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Simulating the parameter recovery of massive binary black holes with LISA

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LISA is a future space-based gravitational wave detector that will complement the LIGO/Virgo observations at much lower frequencies, enabling the detection (among other targets) of coalescences of massive black hole binaries (MBHB). Most MBHB signals are expected to be short and merger-dominated. The development of data analysis tools for LISA is crucial to understand the scientific capabilites of LISA as an observatory. MBHB observations with LISA differ from LIGO/Virgo observations in the morphology of the signals, and in the instrument response that is both time- and frequency-dependent. We present a set of tools that allows fast likelihood computations for Fourier-domain waveform models, enabling Bayesian analyses exploring the full physical parameter space. We present examples of simulated parameter recovery for MBHBs. We highlight degeneracies in parameter space, and identify which features of the instrument response and signal break these degeneracies. We also discuss the sky localization of these systems and whether LISA is able to detect and localize them before the coalescence occurs, thus enabling advance warnings for EM observatories.

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