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Contribution ID: 3 Type: **Oral Competition (Graduate Student) / Compétition orale (Étudiant(e) du 2e ou 3e cycle)**

Relativistic Causality and Vacuum Entanglement Harvesting with a Zero Mode

Friday 12 June 2020 14:00 (15 minutes)

We analyse how zero modes of a quantum field, whenever they arise, have significant impact on the phenomenology of light-matter interactions. Since a zero mode has no physical ground state, several studies in the literature opt to ignore the zero mode and argue that it has negligible impact on the physics. We show that (1) ignoring such modes directly leads to causality violation, in the sense that two atomic detectors can signal faster than light, and (2) how much two detectors can extract entanglement from the quantum vacuum depends strongly on the choice of the zero mode state. Finally, the zero mode provides an explicit example of how the usual wisdom that “quantum field in a large cavity is the same as in free space” does not hold in presence of a particle detector.

Author: TJOA, Erickson (University of Waterloo)

Co-author: MARTIN-MARTINEZ, Eduardo (Institute for Quantum Computing (University of Waterloo) and Perimeter Institute for Theoretical Physics)

Presenter: TJOA, Erickson (University of Waterloo)

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