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Papapetrou fields in boosted Kerr black holes

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The spacetime of a boosted Bondi-Sachs rotating black hole is considered as a proper background to examine electromagnetic configurations connected to analytic solutions of Maxwell equations. In our analysis, we first use the Bondi-Sachs transformations in order to bring the boosted rotating black hole metric into the Kerr-Schild form, from which zero angular momentum observers (ZAMOs) are constructed via the ADM formalism. In Kerr-Schild coordinates, we obtain the Killing fields as sources of Maxwell electrodynamics, and we fix a ZAMO in order to evaluate the components of the electric and magnetic fields, from which we obtain nonsingular patterns of an eventual momentum-energy emission of a boosted Kerr-Schild black hole. Distinct patterns are examined and discussed in the case of variations of the boost parameter γ . We extend our analysis by considering the nonsingular electromagnetic emission in the framework of a boosted Bondi-Sachs rotating black hole, as it moves at relativistic speeds. We also discuss possible mechanisms that may resemble magnetospheres of rotating boosted black holes and give rise to hydromagnetic flows from accretion discs and to the production of jets.

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