Contribution ID : **44**　　　　Type : **not specified**

Bright siren without electromagnetic counterpart by LISA-Taiji-TianQin network

Saturday, 18 October 2025 16:50 (20)

Gravitational waves (GWs) with electromagnetic counterparts (EMc) offer a novel approach to measure the Hubble constant (H_0), known as bright sirens, enabling H_0 measurements by combining GW-derived distances with EM-derived redshifts. Host galaxy identification is essential for redshift determination but remains challenging due to poor GW sky localization and uncertainties in EMc models. To overcome these limitations, we exploit the ultra-high-precision localization ($\Delta\Omega_s \sim 10^{-4}$ deg^2) with a space-based GW detector network (LISA-Taiji-TianQin), which permits unique host identification solely from GW signals. We integrate five massive black hole binary (MBHB) population models and two galaxy number density models to compute the redshift horizon for host galaxy identification and evaluate H_0 constraints. We find that (1) The network enhances localization by several orders of magnitude compared to single detectors; (2) The identification horizon reaches $z \sim 1.2$ for specific MBHBs in the most accurate localization case; (3) The population model choice critically impacts the outcomes: the most refined population models yield to independent EMc identification rate of 0.6-1 yr^{-1} with H_0 constraints $< 1\%$ fractional uncertainty, the less refined models lead to the rate $< 0.1\text{yr}^{-1}$ and $1 - 2\%$ uncertainty on H_0.

Presenter(s) : ZHAN, Yejing

Session Classification : Parallel-1