

Contribution ID: 67 Type: Oral Competition (Graduate Student) / Compétition orale (Étudiant(e) du 2e ou 3e cycle)

Unruh in Superposed Spacetimes

Tuesday 10 June 2025 10:30 (15 minutes)

It is widely anticipated that a quantized theory of gravity will admit quantum spacetime configurations that are described by a superposition of semiclassical spacetimes. However, in the absence of such a complete theory of quantum gravity, can we learn anything about how such states might behave?

Recent developments led by Foo et al., propose an operational approach to this problem by describing the response of a first-quantized two-level quantum detector coupled to a quantum-controlled superposition of spacetimes.

Using this operational approach, we investigate what happens to an accelerated detector in such a superposition of spacetimes. We find that previously observed resonance peaks in the response function (occurring at rational values of the quantized spacetime parameter) are accentuated by the acceleration. Moreover, we provide the first explicit analysis of detector thermalization in superposed spacetimes.

If time permits, I will comment on how this extension of the Unruh effect relates to previous work that found non-thermal responses for detectors travelling along superpositions of accelerated trajectories in a fixed space-time.

Keyword-1

Unruh Effect

Keyword-2

QFT in Curved Spacetime

Keyword-3

Spacetime Superposition

Author: PATTERSON, Everett (University of Waterloo)

Co-authors: GOEL, Lakshay (University of Waterloo); TORABIAN, Mahdi; PRECIADO-RIVAS, Maria Rosa (University of Waterloo); AFSHORDI, Niayesh (University of Waterloo); MANN, Robert

Presenter: PATTERSON, Everett (University of Waterloo)

Session Classification: (DTP) T1-10 Classical and Quantum Gravity | Gravité classique et quantique (DPT)

Track Classification: Technical Sessions / Sessions techniques: Theoretical Physics / Physique théorique (DTP-DPT)