



Contribution ID: 266

Type: **not specified**

Prospects on detections of Gamma-Ray Bursts from Binary Neutron Star mergers, with the Cherenkov Telescope Array Observatory

Wednesday, 13 September 2023 14:00 (25 minutes)

GW170817-GRB170817A provided the first direct evidence that at least a fraction of binary neutron star mergers (BNSs) are progenitors of short Gamma-Ray Bursts (sGRBs). More BNS signals are expected from the upcoming observation runs of the gravitational wave (GW) interferometers. In these systems, each messenger carries unique information about the astrophysical processes at the source. The detection of very-high-energy (VHE) gamma rays from merging binaries will improve our understanding of the BNS-sGRB connection, by revealing the acceleration processes in extreme conditions. The Cherenkov Telescope Array Observatory (CTAO) is the ideal instrument to search for the VHE gamma-ray counterparts thanks to its unprecedented sensitivity, rapid response and capability to monitor large sky areas. We will present potential observing modes and follow-up strategies which are being developed for CTAO to rapidly cover the localisation area of GW events, typically larger than the CTAO field of view. We will provide estimates on the expected number of sGRBs connected to GW events observable and detectable with CTAO, considering both on- and off-axis emission and various timescales of observation after the merger.

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Session Classification: GWMM: Gravitational Waves & MultiMessenger

Track Classification: Gravitational Waves & MultiMessenger