Contribution ID: **29** Type: **Talk**

Gravitational lensing of standard sirens: a systematic effect on cosmological parameters' estimation.

Tuesday, 24 October 2023 12:00 (15 minutes)

Since the first detection, Gravitational Waves (GWs) have opened a new observational window on our Universe. When accompanied by an electromagnetic detection, GWs emitted by merging binaries of compact objects can be used as "standard sirens" to probe the distance-redshift relation and the standard model of cosmology. However, as in the case of light, we expect GW signals to be bent during their trajectory towards our detectors by the intervening matter field, a well-known phenomenon called gravitational lensing. This induces modifications on the measurement of the luminosity distance compared to that of a homogeneous universe. In this talk, I will present how lensing can impact the power of standard sirens for cosmological studies. The scenario is that of third-generation ground-based GW detectors, which are expected to achieve impressive measurement accuracies that will open the era of precision GW cosmology. Treating lensing as a systematic error, I will point out that it can induce a bias in the estimation of the cosmological parameters and quantify the bias in relation to the characteristics of a catalog of future GW events. For our fiducial scenario, I will show evidence that lensing bias can be comparable to or greater than the forecasted statistical uncertainty of the cosmological parameters, although non-negligible fluctuations in the bias values are observed for different realisations of the mock catalog. I will conclude by discussing some mitigation strategies that can be adopted in the data analysis.

Primary author: CANEVAROLO, Sofia

Co-author: CHISARI, Elisa (Utrecht University)

Presenter: CANEVAROLO, Sofia

Session Classification: Astrophysics & Cosmology

Track Classification: Astrophysics & Cosmology