

Extragalactic magnetic fields and directional correlations of UHECRs with local galaxies and neutrinos – Arjen van Vliet (arjen.van.vliet@desy.de)

A. Palladino, AvV, W. Winter and A. Franckowiak, MNRAS 494 (2020) 4255

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- We investigate the expectations for arrival-direction correlations between UHECRs on the one hand and neutrino arrival-directions or local star-forming galaxies on the other hand.
- We compare the expected UHECR and neutrino arrival directions with neutrino multiplet limits and the UHECR correlations with local star-forming galaxies found by the Pierre Auger Collaboration
- In this way, we determine the **likelihood of finding UHECR-neutrino correlations**, and obtain **lower limits on the local source density** and **lower limits on the strength of the local extragalactic magnetic field**.
- Taking into account:
 - the source density and evolution with redshift
 - UHECR deflections in EGMFs and the GMF
 - UHECR interactions with background photon fields
 - UHECR spectrum and composition measurements by the Pierre Auger Collaboration
- **Arrival-direction correlations between HE neutrinos and UHECRs are not expected**, even in the most optimal scenarios.
- **Arrival-direction correlations of UHECRs with star-forming galaxies suggest the presence of strong local extragalactic magnetic fields ($B > 0.64 \text{ nG Mpc}^{1/2}$) or very numerous UHECR sources ($\rho_0 > 3 \times 10^{-3} \text{ Mpc}^{-3}$).**