

# Gravitational Geometry and Dynamics Group Seminar

Wed., Jan. 17<sup>th</sup>, 2024, at 11h00.

Room: Sala Sousa Pinto and Zoom ID: 989 6252 0928

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## New Insights into Strong Gravity from Accreting Black Holes

Recent horizon-scale images of Messier 87\* and Sagittarius A\* have been used to demonstrate that their spacetimes are well-described by the Kerr metric. The latter is a solution to the vacuum Einstein equations of general relativity, and is used to describe spinning black holes. While of fundamental importance, it has undesirable features such as a spacetime singularity or a Cauchy horizon.

To find phenomenological resolutions of such features, using observations, studies of astrophysical processes in non-Kerr spacetimes have gained prominence. We will begin by briefly reviewing the current status of observational constraints on such alternatives. We will then demonstrate how future observations of the "photon ring" can grant access to new observables that will refine our physical understanding of strong-gravity. We will end by showing, using state-of-the-art numerical simulations, that the energetics of relativistic outflows (jets) is universally described by a simple electromagnetic Penrose process (the Blandford-Znajek mechanism).

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