Abstract Submitted
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Astrophysics with gravitational-wave measurements of binary compact object mass distributions[1] RICHARD O'SHAUGHNESSY, Pennsylvania State University, CHRIS VAN DEN BROECK, Cardiff, CHRIS BELCZYNSKI, New Mexico State University; Los Alamos National Lab — Future gravitational wave detectors (advanced LIGO; Virgo) will detect tens to hundreds of few-stellar-mass binary compact object coalescences (CBCs) in the local universe, providing a detection-weighted sample of their mass distribution. We describe how efficiently the observed number and mass distribution can discriminate between different CBC source population models, both abstractly and by explicit comparisons to an archive of binary population synthesis simulations. Finally, proposed future instruments like the Einsten Telescope and other third-generation interferometers, with only a moderate (x10) increase in range range, could detect tens to hundreds of thousands of sources well into the epoch of peak star formation (z$\sim$4). "Gravitational-wave tomography" will be possible, providing data products including a map of the low-redshift universe as seen in binaries and a redshift-dependent mass distribution. We describe how future detectors could use this information to provide exquisitely precise constraints on our understanding of CBC formation.

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