

GRAVITY: CHALLENGES BEYOND GENERAL RELATIVITY

Contribution ID: 15

Type: **not specified**

Superradiant Instability of Magnetic Black Holes

Friday, 24 May 2024 16:30 (15 minutes)

Black hole superradiance has proven being very valuable in several realms of gravitational physics, and holds a promising discovery potential. In this talk I will show how it can shed light on a long standing problem in physics, the quest for magnetic monopoles in the Universe. Placing them in the interior of primordial rotating black holes, which act as natural amplifiers, I will show that massive charged bosonic fields in their vicinity exhibit a superradiant instability which surpasses significantly that of neutral Kerr black holes. Strikingly, this is true for black holes containing an order-one number of magnetic monopoles, or merely a single one, and possessing either low, moderate or large values of angular momentum. In particular, the instability is drastically faster than the radiative decay time of charged pions, thus making it physically relevant. Furthermore, the most unstable modes are a class of monopole spheroidal harmonics, that we dub north and south monopole modes, whose morphology is markedly different from the usual superradiantly unstable modes since they extend along the rotational axis. These results make primordial magnetic black holes promising multimessenger sources in the high-frequency range.

Primary authors: PEREÑIGUEZ, David (Niels Bohr Institute); Mrs DE AMICIS, Marina (Niels Bohr Institute); Dr BRITO, Richard (Instituto Superior Tecnico Lisboa); Dr PANOSSO MACEDO, Rodrigo (Niels Bohr Institute)

Presenter: PEREÑIGUEZ, David (Niels Bohr Institute)