

# Gravitational waves from coalescing supermassive black holes in a galaxy and AGN formation model based on the CDM cosmology

*Thursday, 5 March 2026 15:00 (1 hour)*

I discuss how to make predictions for the amplitude of the gravitational-wave background (GWB) produced by supermassive black hole (SMBH) binaries and for the event rate of SMBH coalescences within the framework of galaxy formation theory in a cold dark matter (CDM) universe. The former can be detected by pulsar timing arrays (PTAs), while the latter will be probed by LISA. We have developed a semi-analytic model of galaxy and active galactic nucleus (AGN) formation that successfully reproduces the observed luminosity functions of galaxies and AGN, as well as the empirical relations between bulge mass and black hole mass. This agreement implies that the SMBH binary merger rates in our model are tightly constrained by observations in both the local and high-redshift universe. Our current model predicts a lower GWB amplitude than that reported by the NANOGrav collaboration, and I discuss the implications of this discrepancy.

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