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Effective Quantum Black Hole Collapse via Surface Matching

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The fate of matter forming a black hole is still an open problem, although models of quantum gravity corrected black holes are available. In loop quantum gravity (LQG) models were presented, which resolve the classical singularity in the centre of the black hole by means of a black-to-white hole transition, but neglect the collapse process. The situation is similar in other quantum gravity approaches, where eternal non-singular models are available. A strategy is presented to generalise eternal models to dynamical collapse models by surface matching. Assuming 1) the validity of a static quantum black hole spacetime outside the collapsing matter, 2) homogeneity of the collapsing matter, and 3) differentiability at the surface of the matter fixes the dynamics of the spacetime uniquely. It is argued that these assumptions resemble a collapse of pressure-less dust and thus generalises the Oppenheimer-Snyder-Datt model. The junction conditions and the spacetime dynamics are discussed generically for bouncing black hole spacetimes, as proposed by LQG, although the scheme is approach independent. A global spacetime picture of the collapse for a specific LQG inspired model is discussed.

Author: MÜNCH, Johannes (Aix-Marseille Université, Université de Toulon, CPT, CNRS)

Presenter: MÜNCH, Johannes (Aix-Marseille Université, Université de Toulon, CPT, CNRS)

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