Contribution ID: **343**   Type: **Invited talk in the parallel session**

Quantum communication through a partially reflecting moving mirror

Tuesday, 6 July 2021 11:10 (20 minutes)

Motivated by the fact that the null-shell of a collapsing black hole can be described by a perfectly reflecting accelerating mirror, we investigate an extension of this model to mirror semi-transparency and derive a general expression for the corresponding Bogoliubov coefficients. In so doing, we introduce the concept of ''impulsive accelerated mirrors", corresponding to those mirrors that are accelerated via an impulsive force. We show this treatment guarantees analytic solutions of Bogolubov coefficients. In particular, we evaluate the corresponding particle production from the so-obtained Bogoliubov coefficients. Finally, we recognize the mirror as a Gaussian quantum channel acting between the spacetime regions of left-past and right-future. As a consequence we study the loss/amplification properties of this quantum channel, alongside the noise it creates, through which we evaluate its capacities in transmitting classical and quantum information.

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Session Classification: Conformal Dilaton Gravity and Related Issues

Track Classification: Alternative Theories: Conformal Dilaton Gravity and Related Issues