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Spatial cross-correlation study of IceCube neutrino alerts and high energy gamma-ray catalogues

Since 2019, the IceCube Neutrino Observatory has issued real-time neutrino alerts via the General Coordinates Network (GCN), following the successful identification of a high-energy neutrino event, IceCube-170922A, in association with a multiwavelength flare from the blazar TXS~0506+056. Although many high-energy neutrinos have been observed since then, their astrophysical counterparts remain largely unidentified. This work investigates potential associations between IceCube neutrinos and gamma-ray emitting active galactic nuclei (AGNs), utilizing recently compiled, independently curated AGN catalogues and the latest list of IceCube alert events. We employed complementary statistical approaches to identify statistically significant AGN subclasses that are promising sources of neutrinos. We performed both direct spatial cross-matching between neutrino alerts and AGN positions and conducted a likelihood ratio test to assess the significance of the associations. The results from this study will be presented.

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