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Interpreting the Gravitational Wave Background in Terms of Supermassive Black Hole Binary Populations J. ANDREW CASEY-CLYDE, University of Connecticut, CHIARA MINGARELLI, Flatiron Institute, JENNY GREENE, ANDY GOULDING, Princeton University, KRIS PARDO, California Institute of Technology — To date, most models of the stochastic gravitational wave background (SGWB) have built up their supermassive black hole binary (SMBHB) populations by modeling the merger histories of massive galaxies to $z \sim 1$. However, recent observations of dual AGN systems have opened up the possibility of using quasar population models as a proxy for massive black hole binary populations, such as the one developed by Goulding et al. (2019). We build on this quasar-backed approach by using estimates of the local number of binary sources from Mingarelli et al. (2017) to tie this model to observables in a self-consistent way. We additionally allow the black hole mass function to evolve with redshift, reflecting changes in the properties of the SMBHB population. The resulting SGWB amplitude is found to be comparable to models based on major mergers, and we offer a comparison of both types of models to results from the NANOGrav 12.5-yr dataset. We note systematic differences between the SMBHB populations implied by each type of model as well as differences in their evolution over cosmic time and compare the two differing populations. Finally, we explore avenues by which these differences might be reconciled to describe a single population of SMBHBs which contribute to the SGWB.

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