Constraining parameters of coalescing binary systems with Einstein Telescope alone

Neha Singh, Tomasz Bulik
Astronomical Observatory,
University of Warsaw, Poland

July 2019

Abstract

Einstein Telescope is a proposed third-generation gravitational wave detector which is expected to have an increased broadband sensitivity by a factor of 10 with respect to advanced detectors while also extending the low frequency sensitivity of ground based gravitational wave interferometers below 10 Hz. Gravitational wave observations using a network of detectors permits a direct and independent measurement of the distance to the source systems. Knowing the redshift of the source, the inspiraling binary systems can be used as standard sirens to extract cosmological information. Since, the redshift and the system chirp mass are degenerate ingravitational wave observations with a single detector, it is usually assumed that the source redshift is obtained from the electromagnetic counterparts. The current design of the Einstein Telescope consists of three overlapping interferometers, arranged in an equilateral configuration with arm-opening angles of 60 degrees. In this work we consider a joint analysis of coalescing binaries detection with three ET-D interferometers in the triangular configuration to constrain their luminosity distances and chirp masses. We present the method and investigate its accuracy.