

Abstract Submitted
for the APR21 Meeting of
The American Physical Society

Angular Momentum in Asymptotically Flat Spacetimes¹ ARWA ELHASHASH, DAVID NICHOLS, Univ of Virginia — The symmetries of asymptotically flat spacetimes in general relativity are described by the Bondi-Metzner-Sachs group (or its proposed extensions). Associated with these symmetries are conserved charges, which include the energy-momentum, supermomentum, and relativistic angular momentum (or super-angular momentum). Several formalisms have been used to compute the spacetime angular momentum. These angular momenta do not always agree, but the different definitions were recently summarized in a two-parameter family of angular momenta. Requiring the angular momentum to vanish in flat spacetime restricts the two parameters to be equal, but there is not as compelling a reason to fix the one remaining free parameter to a particular value. We examine the effect of this free parameter on the values of the angular momentum and super-angular momentum of nonprecessing binary-black-hole mergers. We find the definitions of angular momentum differ only when these systems are radiating gravitational waves. The definitions of super-angular momentum differ even after the gravitational waves pass, because of the gravitational-wave memory effect. Using numerical-relativity surrogate waveforms, we estimate these differences to be small, but of the order of the accuracy of the simulations.

¹NSF Grant PHY-2011784

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Date submitted: 01 Jan 2021

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