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A neutrino flare associated with X-ray emission from TDE ATLAS17jrp

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Tidal disruption events (TDEs), where stars are captured or tidally disrupted by supermassive black holes, are potential astrophysical sources of high-energy neutrinos. We report the discovery of a potential neutrino flare associated with ATLAS17jrp, which occurred 19 days after the onset of the X-ray emission and lasted 56 days. The best-fit spectrum of the neutrino flare follows a power law with a spectral index of $\gamma = 2.7 \pm 0.4$ and a flux normalization of $_0 = 1.9^{+7.2}_{-1.7} \times 10^{-18}$ GeV^{-1}cm^{-2}s^{-1} at 100 TeV, spanning an energy range from 100 GeV to 1 EeV in an analysis of 10 years of IceCube track data. The neutrinos can be produced by the interaction of X-ray photons produced by the hot corona with high-energy particles accelerated by disk winds or outflows. We calculate that the probability of detecting a neutrino flare with a higher test statistic (TS) and a shorter time delay relative to the X-ray emission by chance is 0.4%. Therefore, ATLAS17jrp is the second unambiguous TDE (excluding candidates) potentially linked to high-energy neutrinos, following the TDE AT2019dsg associated with an IceCube neutrino alert.

Collaboration(s)

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