Report on JHEP_259P_0318

Date: June 28, 2018

Author(s): Brad Cownden, Nils Deppe, Andrew R. Frey

Title: Phase Diagram of Stability for Massive Scalars in Anti-de Sitter Spaceti

Received: 2018-03-28 23:39:45.0

Referee report

The authors consider the spherically symmetric Einstein-Klein-Gordon-Λ system with $\Lambda < 0$ in 4+1 dimensions. Using numerical methods, they evolve Gaussian initial data and monitor how the outcome of the evolution depends on two parameters: the mass of the scalar field and the width of the Gaussian. They identify three types of evolution: a) quasiperiodic solutions, b) collapsing solutions (for which a horizon forms in finite time due to the turbulent cascade of energy to high frequencies, and c) "irregular" solutions (for which the time of horizon formation exhibits a "chaotic" behavior).

While the results are potentially interesting, I have serious misgivings about the presentation. First, the manuscript is little more than a collection of plots illustrating the numerical results. What is missing is an attempt to understand these results analytically (at least at a heuristic level). Second, in a purely numerical paper the authors should convince the reader that their results are reliable. Without such validation (for example, in the form of convergence tests), it is impossible to exclude a possibility that the irregular behavior is a numerical artifact caused by the loss of convergence. For these reasons, I do not recommend the paper for publication in JHEP.

REPORT JHEP_259P_0318