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Gravitational-wave event validation by Advanced LIGO and Advanced Virgo detectors. Procedures and challenges for the upcoming observing runs

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The observations of the Advanced LIGO and Advanced Virgo gravitational-wave detectors have led so far to the confident identification of 90 signals, from the merger of compact binary systems constituted 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. For each detection, a thorough event validation procedure has been completed in order to carefully assess the impact of potential data quality issues, such as instrumental artefacts, on the analysis results. This has increased the confidence in the astrophysical origin of the observed signals, as well as in the accuracy of the estimated source parameters. In this presentation, we will describe the most relevant steps of the validation process, in the context of the last observing run (O3) of the Advanced gravitational-wave detectors. Moreover, these detectors are currently ongoing a phase of upgrades in preparation for the next joint observing run (O4), scheduled to begin in December 2022. The predicted improvement in sensitivity is expected to produce a higher rate of candidate events, which will constitute a new challenge for the validation procedures.

In-person participation

No

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