Department of Mathematics and Notre Dame Philosophy of Physics Lab and ISLA

PDE, COMPLEX ANALYSIS AND DIFFERENTIAL GEOMETRY SEMINAR

Guest Speaker: Dominic Dold
Fields Institute

Date: Tuesday, October 3, 2017

Time: 11:00 AM

Location: 258 Hurley Hall

Lecture Title:

Exponentially growing mode solutions to the Klein-Gordon equation in Kerr-AdS spacetimes

Abstract

A classical problem in scattering theory is the construction of potentials (satisfying certain properties) such that, when added to the standard wave operator in Minkowski space, the resulting wave equation has growing solutions. Typically, one has functional freedom in choosing the potential. A similar problem arises when considering the Klein-Gordon equation (i.e. the massive wave equation) in a family of spacetimes (i.e. solutions to the Einstein equations). Constructing growing solutions to these equations amounts to a problem similar to the classical setting, but instead of exploiting functional freedom, one needs to choose the spacetime parameters and the Klein-Gordon mass appropriately. Such a construction reveals interesting insights into the interplay between properties of solutions to wave equations and the underlying geometry. More precisely, in this talk, we will consider solutions to the Klein-Gordon equation in the black hole exterior of Kerr-AdS spacetimes. It is known that, if the spacetimes parameters satisfy the Hawking-Reall bound, solutions (with Dirichlet boundary conditions at infinity) decay logarithmically. We shall present our recent result of the existence of exponentially growing mode solutions in the parameter range where the Hawking-Reall bound is violated. We will discuss various boundary conditions at infinity.

Dominic Dold - Fields Institute