

Possible photohadronic origin of the IC-201114A alert

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The Icecube neutrino observatory is a cubic-kilometer particle detector located at the South Pole. A system of public real-time alerts on neutrino candidate events likely to be of astrophysical origin has been operating since 2016. On November 14th 2020, a track-like event with a high probability of being of astrophysical origin (IC-201114A) was reported. 4FGL J0658.6+0636, a source of the blazar type, was identified inside the 90% localisation region of the alert 0.8° from the best-fit event position by the Fermi-LAT collaboration. In this work, we analyse 12.3 years of Fermi-LAT data from 4FGL J0658.6+0636. No indication of significant gamma-ray activity was found around the time of the alert, however, two periods in which the source was detected significantly were identified and studied considering a lepto-hadronic scenario. We investigate a possible photohadronic origin for high energy neutrinos and calculate the gamma-ray contribution to the spectral energy distribution (SED). The predicted neutrino flux and the expected time for a neutrino detection from the source during a flaring state were calculated for the periods of significant activity. Assuming the historical behaviour of the source, an approximation of the gamma-ray and neutrino flux coming from photohadronic interactions around the IC-alert is also given.

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Collaboration

other Collaboration

Subcategory

Theoretical Results

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