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RESEARCH ARTICLE

Entropy spectrum of the D-dimensional massless topological black hole

A. López-Ortega

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Abstract There are exact solutions to Einstein's equations with negative cosmological constant that represent black holes whose event horizons are manifolds of negative curvature, the so-called topological black holes. Among these solutions there is one, the massless topological black hole, whose mass is equal to zero. Hod proposes that in the semiclassical limit the asymptotic quasinormal frequencies determine the entropy spectrum of the black holes. Taking into account this proposal, we calculate the entropy spectrum of the massless topological black hole and we compare with the results on the entropy spectra of other topological black holes.

Keywords Massless topological black hole · Entropy spectrum · Quasinormal modes

Bekenstein [1,2] proposes that in a quantum theory of gravity the horizon area of a black hole is quantized. Also in the semiclassical limit he expects that the area spectrum takes the form

$$A_n \approx \varepsilon \hbar n, \tag{1}$$

where $n = 0, 1, 2, \ldots, \hbar$ denotes the reduced Planck constant, and ε stands for an unknown parameter of order 1.

In an interesting conjecture, Hod [3] states that the spacing of the area spectrum ($\varepsilon\hbar$) is determined by the real part of the asymptotic quasinormal frequencies (QNF)

A. López-Ortega (✉)
Centro de Investigación en Ciencia Aplicada y Tecnología Avanzada, Unidad Legaria,
Instituto Politécnico Nacional, Calzada Legaria # 694, Colonia Irrigación,
Delegación Miguel Hidalgo, Mexico, D.F. 11500, Mexico
e-mail: alopezo@ipn.mx