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Blandford-Znajek process in vacuo and its holographic dual

Abstract

Blandford and Znajek (BZ) discovered a process by which a spinning black hole can transfer rotational energy to a plasma, offering a mechanism for energy and jet emissions from quasars. In this talk I will describe a version of this mechanism that operates with only vacuum electromagnetic fields outside the black hole. The setting, which is not astrophysically realistic, involves either a cylindrical black hole or one that lives in 2+1 spacetime dimensions, and the field is given in simple, closed form for a wide class of metrics. Towards the end I will focus on the asymptotically Anti-de Sitter black holes in 2+1 dimensions to establish a concrete example for the holographic dual of this BZ mechanism.