Contribution ID: **4** Type: **Poster/Talk submitter**

Reconstructing star formation rate for compact binary populations with Einstein telescope

Einstein Telescope (ET) is a proposed third generation, wide-band gravitational wave (GW) detector. Given its improved detection sensitivity in comparison to the second generation detectors, it will be capable of exploring the universe with GWs up to very high redshifts. In this work we present the algorithm to answer three main questions regarding the star formation rate density (SFR) (i) when did the formation terminate?, (ii) at what redshift does the SFR peak?, and finally (iii) what is the functional form of SFR at high redshift? for a given population. We infer the functional form of SFR for different populations of compact binaries originating in stars from Population (Pop) I+II and Pop III, using ET as a single instrument. We conclude that the reconstruction of SFR is essentially independent of the time delay distributions up to z~14 and the accuracy of the reconstruction strongly depends on the time delay distribution only at high redshifts of z⪆14. In this analysis we constrain the peak of the SFR as a function of redshift and show that ET as a single instrument can distinguish the termination redshifts of different SFRs.

Primary author: SINGH, Neha (LAPTh, CNRS)

Co-authors: BULIK, Tomasz (Astronomical Observatory, University of Warsaw); BELCZYNSKI, Krzysztof (Nicolaus Copernicus Astronomical Center, Warsaw); CIESLAR, Marek (Astrocent, Nicolaus Copernicus Astronomical Center, Warsaw); CALORE, Francesca (LAPTh, CNRS)

Presenter: SINGH, Neha (LAPTh, CNRS)

Session Classification: Poster Session