PERTURBATIONS OF A QUANTUM-INSPIRED BLACK HOLE IN A FIVE-DIMENSIONAL DE SITTER BACKGROUND

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Abstract

This talk explores the quasinormal modes (QNMs) of a five-dimensional scale-dependent black hole with a positive cosmological constant, examining scalar, electromagnetic, and Dirac perturbations. We derive exact analytical solutions within the scale-dependent gravity framework, selecting a modified solution family, and analyze the effective potentials and lapse function for each perturbation type. The WKB semi-analytical method is employed to compute QNMs, focusing on a small range of the scale-dependent parameter ε and using a first-order approximation for the lapse function, valid for small ε. QNM frequencies are calculated for both the classical case and non-zero ε, with results presented in tables and figures. The findings confirm the stability of the black hole across all perturbation types, as indicated by the negative imaginary parts of the QNM frequencies.