

# Chung-Chun Hsieh

(U. of Maryland, College Park)

**Time: 10 am, Tuesday, Feb. 10, 2026**

**Place: R815, CCMS-New Phys. building, National Taiwan University**

## Title: Quantum computation of hadron scattering in a lattice gauge theory

Abstract:

We present a digital quantum computation of two-hadron scattering in a Z2 lattice gauge theory in 1+1 dimensions. We prepare well-separated single-particle wave packets with desired momentum-space wavefunctions, and simulate their collision through digitized time evolution. Multiple hadronic wave packets can be produced using the efficient, systematically improvable algorithm of this work, achieving high fidelity with the target initial state. Specifically, employing a trapped-ion quantum computer (IonQ Forte), we prepare meson wave packets using 11 and 27 system qubits, and simulate their collision dynamics for the smaller system. Results for local observables are consistent with numerical simulations at early times, but decoherence effects limit evolution into long times. We demonstrate the critical role of high-fidelity initial states for precision measurements of state-sensitive observables, such as S-matrix elements. Our work establishes the potential of quantum computers in simulating hadron-scattering processes in strongly interacting gauge theories.