Contribution ID: **304** Type: **Poster**

Detectability of very-high-energy counterpart of gravitational waves

Friday, December 15, 2023 2:55 PM (1 minute)

The joint detection of GW170817 and a short gamma-ray burst (GRB) has provided the first direct evidence that binary neutron star (BNS) merger produces GRB. Recently and unprecedentedly, very-high-energy (˜0.1–10 TeV) afterglow emission were reported from a few GRBs (e.g. MAGIC, H.E.S.S. and LHAASO observations), suggesting the prospects of multi-messenger detection of gravitational-wave counterparts with the next-generation gamma-ray detectors. We study GW-TeV joint detectability of BNS merger using a population model prescribing the distribution of common parameters (e.g. energetics, viewing angle) in both gravitational-wave and very-high-energy afterglow emission. We report the expected distributions of observables (distances, orientations, energetics and ambient densities) for detectable events and the joint GW-TeV detection rate for the CTA and LHAASO projects.

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Session Classification: Poster