Real-time Multi-Messenger Analysis Framework of KM3NeT

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KM3NeT is a multi-purpose cubic-kilometer neutrino observatory in construction in the Mediterranean Sea. KM3NeT will be sensitive to neutrinos from MeV scale core collapse supernova neutrinos, atmospheric neutrinos at GeV scale, and astrophysical neutrinos up to a few tens of PeV. The current operational six lines of ORCA can already achieve similar effective area to ANTARES.

In view of the growing field of time-domain astronomy, it is increasingly crucial to be able to identify neutrinos in real-time. This work presents the status of KM3NeT's real-time multi-messenger analysis framework.

The framework has a response time at the order of 10 seconds, it includes CCSN monitoring, a fast online event reconstruction, event classification and selection of a high-purity sample, alert receiver and alert sender. The online neutrino sample will serve to trigger neutrino alerts that will be sent to the astronomy community and to look for time/space coincidence around external electromagnetic and multi-messenger triggers. The first test of the track selection on over a year of ORCA6 data is performed. More optimization and analysis are underway, we plan to issue KM3NeT multi-messenger alerts beginning in 2022.