Contribution ID: **287**   Type: **Talk in a parallel session**

Studies on multi-messenger astrophysics with the GW-Universe Toolbox

Thursday, 11 July 2024 18:00 (20 minutes)

The GW-Universe Toolbox is a software package designed to simulate observations of various types of gravitational wave (GW) source populations using a wide range of GW detectors, including ground-based and space-based laser interferometers, as well as pulsar timing arrays. In its recent development, the GW-Universe Toolbox has been upgraded to enable the simulation of joint observations of gamma-ray burst (GRB) prompt emissions and GW chirps from binary neutron star mergers. In this talk, we will first introduce the software and then discuss its application to several astrophysical problems, including the population study of compact binary mergers, sub-threshold joint observations, and constraints on GW velocity.

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Session Classification: Multi-messenger astronomy with gravitational waves

Track Classification: Multimessenger Astrophysics (MA): Multi-messenger astronomy with gravitational waves