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Using Lyapunov Exponents to portray Black Hole Phase Transitions

We investigate the conjectured relationship between Lyapunov exponents and black hole phase transitions. Our study involves the computation of Lyapunov exponents for both massless and massive particles as a function of temperature. We observe that a first-order phase transition occurs at specific parameter values, where the Lyapunov exponents exhibit a discontinuity, serving as the order parameter. Furthermore, we note a consistent minimum saturation value of Lyapunov exponents at a constant length scale, which remains uniform across all black holes in our analysis.

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