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(I) Holographic Complexity in Gravitational Collapse

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Through the AdS/CFT correspondence, properties of a quantum field theory are equivalent to geometric quantities in the bulk of anti-de Sitter spacetime. The complexity of the QFT state at some time is conjectured to be either the volume of a slice through AdS or the action on a patch of AdS. We evaluate both types of complexity during the gravitational collapse of a scalar field in AdS, which can have oscillatory behavior prior to forming a black hole horizon, and we determine whether the complexity is quasiperiodic or has a ratcheting behavior as the scalar wave undergoes focusing during collapse.

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