Abstract Submitted
for the APR10 Meeting of
The American Physical Society

Gravitational self-force for a particle in circular orbit around the Schwarzschild black hole ABHAY SHAH, JOHN FRIEDMAN, University of Wisconsin-Milwaukee, TOBIAS KEIDL, University of Wisconsin-Colleges, LARRY PRICE, University of Wisconsin-Milwaukee — This talk reports recent progress on computing the self-force in a radiation gauge.The Weyl scalars determine the perturbed metric only up to a type D perturbation, and Carter's theorem is not sufficient to rule out a local perturbed Kerr-NUT or C-metric contribution to the singular field. Nevertheless, we show that only infinitesimal changes in mass and angular momentum arise and present alternative methods for obtaining the renormalized field for these contributions in a Schwarzschild and Kerr background. We present a corrected computation of the conservative part of the self-force in a radiation gauge for a particle circling a Schwarzschild black hole. The Weyl scalar and its derivatives are renormalized by subtracting the singular field to leading and subleading order from the retarded solution to the Bardeen-Press (Teukolsky) equation. Higher powers of l are subtracted by matching the retarded field with a series in l at high l. From the renormalized Weyl scalar (and its derivatives), one computes the renormalized Hertz potential (and its derivatives) by an algebraic inversion. From the renormalized Hertz potential and a renormalization of the l=0 and l=1 parts of the metric, we obtain the self-force.

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Date submitted: 23 Oct 2009 Electronic form version 1.4