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Relativistic quantum information with Unruh-DeWitt detectors

The study of quantum field theory in curved spacetimes as uncovered fascinating phenomena, showing that the vacuum is far from empty. The famous Unruh effect, for example, demonstrates that what is the vacuum with respect to inertial observers appears as a thermal state to uniformly accelerated observers. Another example, ultimately a consequence of the Schleeh-Rieder theorem, is the entanglement contained in the vacuum state. This entanglement correlates the fluctuations of the field everywhere, even between spacelike separated regions.
An operational approach to these counter-intuitive effects is provided by the Unruh-DeWitt particle detector model. It provides a simple model for the interaction of a localized observer (atom) with the quantum field. Originally introduced to demonstrate the Unruh effect and particle creation in curved spacetimes, they have today evolved into a widely used method in relativistic quantum information. Here they are used to study, e.g., relativistic quantum communication, the extraction of entanglement from the vacuum or to demonstrate that vacuum entanglement can be used to teleport energy.
In this talk I introduce particle detectors, and give an overview of their use in the study of relativistic quantum fields and their quantum information theoretical properties.