

Cosmological parameters and dark energy with advanced gravitational-wave detectors

Abstract

We study the potential of advanced GW detectors for improving the current knowledge of cosmological parameters and testing the dark-energy sector, using standard sirens. We consider both a second-generation network made by the two advanced LIGO detectors+advanced Virgo+LIGO India+Kagra, and third-generation detectors such as the Einstein Telescope and Cosmic Explorer. We construct mock catalogs of standard sirens, considering different scenarios for the local merger rate and for the detection of an electromagnetic counterpart. We first study how standard sirens can improve the determination of H_0 and Ω_M in Λ CDM, with respect to the current results from *Planck* CMB data, BAO and SNe. We then study how standard sirens at second- or third-generation GW detectors, alone or in combination with other cosmological datasets, can give information not only on H_0 and Ω_M but also on the dark energy sector, considering both a non-trivial dark energy equation of state and modified GW propagation.