Canadian Association of Physicists
Association canadienne des physiciens et physiciennes

Contribution ID: **56** Type: **Oral (Non-Student) / Orale (non-étudiant(e))**

Unruh-DeWitt Detector Differentiation of Black Holes and Exotic Compact Objects

Monday 7 June 2021 12:45 (3 minutes)

We study the response of a static Unruh-DeWitt detector outside an exotic compact object (ECO) with a variety of (partially) reflective boundary conditions in 3+1 dimensions. The horizonless ECO, whose boundary is extremely close to the would-be event horizon, acts as a black hole mimicker. We find that the response rate is notably distinct from the black hole case, even when the ECO boundary is perfectly absorbing. For a (partially) reflective ECO boundary, we find resonance structures in the response rate that depend on the different locations of the ECO boundary and those of the detector. We provide a detailed analysis in connection with the ECO's vacuum mode structure and transfer function.

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Session Classification: M2-2 Classical and Quantum Gravity II (DTP) / Gravité classique et quantique II (DPT)

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