The instability of AdS spacetime for the Einstein-scalar field system
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According to the AdS instability conjecture, there exist arbitrarily small perturbations to the initial data of AdS spacetime which, under evolution by the vacuum Einstein equations with reflecting boundary conditions on conformal infinity, lead to the formation of black holes after sufficiently long time. To this day, the question about the vacuum equations remains open (and poorly understood). However, during the last decade, a large number of numerical and heuristic works have been dedicated to addressing the conjecture in the presence of matter fields allowing spherically symmetric dynamics. In this talk, I will present a rigorous proof of the AdS instability conjecture in the setting of the spherically symmetric Einstein-scalar field system. The proof will be based on the non-linear interactions of special configurations of matter beams. The possible extension of the main ideas to the vacuum case will also be discussed.