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PEV NEUTRINOS AND UHECRS CONNEXION AROUND THE LOBES OF CENTAURUS A

Ultra-high-energy cosmic ray (UHECR) detections could give an indirect signal of PeV neutrino emission. Recently, Pierre Auger observatory reported the distribution of arrival directions of the highest energy cosmic rays. These events were collected in 10 years of operations with declinations between -90◦
and +45◦. The IceCube neutrino telescope reported the detection of 54 extraterrestrial neutrinos in the High-Energy Starting Events (HESE) catalog. The highest-energy neutrino event (IC35) reported in this catalog had an energy of
2004(+236−262) TeV and was located centered at RA=208.4◦ and DEC=−55.8◦(J2000). Being Centaurus A (CenA) the nearest radio-loud active galactic nucleus and one of the best potential candidates for accelerating cosmicrays up to ~ 1020 eV, we show that UHECRs with E > 58 EeV around the direction of Cen A (15◦radius)could be accelerated inside the giant lobes. These comic rays unavoidably interact with external radiation fields and ambient gas whereas they propagate through the lobes and their paths to Earth. Using the buoyancy ages of the giant radio lobes instead of their spectral ages, and those UHECRs in the direction of the IC35 event, we found that although the IC35 event cannot be generated inside the giant lobes, this neutrino event could be created when ultra-relativistic protons interact outside of them in their paths to Earth. In addition, we found that through proton-proton interactions inside the giant radio lobes, the proton luminosity normalized with these UHECRs is consistent with γ-ray fluxes reported by Fermi Collaboration.

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