

Probing the large scale structure with gravitational-wave observations of binary black holes

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Advanced gravitational-wave (GW) observatories are expected to observe thousands of binary black hole mergers in the next few years, and the detection rates will go up by several orders of magnitude with the advent of third generation observatories like the Einstein Telescope and Cosmic Explorer. The reconstructed three-dimensional location of these mergers will probe the large-scale structure of the Universe, analogous to the current galaxy surveys using optical telescopes. GW and optical surveys are likely to provide complementary information — GW observations are likely to access very large redshifts ($z \sim 10 - 15$) inaccessible by optical telescopes, although with much poor precision on the source location. We explore the possibility of probing large scale structures from the correlation function and power spectrum of the distribution of binary black hole mergers using the second and third generation of gravitational-wave observatories.