Contribution ID: **409** Type: **Talk in the parallel session**

Radio-neutrino synergy: neutrinos are produced in numerous bright blazars

Wednesday, 7 July 2021 08:10 (20 minutes)

We utilize radio interferometric (VLBI) observations to tackle the problem of determining high-energy neutrino origins. Specifically, we find blazars positionally associated with IceCube neutrino detections to exhibit stronger parsec-scale radio emission compared to the rest of the sample. The probability of a chance coincidence is only 4*10^-5 (4.1 sigma). There are at least 70 bright blazars emitting neutrinos at energies from TeVs to PeVs. Moreover, the continuous RATAN-600 monitoring helps us finding a correlation of radio flares in relativistic jets to neutrino arrival dates. The most pronounced example of such behavior is PKS 1502+106 that experienced a major flare in 2019. We demonstrate that radio blazars may explain the entire astrophysical neutrino flux derived from IceCube muon-track analyses. Our preliminary findings based on ANTARES observatory detections also show signs of neutrino-blazar association in an even wider energy range. We suggest that neutrinos can be born in photohadronic interactions within parsec-scale jets, indicating the presence of accelerated ultrarelativistic protons there.

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Session Classification: Multiwavelength and Multi-Messenger Observations of Active Galactic Nuclei

Track Classification: Active Galactic Nuclei: Multiwavelength and Multi-Messenger Observations of Active Galactic Nuclei