Gravitational Geometry and Dynamics Group Seminar

Wed., October 2nd, 2024, at 11h00.

Room: Sala Sousa Pinto and **Zoom ID:** 955 4130 8539

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No-go theorems for gravitating nonlinear electromagnetic fields

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Nonlinear electrodynamics (NLE) is an umbrella term for various nonlinear generalisations of Maxwell's theory, usually defined by Lagrangians depending on two quadratic electromagnetic invariants. We discuss two classes of no-go theorems that can be established when NLE fields are coupled to gravity.

Motivated by the canonical result from Einstein-Maxwell theory, which states that strictly stationary, regular, asymptotically flat spacetime cannot support a nontrivial electromagnetic field, we prove two no-soliton theorems for Einstein-NLE systems.

A further question is whether black hole singularities can be cured within NLE theories and how general this prospect is. The first systematic approach to the problem was presented by Bronnikov, whose no-go theorems are formulated for spherically symmetric spacetimes sourced by NLE Lagrangians that are functions of one electromagnetic invariant. We extend Bronnikov's analysis by inspecting a broader class of Lagrangians, those depending on both electromagnetic invariants. Our results significantly narrow down the possibility of regularisation using physically plausible NLE theories.

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