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R. Luna: Kicks in charged black hole binaries

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We compute the emission of linear momentum (kicks) by both gravitational and electromagnetic radiation in fully general-relativistic numerical evolutions of quasi-circular charged black hole binaries. We derive analytical expressions for slowly moving bodies and explore numerically a variety of mass ratios and charge-to-mass ratios. We find that for the equal mass case our analytical expression is in excellent agreement with the observed values and, contrarily to what happens in the vacuum case, we find that in presence of electromagnetic fields there is emission of momentum by gravitational waves. We also find that the strong gravitational kicks of binaries with unequal masses affect the electromagnetic kicks, causing them to strongly deviate from Keplerian predictions. For the values of charge-to-mass ratio considered in this work, we observe that magnitudes of the electromagnetic kicks are always smaller than the gravitational ones.

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