
Electromagnetic radiation reaction and energy extraction from black holes: The tail term cannot be ignored

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Abstract

We study electromagnetic radiation reaction in curved space and the dynamics of radiating charged particles (Phys. Rev. D 107, 064046 (2023)). The equation of motion for such particles is the DeWitt-Brehme equation, and it contains a particularly complicated, non-local, tail term. It has been claimed that the tail term can be neglected in certain magnetized black hole spacetimes, and that radiation reaction may then lead to energy extraction (“orbital widening”) in the absence of an ergoregion. We show that such claims are incorrect, at least in the Newtonian limit: the tail term can never be neglected consistently in the relevant scenarios, and when it is included the reported energy extraction no longer occurs.

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