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Entanglement Dynamics of Detectors in an Einstein Cylinder

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We investigates how nontrivial topology affects the entanglement dynamics between a detector and a quantum field and between two detectors mediated by a quantum field. Nontrivial topology refers to both that of the \textit{base space}
and that of the \textit{bundle}. Using a derivative-coupling Unruh-DeWitt-like detector model interacting with a quantum scalar field in an Einstein cylinder
$\mathbf{S}^1$ (space) $\times\mathbf{R}_1$ (time), we see the beating behaviors in the dynamics of the detector-field entanglement
and the detector-detector entanglement, which distinguish from the results in the non-compact (1+1) dimensional Minkowski space.
The beat patterns of entanglement dynamics in an untwisted and twisted fields with the same parameter values are different simply because
of different spectrum of the eigen-modes. In terms of the physically measurable momentum of the detectors, we find that the contribution
by the zero mode in a normal field to entanglement dynamics has no qualitative difference from those by the nonzero modes.

Summary

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