

Follow-up of GWTC-2 Gravitational Wave events with neutrinos from the Super-Kamiokande detector

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Super-Kamiokande (SK) is a 50-kt 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 the future real-time public release of follow-ups for the O4 period (in 2022) and beyond.

Keywords

gravitational waves; binary merger; black hole; neutrino star; Cherenkov; coincidence

Collaboration

other (fill field below)

other Collaboration

Super-Kamiokande

Subcategory

Experimental Results

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