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Near-future discovery of point sources of ultra-high-energy neutrinos

Upcoming neutrino telescopes may discover ultra-high-energy (UHE) cosmic neutrinos, with energies beyond 100 PeV, in the next 10–20 years. Finding their sources would expose the long-sought origin of UHE cosmic rays. We search for sources by looking for multiplets of UHE neutrinos arriving from similar directions. Our forecasts are state-of-the-art, geared at neutrino radio-detection in IceCube-Gen2. They account for detector energy and angular response, and for critical, but uncertain backgrounds. We report powerful insight. Sources at declination of -45° to 0° will be easiest to discover. Discovering even one steady-state source in 10 years would disfavor most known steady-state source classes as dominant. Discovering no transient source would disfavor most known transient source classes as dominant. Our results aim to inform the design of upcoming detectors.

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