Abstract Submitted
for the APR15 Meeting of
The American Physical Society

Genuine Spin-Flip in Binary Black Holes CARLOS LOUSTO, JAMES HEALY, Rochester Institute of Technology — We perform a full numerical simulation of binary spinning black holes to display the long term spin dynamics. We start the simulation at an initial proper separation between the equal mass holes of $d \approx 25M$ and evolve them down to merger for nearly 48 orbits, 3 precession cycles and half of a flip-flop cycle. The simulation lasts for $t = 20000M$ and displays a change in the orientation of the spin of the black holes with one of them going from initially aligned with the orbital angular momentum to a complete anti-alignment after half of a flip-flop cycle. We compare this evolution with an integration of the 3.5 Post-Newtonian equations of motion and spin evolution to show that this process continuously flip-flops the spin during the lifetime of the binary until merger. We also provide lower order analytic expressions for the maximum flip-flop angle and frequency. We discuss the effects on spin growth in accreting binaries and the observational consequences for galactic and supermassive binary black holes.

Carlos Lousto
Rochester Institute of Technology

Date submitted: 15 Dec 2014 Electronic form version 1.4