

UHECR event map and multiplets made by Lightest and Heaviest radioactive nuclei

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The puzzle of UHECR origination is related to their composition, spectra and maps.

The main signal that survived in last AUGER data is a clustering along Cen A.

Very recent multiplet at 20 EeV do cluster also along Cen A. These events fit a UHECR Light nuclei for extragalactic sources. Most of remnants UHECR may be heavy nuclei radioactive originated mostly by nearby SN-GRB whose traces are found in correlated gamma TeV-MeV-UHECR maps. We show that recent ARGO-ICECUBE data do hint for Vela, Magellanic stream and even Crab connection with UHECR. Tau Neutrino at PeVs energy may shine similar anisotropies in the sky.

Summary

UHECR (Ultra High Cosmic Rays) made by He-like lightest nuclei might solve the AUGER extragalactic clustering along Cen A: He UHECR cannot arrive from Virgo because the light nuclei fragility and opacity above few Mpc; UHECR signals are clustering along Cen-A spreading as observed by horizontal galactic arms magnetic fields, along random vertical angles [18]. Cen A events by He-like spread along a width angle as large as the observed clustered one. UHECR He, being fragile should partially fragment in secondaries at tens EeV multiplet (D,He3,p) almost as it occurs in the very recent UHECR multiplet at 20 EeV along Cen A UHECR clustering. Their narrow crowding within a tiny (Cen A centric disk) observation area (below 10^{-2} of the whole AUGER sky) aligned with Cen A may occur by a very low probability, below $3 \cdot 10^{-5}$. Remaining UHECR spread group show correlations with other gamma (MeV-Al²⁶ radioactive) maps, mainly due to galactic SNR sources as Vela pulsar, the brightest, nearest GeV source [20]. Other nearest galactic gamma sources (as partially Crab and Galactic Center core) show links with UHECR via TeV correlated maps, see Fig.7. We speculate here that UHECR are also heavy radioactive galactic nuclei as Ni⁵⁶, Ni⁵⁷ and Co⁵⁷,Co⁶⁰ widely bent (tens degree up to $\geq 100^\circ$) by galactic fields. UHECR radioactivity (in beta,gamma channels) decay in flight at hundreds keV is boosted (by huge Lorentz factor $\simeq 10^9 - 10^8$) leading to TeVs gamma correlated sky anisotropy, see Fig.7. Tau neutrinos secondaries and their tau airshowers at horizons may rise (from hundreds TeVs-PeVs) in future ICECUBE,ANTARES double bang events, or in ARGO and ASHRA horizons or in AUGER or TA airshowers at PeVs-EeV energies, showing the expected Neutrino astronomy link to UHECR decay in flight.

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