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Spin foam framework for the black-to-white hole transition

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Black holes formation and evolution have been extensively studied at the classical level. However, not much is known regarding the end of their lives, a phase that requires to consider the quantum nature of the gravitational field. A black-to-white hole transition can capture the physics of this phenomenon, in particular the physics of the residual small black holes at the end of the Hawking evaporation. In this talk I discuss how the spin foam formalism achieve to describe this non-perturbative phenomenon. I examine the three distinct regions of the black hole spacetime in which quantum effects cannot be neglected. I argue that the scenario in which the black hole geometry undergoes a quantum transition in a white hole geometry is natural and conservative. I study this quantum transition using the spin foam formalism, explicitly computing the resulting transition amplitude. The ongoing numerical analysis of this transition amplitude may provide an estimation of the back-to-white transition timescales and improve the understanding of its phenomenology.

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