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Searching for eccentric binary neutron star coalescences in Advanced LIGO. ELIU HUERTA, DUNCAN BROWN, Syracuse University, LIGO COLLABORATION — The coalescence of binary neutron stars is the primary source targeted by the Laser Interferometer Gravitational-wave Observatory (LIGO) and Virgo. Current searches for these systems assume that they will be on circular orbits when they enter Advanced LIGO's band (~ 15 -1500 Hz), as expected for the observed binary pulsars that have evolved in the field. Several recent studies suggest that a population of binary neutron stars may also form by n-body interactions in core-collapsed globular clusters or in galactic nuclei near supermassive black holes and that these systems may have non-negligible eccentricity in the LIGO band. Optimal searches to detecting eccentric binaries or to place observational constraints on the rate requires template waveforms that capture the effect of eccentricity. For systems with total mass of 2.4 (6.0) solar masses, the effect of eccentricity $e < 0.02$ (0.05) is negligible and a circular search can effectively recover these events. For eccentricities up to $e = 0.4$, we investigate the ability of searches using the post-circular expansion of Yunes et al. to detect eccentric systems and investigate the selection bias in searches for binaries with low to moderate eccentricities.

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