Contribution ID: **13** Type: **talk**

Penrose inequality for integral energy conditions

Monday 1 September 2025 11:50 (35 minutes)

The classical Penrose inequality (PI), a relation between the ADM mass and the area of any cross section of the black hole event horizon, was introduced as a test of the weak cosmic censorship: if it fails, the trapped surface is not necessarily behind the event horizon and a naked singularity could form. Since that original derivation, a variety of proofs have developed, mainly focused on the initial data formulation on maximal spacelike slices of spacetime. Most of these proofs are applicable only for classical fields, as the energy conditions required are violated in the context of quantum field theory. In this talk I will present two generalizations of the PI for spherically symmetric spacetimes: 1) a proof of PI with a classical energy inequality using initial data and 2) a proof of a generalized PI for evaporating black holes with a connection to the weak cosmic censorship using a condition inspired by quantum energy inequalities. The latter case could also be applicable to quantum fields. Finally, I will provide physically motivated examples for both. Based on: arXiv:2504.19794

Primary author: KONTOU, Eleni-Alexandra (King's College London)

Co-author: HAFEMANN, Eduardo (University of Hamburg)

Presenter: KONTOU, Eleni-Alexandra (King's College London)

Session Classification: Morning