

Gravitational Wave Searches, Public Alerts, and Event Validation in the Fourth Observing Run of LIGO, Virgo and KAGRA

Thursday, 26 October 2023 11:30 (30 minutes)

The first three observational campaigns of the Advanced LIGO and Advanced Virgo gravitational-wave (GW) detectors have culminated in the confident identification of 90 signals arising from the mergers of compact binary systems composed of black holes and neutron stars. These events have offered a new testing ground for General Relativity and better insights into the nuclear equation of state for neutron stars, as well as the discovery of a new population of black holes.

In the ongoing fourth joint observing run by the LIGO, Virgo, and KAGRA collaborations (collectively referred to as LVK), substantial improvements have been implemented to enhance the detectors' sensitivity. These enhancements are poised to significantly boost the rate of detections, promising new discoveries and more profound insights into the aforementioned domains. To support these goals, substantial progress has been made in fortifying the low-latency infrastructure to foster multimessenger searches. The operations of rapid response to GW candidate alerts and event validation procedures as been refined as well to strengthen the confidence in the detected signals.

This presentation offers an overview of the upgrades made to the detectors from O3 to O4 and the expected increase in event detection rates. Furthermore, it delves into the key aspects of GW transient searches, encompassing the dissemination of public alerts and the meticulous validation of candidate events, including the noise artifact mitigation before parameter estimation analyses, and the inclusion of the events in discovery papers or catalogs.

Primary author: DI RENZO, Francesco

Presenter: DI RENZO, Francesco

Session Classification: Machine Learning for Gravitational Waves