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Search for neutrinos in coincidence with Gravitational Wave events from LIGO-Virgo O3a Observing Run with the Super-Kamiokande detector

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Super-Kamiokande (SK) is a 50-kton water Cherenkov detector, instrumented with ~13k photomultipliers and running since 1996. It is sensitive to neutrinos with energies ranging from 4.5 MeV to several TeV. A new framework has been developed for the follow-up of gravitational wave (GW) alerts issued by the LIGO-Virgo collaboration (LVC). Neutrinos are searched for, using a 1000-second time window centred on the alert time and in both SK low-energy and high-energy samples.

Such observation can then be used to constrain the neutrino emission from the GW source. The significance of potential signals has been obtained by comparing neutrino direction with the localisation of the GW. The computation of limits on incoming neutrino flux and on the total energy emitted in neutrinos by the source has been performed for the different neutrino flavours.

The results using the LVC GWTC-2 catalogue (covering O3a period) will be presented, as well as the plans for future real-time public release of follow-ups for O4 period (in 2022) and beyond.

Collaboration name

Super-Kamiokande

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