RESEARCH ARTICLE

Electromagnetic quasinormal modes of *D*-dimensional black holes

A. López-Ortega

Received: 5 May 2006 / Accepted: 28 September 2006 / Published online: 25 October 2006 © Springer Science+Business Media, LLC 2006

Abstract Using the monodromy method we calculate the asymptotic quasinormal frequencies of an electromagnetic field moving in *D*-dimensional Schwarzschild and Schwarzschild de Sitter black holes $(D \ge 4)$. For the *D*-dimensional Schwarzschild anti-de Sitter black hole we also compute these frequencies with a similar method. Moreover, we calculate the electromagnetic normal modes of the *D*-dimensional anti-de Sitter spacetime.

Keywords Quasinormal modes · Schwarzschild · Anti-de Sitter · Monodromy

1 Introduction

The dynamics of classical fields in higher dimensional black holes has been recently investigated, mainly motivated by the Brane World scenario in String Theory and the study of the higher dimensional features of General Relativity (see [1–22] for some examples). These papers have studied the separability properties of the wave equations in higher dimensional backgrounds [1–5], the stability against small perturbations of several black holes [6–8], their greybody factors [9–11], and quasinormal modes (QNMs) [12–22].

The QNMs of a black hole are solutions to the wave equations that satisfy physical boundary conditions near and far from the black hole horizon (for more details see reviews [23]). For an asymptotically flat black hole they fulfill: (1) the field is purely ingoing near the horizon; (2) the field is purely

A. López-Ortega (⊠) Departamento de Física, CINVESTAV-IPN, Apartado Postal 14-740, 07000 México Distrito Federal, México e-mail: alfredo@fis.cinvestav.mx