Abstract Submitted
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Angular momentum at null infinity ADAM HELFER, University of Missouri — I will describe a definition of angular momentum at null infinity which appears to be satisfactory. It is natural, resolves the supertranslation problem, allows a computation of fluxes, and gives physically plausible characterizations of spin and center of mass. It is a development of Penrose's twistor-based ideas, but I will recast it in conventional (non-twistor) terms. The supertranslation problem prevents a consistent treatment of gravitational angular momentum in special-relativistic terms. The resolution of this difficulty turns out to be that the angular momentum is not a pure $j = 1$ quantity M_{ab}, but acquires higher-j terms as well. These higher-j terms fit into the theory just so as to give geometrically natural definitions of spin and center of mass. Remarkably, too, they correspond precisely to the Bondi shear. So shear and angular momentum should be regarded as different elements of a single unified concept. While this definition reproduces conventional results in weak-field slow-motion limits, it has novel features in more general situations. Systems which are asymmetric and highly dynamical may radiate angular momentum (including "conventional," $j = 1$, angular momentum) at *first order* in the gravitational wave strength. Astrophysical systems might have measurable "hops" and spin-changes associated with such emissions of center-of-mass or spin angular momentum.
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