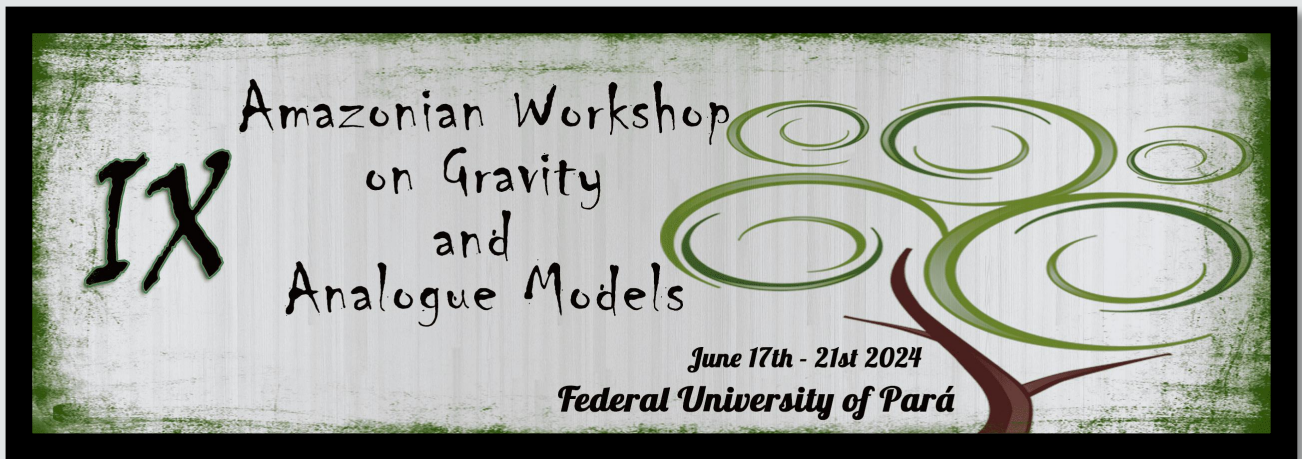




UNBOUNDED SUPERRADIANCE IN REGULAR BLACK HOLE SPACETIMES

Marco A. A. de Paula¹, Luiz C. S. Leite², Sam R. Dolan³, and Luís C. B. Crispino¹

1 Programa de Pós-Graduação em Física, Universidade Federal do Pará, 66075-110, Belém, Pará, Brazil

2 Campus Altamira, Instituto Federal do Pará, 68377-630, Altamira, Pará, Brazil

3 Consortium for Fundamental Physics, School of Mathematics and Statistics, Hicks Building, University of Sheffield, Hounsfield Road, Sheffield S3 7RH, United Kingdom

Regular black holes (RBHs) -- geometries free from curvature singularities -- arise naturally in theories of non linear electrodynamics. Here we study the superradiant amplification of a monochromatic planar wave in a charged, massive scalar field impinging on the electrically-charged Ayón-Beato-García (ABG) RBH. We address the superradiance by calculating the absorption cross section (ACS) numerically, via the partial-wave expansion, and present a gallery of results. We find that, in a certain parameter regime, the ABG ACS is negative, due to superradiance, and moreover it is unbounded from below as the momentum of the wave approaches zero. This phenomenon of "unbounded superradiance" is absent in the Reissner–Nordström case. We also show how the parameter space can be divided into regions, using the bounded/unbounded and absorption/amplification boundaries.