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Modeling the Potential Emission of Binary Black Hole Mergers in AGN Accretion Disks

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In recent years, multimessenger astronomy has provided new oportunities to reveal the mysteries of cosmology and potentially resolve the tension in the Hubble Constant measurement. The Dark Energy Survey collaborates with LIGO through electromagnetic follow-up of LIGO-Virgo detections of gravitational wave events. For binary neutron star and perhaps neutron star-black hole mergers we expect to see an explosion known as a kilonova. In the case of binary black hole (BBH) mergers, we do not expect to see such a flare from the compact objects themselves; however, when BBHs collide and merge, the energy released in the form of gravitational waves carries away linear momentum which "kicks back" the newly formed post-merger black hole. When BBH mergers occur within an active galactic nucleus accretion disk, the kicked black hole drags along the gravitationally-bound surrounding gas and potentially produces an electromagnetic flare. In order to improve BBH mergers' viability as optical probes, we model the potential emission from such events.

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