098>

Passcode: 921305

Quantum simulators are widely seen as one of the most promising near-term applications of quantum technologies. However, it remains unclear to what extent a noisy device can output reliable results in the presence of unavoidable imperfections. In this talk I will talk about some recent work addressing this issue. First, I will describe a recently developed framework that links the robustness to perturbations of the simulated expectation values with the spectral properties of the output observable, which can in turn be associated with the macroscopic or microscopic character of the observable. I will show that, under general assumptions and on average over all states, imperfect simulators are able to reproduce the dynamics of macroscopic observables accurately, while the relative error in the expectation value of microscopic observables is much larger on average. Then, I will discuss gate-based simulation using Trotter - Suzuki decomposition, and describe how the mapping of the simulator dynamics to a driven Floquet system can lead to novel insights into the emergence of errors in the quantum simulation