

Stirring a black hole

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ABSTRACT

I will present novel asymptotically AdS₄ solutions, constructed by turning on a dipolar differential rotation at the conformal boundary. At fixed energy and boundary profile, we find two different geometries: a horizonless AdS soliton, and a deformed black hole with zero net angular momentum, both of which exist up to some maximum amplitudes of the boundary profile. For sufficiently high temperatures, the large black holes are elastic and have an extended hourglass shape. At the maximum amplitude, these hot, large black holes develop an ergoregion attached to the boundary, which signals a superradiant instability. I will discuss the full phase diagram, including the possibility of phases with disconnected horizons, by considering the Mathisson-Papapetrou equations for a spinning test particle. Finally, I will comment on the possible implications of this work for weak cosmic censorship.