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A high-energy neutrino coincident with a tidal disruption event

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Summary

The IceCube Collaboration recently associated one high-energy neutrino with a flare from the relativistic jet of an accreting black hole. However a combined analysis of many similar active galaxies revealed no excess from the broader population, leaving the vast majority of the cosmic neutrino flux unexplained. In this talk I will present the association of a radio-emitting tidal disruption event with another high-energy neutrino, identified in a systematic search for optical counterparts to high-energy neutrinos with the Zwicky Transient Facility (ZTF). The probability of finding any radio-emitting tidal disruption event by chance is 0.5%. Our electromagnetic observations can be explained through a multi-zone model, with radio analysis revealing a central engine, embedded in a UV photosphere, that powers an extended synchrotron-emitting outflow. The system provides an ideal site for PeV neutrino production. The association suggests that tidal disruption events contribute to the cosmic neutrino flux. Unlike previous work, which considered the rare subset of tidal disruption events with relativistic jets, our observations of AT2019dsg imply that a mildly-relativistic outflow could be sufficient of PeV-scale particle acceleration.

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