HARVARD UNIVERSITY
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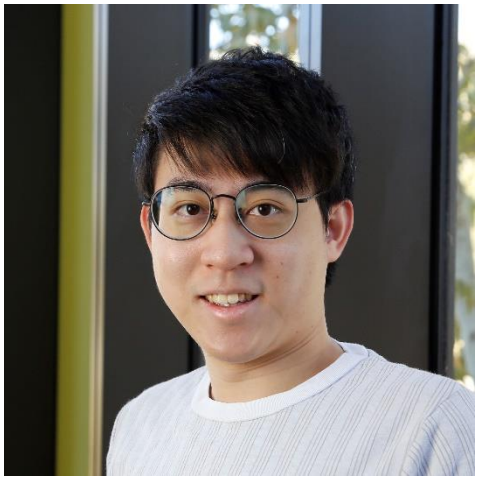
Mathematical Picture Language Seminar



Tuesday, March 26

4:30 p.m. Boston time

Remote on Zoom

Robert Huang
California Institute of Technology

Certifying almost all quantum states with few single-qubit measurements

Abstract: Quantum systems can exhibit highly complex entanglement. Certifying that an n-qubit state in the experimental lab is close to a highly-entangled target state typically requires deep entangling circuits or exponentially many single-qubit measurements. In this work, we prove that almost all n-qubit target states, including those with exponential circuit complexity, can be certified from only O(n^2) single-qubit measurements. This result is established by a new technique relating certification to a random walk's mixing time. Our protocol has applications for benchmarking the fidelity of quantum systems and for learning and verifying neural networks, tensor networks, and various other representations of quantum states using only single-qubit measurements. We show that such verified representations can be used to efficiently predict highly non-local properties that would otherwise require an exponential number of measurements.

Zoom QR Code & Link:
https://harvard.zoom.us/j/77928335?pwd=MitXVm1pYUlJVzZqT3lwV2pCT1ZUQT09

Passcode: 657361

https://mathpicture.fas.harvard.edu/seminar