

# Search for High-Energy Neutrinos from Blazars with IceCube

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The IceCube Neutrino Observatory is the world largest neutrino telescope, instrumenting one cubic kilometre of Antarctic ice. IceCube started its operation in 2011 and a diffuse flux of neutrino was discovered in 2013. To this day the sources of those neutrinos are still largely unknown. One of the most promising neutrino source candidates are blazars, Active Galactic Nuclei with jets aligned towards Earth.

In 2018 IceCube reported the first observation of an astrophysical high-energy neutrino, IC170922A, in spatial and temporal coincidence with blazar TXS 0506+056. Other examples of coincidences that have been observed with lower significance are, but not limited to, IC190730A with blazar PKS 1506+012 and IC141209A with blazar GB6 J1040+0617. What these have in common is that they involve a blazar and a high-energy neutrino with a high probability of being astrophysical in origin (neutrino alert). These coincidences can be combined to calculate a global p-value by performing a stacking analysis. Here we present the sensitivity and discovery potential obtained with 1916 blazars from the Fourth Catalog of Active Galactic Nuclei detected by Fermi-LAT (4LAC) and 275 neutrinos detected by IceCube between 2011 and 2020 that would have passed the neutrino alert criteria.

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Neutrinos

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