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Ergoregion instability of exotic compact objects

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Gravitational-wave astronomy can give us access to structure of black holes, potentially probing microscopic corrections at the horizon scale. Some quantum-gravity models of exotic compact objects replace the event horizon by a reflective surface. Spinning horizonless compact objects with these properties may be unstable against an ergoregion instability.
In this talk we investigate a model consisting of a Kerr geometry with a reflective surface near the horizon and we analyse its instability under scalar, electromagnetic and gravitational perturbations. We derive analytically the quasi-normal mode frequencies and the instability time scale of unstable modes in the black-hole limit. We show that the instability for electromagnetic and gravitational perturbations is generically stronger than in the scalar case and it requires larger absorption at the surface to be quenched. This result has important consequences for the viability of exotic compact objects as alternatives to black holes.

Summary

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