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Adding light to the gravitational waves on the null cone MARIA BABIUC, Marshall University — Recent interesting astrophysical observations point towards a multi-messenger, multi-wavelength approach to understanding strong gravitational sources, like compact stars or black hole collisions, supernovae explosions, or even the big bang. Gravitational radiation is properly defined only at future null infinity, but usually is estimated at a finite radius, and then extrapolated. Our group developed a characteristic waveform extraction tool, implemented in an open source code, which computes the gravitational waves infinitely far from their source, in terms of compactified null cones, by numerically solving Einstein equation in Bondi space-time coordinates. The goal is extend the capabilities of the code, by solving Einstein-Maxwell's equations together with the Maxwell's equations, to obtain the energy radiated asymptotically at infinity, both in gravitational and electromagnetic waves. The purpose is to analytically derive and numerically calculate both the gravitational waves and the electromagnetic counterparts at infinity, in this characteristic framework. The method is to treat the source of gravitational and electromagnetic radiation as a black box, and therefore the code will be very flexible, with potentially large applicability.

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