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Low Latency gravitational alerts of the LIGO/Virgo collaboration

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The second LIGO-Virgo observational witnessed the birth of gravitational-wave multi-messenger astronomy. The first ever gravitational-wave (GW) detection from the coalescence of two neutron stars, GW170817, associated to its gamma-ray counterpart, GRB 170817A, as well as its optical, X-ray and radio counterparts (AT 2017gfo).

In this talk, we will describe the O2 low-latency program of the LIGO/Virgo collaboration, enabling multi-messenger discovery. We will focus on the online candidate alerts shared with observing partners during O2. First, we will describe the distribution of gravitational-wave alerts : we will highlight the validation process, especially from the detector characterization effort to separate transient noise from real GW signal. We will also show the gravitational-wave observables which were sent in the alerts to enable searches for their counterparts.

The next observation campaign O3 (starting coming Spring) promises multiple GW detections: the expected rate of binary black hole (BBH) triggers will be around one every few days whereas binary neutron stars rate is estimated to be one every two weeks at most. The LIGO-Virgo Collaboration (LVC) has developed a robust alert system for the open public alerts (OPA) era in order to enable a prompt electromagnetic follow-up. This requires some automations as: selection of the best GW trigger candidate among the different online searches and the validation process to reject transients originated from the noise. This talk will present as a second part an overview of the O3 LIGO-Virgo low-latency multi-messenger program.

Summary

Primary authors: ARNAUD, NICOLAS (LAL ORSAY CNRS-IN2P3); ANTIER, Sarah

Presenter: ANTIER, Sarah

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