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Blandford-Znajek power as a strong-gravity signature

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The Blandford-Znajek (BZ) mechanism is an electromagnetic manifestation of the Penrose process that currently constitutes the best theoretical candidate to explain the launching of relativistic jets by black holes. In this talk we offer a modern review about the BZ mechanism and the analytic construction of black hole magnetospheres. Higher order perturbative corrections are crucial in order to produce results that are complementary to numerical simulations when the black hole is in the high-spin regime, and can potentially predict new features about the non-perturbative structure of the BZ theory. Moreover, we show by means of an explicit example that these perturbative corrections depend in a non-degenerate manner on the underlying theory of gravity considered, enabling one to use the BZ power emitted as a strong-gravity signature to test General Relativity against alternative theories of gravity on future horizon-scale observations.

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