

# Constraining the acceleration of moving binary black holes using gravitational wave

*Monday, 26 June 2023 11:00 (18 minutes)*

Binary black holes (BBHs) are one of the most important types of gravitational wave (GW) sources. Recent studies show that BBHs may form and merge in the vicinity of a supermassive black hole (SMBH), which results in overestimated masses of black holes due to gravitational and Doppler redshift. One of the distinctive features of these GW sources is that they are accelerating around the SMBH, and we can search for them by constraining their acceleration using GW signals. In this work, we treat the GW sources which give deviated results from general relativity in the inspiral-merger-ringdown (IMR) consistency test as candidates for potentially accelerating ones. We use the Bondi-Metzner-Sachs (BMS) transformation to construct the GW waveform of accelerating BBHs and use the Bayesian inference method to estimate these candidates' acceleration.

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**Session Classification:** Gravitational Waves