

Gravitational Geometry and Dynamics Group Seminar

Wed., May 13, 2026, at 11h00.

Room: Sala Sousa Pinto and Teams ID: 389 960 253 110 526

(Password: contact jnicoules@ua.pt)

Squeezing solution generating techniques: A road to enlarge the spectrum of exact vacuum solutions in GR and to construct dynamical primordial objects.

This talk presents two distinct problems in gravitational physics that are connected through the use of solution-generating techniques within Einstein–Maxwell–scalar theory. First, we construct new vacuum solutions of Einstein’s equations starting from electrovacuum configurations embedded in external electromagnetic backgrounds. By applying magnetization and inversion symmetries to accelerating Bertotti–Robinson black holes, we generate accelerating vacuum spacetimes of Petrov type I in which the electromagnetic field is removed but leaves a non-trivial gravitational imprint. In the static limit, known solutions are recovered, while the inversion symmetry yields a new extension of the Schwarzschild–Levi-Civita geometry, providing a systematic method to obtain algebraically general vacuum spacetimes. Second, we construct an exact solution describing a dynamical black hole in a time-dependent electromagnetic field within the Einstein–scalar–Maxwell system. The configuration incorporates both a dynamical cosmological background and full electromagnetic backreaction. It is obtained by dressing a Schwarzschild black hole with a time-dependent scalar field and generating the electromagnetic field via a symmetry that extends Harrison transformations to dynamical settings. The resulting spacetime features a dynamical horizon and a rich asymptotic structure, with time dependence playing a key role in cloaking curvature singularities. Together, these results highlight the versatility of solution-generating techniques as a unifying tool to construct and understand novel gravitational configurations across different physical regimes.

Adolfo Cisterna

Institute of Theoretical Physics,
Charles University

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