bright or kinematically well-aligned galaxies do. Our results show that the rotation of a galaxy, particularly at its outskirt, may be significantly influenced by recent interactions with its neighbors.

[구 GC-05] The Spin-Orbit Alignment of Dark Matter Halo Pairs: Dependence on the Halo Mass and Environment

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We present a statistical analysis on the spin-orbit alignment of dark matter halo pairs in cosmological simulations. The alignment is defined as the angular concurrence between the halo spin vector ($\vec{S}$) and the orbital angular momentum vector ($\vec{L}$) of the major companion. We identify interacting halo pairs with the mass ratios from 1:1 to 1:3, with the halo masses of $10.8 < \mathrm{Log}(M_{\mathrm{halo}}/M_{\mathrm{sun}}) < 13.0$, and with the separations smaller than a sum of their virial radii ($R_{12} < R_{1,\mathrm{vir}} + R_{2,\mathrm{vir}}$). Based on the total energy (E_{12}), the pairs are classified into flybys ($E_{12} > 0$) and mergers ($E_{12} \leq 0$). By measuring the angle (θ_{SL}) between $\vec{S}$ and $\vec{L}$, we confirm a strong spin-orbit alignment signal such that the halo spin is preferentially aligned with the orbital angular momentum of the major companion. We find that the signal of the spin-orbit alignment for the flyby is weaker than that for the merger. We also find an unexpected excess signal of the spin-orbit alignment at $\cos\theta_{\mathrm{SL}} \sim 0.25$. Both the strength of the spin-orbit alignment and the degree of the excess depend only on the environment. We conclude that the halo spin is determined by the accretion in a preferred direction set by the ambient environment.

[구 GC-06] Detection of Intrinsic Spin Alignments in Isolated Spiral Pairs

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Observational evidence for intrinsic galaxy alignments in isolated spiral pairs is presented. From the catalog of the galaxy groups identified by Tempel et al. in the flux-limited galaxy sample of the Sloan Digital Sky Survey Data Release 10, we select those groups consisting only of two spiral galaxies as isolated spiral pairs and investigate if and how strongly the spin axes of their two spiral members are aligned with each other. We detect a clear signal of intrinsic spin alignment in isolated spiral pairs, which leads to the rejection of the null hypothesis at the 99.9999% confidence level via the Rayleigh test. It is also found that those isolated pairs comprising two early-type spiral galaxies exhibit the strongest signal of intrinsic spin alignment and that the strength of the alignment signal depends on the angular separation distance as well as on the luminosity ratio of the member galaxies. Using the dark matter halos consisting of only two subhalos resolved in the EAGLE hydrodynamic simulations, we repeat the same analysis but fail to find any alignment tendency between the spin angular momentum vectors of the stellar components of the subhalos, which is in tension with the observational result. Several possible sources of this apparent inconsistency between the observational and the numerical results are discussed.

[석 GC-07] Understanding the physical environment of relativistic jet from 3C 279 using its spectral and temporal information

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Blazars are a subclass of active galactic nuclei (AGNs) with relativistic jets aligned with our line of sight. The jet physics is yet to be understood, but can be studied with blazar variability (e.g., flares). The highly variable blazar 3C 279 has shown a general decline of its radio flux density since 2013, but the flux density has been increasing since 2017. To better understand physical properties of 3C 279 related with the flux variations, we analyze multi-frequency new radio data obtained with Korean VLBI Network (KVN), as well as archival data from Owens Valley Radio Observatory (OVRO) and Submillimeter Array (SMA). We measure the radio spectral variability and infer the relativistic jet properties of 3C 279. The high-cadence OVRO and SMA observations are used to construct detailed light curves of the source, and KVN data supplement the spectral coverage and allow us to locate the spectral break frequencies precisely. In this talk, we present our analysis results and interpret them using a blazar jet model.

[구 GC-08] BAT AGN Spectroscopic Survey – The parsec scale jet properties of the ultra hard X-ray selected local AGNs