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Detection of a Muon Burst Coincident with KM3-230213A

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The detection of a 220 PeV muon neutrino by the KM3NeT neutrino telescope presents a unique opportunity to investigate the Universe at extreme energies. Three scenarios have been proposed to explain this event: emission from a transient point source, diffuse astrophysical background emission, and line-of-sight interactions of ultrahigh-energy cosmic rays. At present, no other detectors have observed events coincident with KM3-230213A, supporting the diffuse emission scenarios over the transient one.

In this study, we analyze the counting rate recorded by the YangBaJing muon telescope on February 13, 2023, which shows an excess of 3000 ± 600 events over the atmospheric muon background. The distribution of the excess is consistent with an exponential profile starting at 01:17 UTC, with a decay time of approximately 400 seconds. The counting rate excess is observed exclusively in the telescope channel aligned with the direction of KM3-230213A (RA = 94.3°, Dec = −7.8°).

The estimated probability of a chance coincidence with the KM3-230213A event is approximately 10^{-3}. If confirmed, this detection would favor the hypothesis of an astrophysical transient source and allow for preliminary inferences about the source's properties.

Collaboration you are representing

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