

講演概要

題 目 : Probing foundations of quantum theory with AMO platforms

講 師 : Dr. Joshua Foo (University of Waterloo)

日 時 : 2025 年 6 月 25 日 13:00 – 14:00

場 所 : Teams のオンライン会議

[https://teams.microsoft.com/l/meetup-](https://teams.microsoft.com/l/meetup-join/19%3ameeting_NjNkNzc2YzQtOWE4Yy00ODcwLTkzMzQtODZjMmViNGNkMDk0%40thread.v2/0?context=%7b%22Tid%22%3a%229e5b5dfd-669d-4ef8-b240-4229cbf4a83d%22%2c%22Oid%22%3a%2228ec6043-f59a-4c4d-bef2-1d0cfe19d64a%22%7d)

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要 旨 : The rapid development of tabletop technologies in the past few decades has inspired several research directions that aim to test the interplay of quantum theory, gravity, and relativity in previously unexplored regimes. In this seminar, I will discuss three of my research works that propose to witness and simulate new quantum relativistic effects in AMO platforms. First, I will show how the trajectory of a relativistic photon may be inferred from weak measurements, and the insights this might provide about quantized sources of spacetime curvature. Second, I will discuss new dynamical effects that arise in trapped-ion optical clocks when treating time dilation quantum-mechanically, and how quantum clocks may allow us to experimentally probe superpositions of spacetime. Third, I will explain a recent proposal to witness vacuum particle content using a quantum metasurface that divides a photonic cavity, and how it can serve as a simulation platform for quantum gravity effects. I will conclude the seminar with a summary of my future research plans.