

Abstract Submitted
for the APR10 Meeting of
The American Physical Society

Gravitational-Wave Recoil from the Ringdown Phase of Coalescing Black Hole Binaries¹ CLIFFORD WILL, Washington University, St. Louis, ALEXANDRE LE TIEC, LUC BLANCHET, Institut d Astrophysique de Paris — The gravitational recoil or “kick” of a black hole formed from the merger of two orbiting black holes, and caused by the anisotropic emission of gravitational radiation, is an astrophysically important phenomenon. We combine (i) an earlier calculation, using post-Newtonian theory, of the kick velocity accumulated up to the merger of two non-spinning black holes, (ii) a “close-limit approximation” calculation of the radiation emitted during the ringdown phase, and based on a solution of the Regge-Wheeler and Zerilli equations using initial data accurate to second post-Newtonian order. We prove that ringdown radiation produces a significant “anti-kick”. Adding the contributions due to inspiral, merger and ringdown phases, our results for the net kick velocity agree with those from numerical relativity to 10 to 15 percent over a wide range of mass ratios, with a maximum velocity of 180 km/s at a mass ratio of 0.38.

¹Supported by NSF grant No. PHY06-52448, NASA grant No. NNG-06GI60G, and CNRS PICS grant No. 4396.

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Date submitted: 22 Oct 2009

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