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Coalescing Compact Binaries with Quark Star Component¹ SAM KOSHY, PRASHANTH JAIKUMAR, California State University, Long Beach, MICHELE VALLISNERI, Jet Propulsion Laboratory — Binary stars in close orbit around each other emit gravitational radiation, which causes their orbit to decay. Here we study the tidal interactions between such inspiraling compact binaries, with neutron star-quark star and black hole-quark star components. While the gravitational radiation waveforms from coalescing binaries can be calculated fairly accurately, tidal torques cause phase errors to accumulate in their gravitational wave signal, which become significant in the event the two stars tidally lock (i.e. their orbital and spin frequencies are synchronized). Given the large viscosity that a quark star can have, tidal synchronization for both types of binaries is shown to be possible; thereby hampering signal extraction if the resulting phase difference is not incorporated into the theoretical waveform templates. In addition, the signal strengths of a gravitational wave signal from such systems are shown. And finally, we consider the possibility of stable mass transfer from the quark star to the neutron star.

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