

A novel study connecting UHECRs, neutrinos, and gamma-rays with the objective to identify common counterparts of the three astrophysical messenger

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We present a novel study connecting UHECRs, neutrinos, and gamma-rays with the objective to identify common counterparts of the three astrophysical messengers. In the test presented here, we first identify potential hadronic sources by selecting gamma-ray emitters that are in spatial coincidence with IceCube neutrinos. Subsequently, these objects are correlated against UHECRs detected by the Pierre Auger Observatory and the Telescope array, scanning in gamma-ray flux and angular separation between sources and cosmic rays. A maximal excess of 80 cosmic rays (41.9 expected) is observed for the second catalog of hard Fermi-LAT (2FHL) objects of blazars of the high synchrotron peak type. This corresponds to a deviation from the null-hypothesis of 3.26σ . No excess is observed for objects not in spatial connection with neutrinos. The gamma-ray sources that make up the excess are blazars of the high synchrotron peak type, which we propose here as ultra high energy cosmic ray and neutrino emitters.

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