

Abstract Submitted
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Black hole fireworks: quantum-gravity effects outside the horizon spark black to white hole tunneling¹ HAL HAGGARD, Physics Program, Bard College, CARLO ROVELLI, Centre de Physique Theorique, Aix-Marseille University — We show that there is a classical metric satisfying the Einstein equations outside a finite spacetime region where matter collapses into a black hole and then emerges from a white hole. We compute this metric explicitly. We show how quantum theory determines the (long) time for the process to happen. A black hole can thus quantum-tunnel into a white hole. For this to happen, quantum gravity should affect the metric also in a small region outside the horizon: we show that contrary to what is commonly assumed, this is not forbidden by causality or by the semiclassical approximation, because quantum effects can pile up over a long time. This scenario alters radically the discussion on the black hole information puzzle.

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