



QUIEST

Quantum Information,
Engineering, Science and Technology

UNIVERSITY of PENNSYLVANIA

PhD and Post Doc Quantum Seminar Series

Speaker: Junyu Zhou

Bosehedral: Compiler Optimization for Bosonic Quantum Computing

Bosonic quantum computing, based on the infinite-dimensional qumodes, has shown promise for various practical applications that are classically hard. However, the lack of compiler optimizations has hindered its full potential. This paper introduces Bosehedral, an efficient compiler optimization framework for (Gaussian) Boson sampling on Bosonic quantum hardware. Bosehedral overcomes the challenge of handling infinite-dimensional qumode gate matrices by performing all its program analysis and optimizations at a higher algorithmic level, using a compact unitary matrix representation. It optimizes qumode gate decomposition and logical-to-physical qumode mapping and introduces a tunable probabilistic gate dropout method. Overall, Bosehedral significantly improves the performance by accurately approximating the original program with much fewer gates. Our evaluation shows that Bosehedral can largely reduce the program size but still maintain a high approximation fidelity, which can translate to significant end-to-end application performance improvement.

Wednesday November 20th 12-1pm
LRSM 112C – Lunch Provided!

