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Quantum Effects on Black Hole Cauchy Horizons

Wednesday, 30 August 2023 11:50 (1 hour)

Black hole spacetimes harbor intricate internal structures, featuring geometry that extends through an inner horizon to another external universe. This regularity of the inner horizon, which plays the causal role of a Cauchy horizon, challenges predictability within black holes. The strong cosmic censorship conjecture offers a solution, asserting that the Cauchy horizon becomes sufficiently irregular under perturbations, hence negating its existence. While this scenario is known to hold classically in some cases, its validity amidst quantum perturbations remains an open question.
Answering this question requires understanding how quantum energy fluxes influence the internal geometry of black holes, particularly at the inner horizon. A divergence in these fluxes could dramatically alter the internal structure, potentially restoring predictability by rendering the inner horizon impassable. Recent works have conquered the challenge of computing semiclassical energy fluxes (T_{uu} and T_{vv} stress-energy tensor components in Eddington coordinates)
within black hole interiors, shedding light on the nature of the Cauchy horizon under quantum backreaction.
My talk outlines these recent advancements, presenting results in both asymptotically at (Zilberman,Casals,Ori&Ottewill) and asymptotically deSitter (Hollands,Zahn&Wald) cases, briefly mentioning possible implications for the inner horizon traversability.

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