



Contribution ID: 154

Type: oral

UHECR : Lightest to heavy nuclei confined in a nearest Universe

Tuesday, 24 September 2024 18:08 (17 minutes)

Ultra High Energy Cosmic Rays, UHECR, since last two decades offered new hopes for a new Astronomy. Cosmic Rays in TeV- PeV energy range, are mostly bent by galactic magnetic fields, feeding an homogeneous noisy sky. But the highest energy particle rigidity, above tens EeV, are expected to follow nearly rectilinear trajectories tracing their sources. The surprising evolution, with growing energies, of their nuclear composition from lightest nuclei to heavy ones, imply severe bounds on their source distances mostly due to the photo-nuclear-distrupction. These narrow cosmic sizes explain the few nearest candidate as Cen A, NGC 253, M82. The AUGER dipole anisotropy find an explanation by mixed sources. Most energetic events as recent Amaterasu one, could be understood by a heavy nuclei random flight by a well known nearby source. In alternative, by an exotic model, based on ZeV neutrinos ejected by far cosmic AGN, scattering onto relic, sterile, ones with mass, in dark halos.

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Session Classification: High Energy Cosmic Rays