Abstract Submitted
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Spin Self-Force KRISTIAN MACKEWICZ, ROBERT WALD, University of Chicago — We analyze the motion of charged and spinning bodies along the symmetry axis of a non-extremal Kerr-Newman black hole. If one treats the body as a test point particle of mass m, charge q, and spin S, then the first order area increase, δA, of the black hole can be made arbitrarily small by dropping the body into the black hole from sufficiently near the horizon. At second order, there may be effects quadratic in q and S on the energy delivered to the black hole. These effects are due to (i) the finite size of the body and (ii) self-force corrections to the energy. We consider a charged and spinning body on the symmetry axis of a Kerr-Newman black hole, where the self-force effects have not been calculated. After accounting for all finite size effects, we find that the condition $\delta^2 A \geq 0$ yields a nontrivial lower bound on the self-force energy, E_{SF}, at the horizon. For an uncharged, spinning body on the axis of a Kerr black hole of mass M, the spin self-force energy of the body at the horizon satisfies $E_{SF} \geq S^2/8M^3$.

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