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Constraining properties of dark matter candidates from gravitational-wave observations[1] DIVYA SINGH, Pennsylvania State University, ANURADHA GUPTA, University of Mississippi, BANGALORE SATHYAPRAKASH, Pennsylvania State University — The rate of binary neutron star mergers determined by gravitational-wave observations is so large that we can expect the next generation of ground-based detectors to observe up to millions of mergers each year. If progenitor binaries live long enough then certain dark matter particles, depending on their mass and interaction cross section, could accumulate in neutron star cores, collapse, and form mini black holes that grow during the binarys lifetime. Eventually, accretion of such dark matter particles could lead to the implosion of one or both the companion neutron stars. Thus the observed universe might contain three distinct populations of compact binaries in the mass range ~ 1–$3\,M_\odot$ - one containing only neutron stars, a second population of only black holes, and a third consisting of a neutron star and black hole. In this talk we explore the capability of future gravitational-wave detectors such as the proposed US Cosmic Explorer and the European Einstein Telescope, to discriminate the different populations by measuring the tidal deformability of the companion stars. The relative rates of the different populations constrains the properties of dark matter particles.

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