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Gravitational self-force in a radiation gauge for a particle in circular orbit around a Kerr black hole ABHAY SHAH, University of Wisconsin-Milwaukee, TOBIAS KEIDL, University of Wisconsin-Washington County, JOHN FRIEDMAN, LARRY PRICE, University of Wisconsin-Milwaukee — This talk reports recent progress on computing the self-force in a radiation gauge for a particle in circular orbit around a Kerr black hole. We work in a gauge which allows us to use the Teukolsky equation to obtain retarded field needed to compute the self-force. We use of the Chrzanowski-Cohen-Kegeles formalism to extract the perturbed metric from the Weyl scalar. The Hertz potential is calculated by algebraically inverting the differential angular equation relating it to the Weyl scalar. Since this is an algebraic inversion, every operator acting on the Hertz potential to yield the self-force can be traced back to an action on the Weyl scalar, which simplifies our analytic work. Once the retarded self-force is calculated, we match it numerically to an appropriate series in the angular harmonic index l to extract regularization parameters. The quantity $h_{ab}u^a u^b$ and an associated change in the orbital frequency are invariant under helically symmetric gauge transformations, and we compute them inside the (Boyer-Lindquist) radius of the particle.

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