



**GRAVITY: CHALLENGES  
BEYOND GENERAL RELATIVITY**

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## **New type I black holes in General Relativity and some hairy extensions**

*Wednesday, 22 May 2024 15:15 (45 minutes)*

This talk explores novel algebraically general black hole solutions by reevaluating Buchdahl transformations within Einstein and Einstein-Scalar theories. It investigates the relationship between Buchdahl transformations and Levi-Civita spacetimes when applied along a spacelike Killing vector of a given seed. By employing Kerr-Schild transformations, our study extends Buchdahl's theorem to construct new vacuum-rotating black holes in higher dimensions, specifically Levi-Civita extensions of the Myers-Perry geometry. In the context of the Einstein-Scalar system, we will extend the corresponding Buchdahl theorem to scenarios where a static vacuum seed, transformed with respect to a spacelike Killing vector, generates a hairy black hole spacetime. We will analyze the primary geometrical features of these spacetimes and explore how a change of frame, via conformal transformations, leads to a new family of black hole spacetimes within the Einstein-Scalar-Conformal system. The presentation concludes by suggesting several avenues for further exploration of these novel techniques.

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