Canadian Association of Physicists
Association canadienne des physiciens et physiciennes

Contribution ID: **4160** Type: **Invited Speaker / Conférencier(ère) invité(e)**

A photonic which-path entangler

Monday 27 May 2024 10:30 (30 minutes)

We show theoretically that a modulated longitudinal cavity-qubit coupling can be used to control the path taken by a multiphoton coherent-state wavepacket conditioned on the state of a qubit, resulting in a qubit-which-path (QWP) entangled state [1]. We further show that QWP states have a better potential sensitivity for quantum-enhanced phase measurements (characterized by the quantum Fisher information), than either NOON states or entangled coherent states having the same average number of photons. QWP states can generate long-range multipartite entanglement using strategies for interfacing discrete- and continuous-variable degrees-of-freedom. Entanglement can therefore be distributed in a quantum network via QWP states without the need for single-photon sources or detectors.

[1] Z. M. McIntyre and W. A. Coish, arXiv:2306.13573 (to appear in Phys. Rev. Lett.)

Keyword-1

entanglement

Keyword-2

quantum metrology

Keyword-3

quantum networks

Authors: COISH, Bill (Department of Physics, McGill University); Ms MCINTYRE, Zoé (Department of Physics, McGill University)

Presenter: COISH, Bill (Department of Physics, McGill University)

Session Classification: (DQI) M1-6 Quantum System Engineering and Control | Ingénierie et contrôle des systèmes quantiques (DIQ)

Track Classification: Technical Sessions / Sessions techniques: Division for Quantum Information / Division de l'information quantique (DQI / DIQ)