

Annual Meeting QGSKY - Quantum Universe



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NON-LINEAR ELECTRODYNAMICS IN BLANDFORD-ZNAJEK ENERGY EXTRACTION

Friday, 6 October 2023 12:40 (20 minutes)

Non-linear electrodynamics (NLED) is a generalization of Maxwell's electrodynamics for strong fields. It could have significant implications for the study of black holes and cosmology and have been extensively studied in the literature, extending from quantum to cosmological contexts. Recently, its application to black holes, inflation and dark energy has caught on, being able to provide an accelerated Universe and address some current theoretical inconsistencies, such as the Big Bang singularity. In this work, we report two new ways to investigate these non-linear theories. First, we have analyzed the Blandford-Znajek mechanism in light of this promising theoretical context, providing the general form of the extracted power up to second order in the black hole spin parameter a . We have found that, depending on the NLED model, the emitted power can be extremely increased or decreased, and that the magnetic field lines around the black hole seems to become vertical quickly. Considering only separated solutions, we have found that no monopole solutions exist and this could have interesting astrophysical consequences (not considered here).

Presenter: CARLEO, Amodio (Istituto Nazionale di Fisica Nucleare)

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