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Sensitivity of Present and Future Black Hole Binary Observations Across the Gravitational Wave Spectrum ANDREW KAISER, West Virginia Univ — We present a tool for modelling the sensitivities of current and future generations of gravitational wave detectors across the entire gravitational-wave spectrum of coalescing black hole binaries. We provide methods to generate sensitivity curves for pulsar timing arrays (PTAs) using a novel realistic PTA sensitivity curve generator, space-based interferometers using adaptive models that can represent a wide range of proposed detector designs, and ground-based interferometers using current, second, and third generation designs. To model the signal from black hole binaries at any mass scale, we use phenomenological waveforms capable of modelling the inspiral, merger, and ringdown for sources with varying mass ratios and spins. Using this adaptable framework, we produce signal-to-noise ratios for the combination of any modelled parameter, associated with either the detector or the source. By allowing variation across each detector and source parameter, we can pinpoint the most important factors to determining the optimal performance for particular instrument designs. The adaptability of our detector and signal models can easily be extended to new detector designs and other models of gravitational wave signals.

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