[구HA-03] Deflection of Ultra-high Energy Cosmic Rays by the Galactic Magnetic Field

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We investigate the influence of the galactic magnetic field (GMF) on the arrival direction (AD) of ultra-high energy cosmic rays (UHECRs) by searching the correlation with the large-scale structure (LSS) of the universe. The deflection angle of UHECRs from sources by the GMF is reflected in a source model by introducing the Gaussian smearing angle as a free parameter. Assuming the deflections by the GMF are mainly dependent on the galactic latitude, b, we divide the regions of sky by b and analyze the correlation between the AD of UHECRs and the LSS of the universe in each region varying the smearing angle. We find the deflection is strongly dependent on the galactic latitude by the maximum likelihood estimation. Specifically, the best-fit smearing angles are 9° and 84° in the high galactic latitude (HGL), $-90°<b<-60°$, and in the low galactic latitude (LGL), $-30°<b<30°$, respectively. The strength of GMF becomes stronger from the HGL to the LGL. From the results, we can estimate the strength of GMF in each region. In the LGL, for example, if we assume UHECRs are protons, we have the order of 100 μG GMF, which is much stronger than the expected value of conventional GMF model. However, if the primaries are heavy nuclei, which is consistent with the observational result of mass composition analysis, the order of GMF strength is a few μG. More data from the future experiments make it possible to study the GMF between the source of UHECRs and Earth more accurately.

[구HA-04] Insights on the rotation measure of the M87 jet on arc-second scales

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We investigate the rotation measure (RM) of the nearby low luminosity AGN M87 by using archival polarimetric VLA data at 8, 15, 22 and 43 GHz. For the first time, the RM properties of its jet are resolved at at arc-second scales. The distribution of the RM appears to be a gaussian with a mean value of ~200rad/m2 and the power spectrum follows a power law with index -2.5. A simple Kolmogorov model assuming a random turbulent magnetic fields extrinsic to the jet appears not to be adequate to explain the observed RM power spectra. On the other hand, underlying RM gradients possibly connected with the jet could be a possible interpretation.