correspondence method, our method predicts more satellite galaxies close to their host halo center and larger pairwise peculiar velocity of galaxies. As a result, our method reproduces the observed galaxy group mass function, the number of member galaxies, and the two-point correlation functions while the subhalo-galaxy correspondence method underestimates them.

[구 GC-06] Synchrotron Emission Modeling of Radio Relics in the Cluster Outskirts

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   Radio relics are diffuse radio sources found in the outskirts of galaxy clusters and they are thought to trace synchrotron-emitting relativistic electrons accelerated at shocks. We explore a diffusive shock acceleration (DSA) model for radio relics in which a spherical shock with the parameters relevant for the Sausage radio relic in cluster CIZA J2242.8+5301 impinges on a magnetized cloud containing fossil relativistic electrons. This model is expected to explain some observed characteristics of giant radio relics such as the relative rareness, uniform surface brightness along the length of thin arc-like radio structure, and spectral curvature in the integrated radio spectrum. We find that the observed surface brightness profile of the Sausage relic can be explained reasonably well by shocks with speed $u_s \sim 3 \times 10^3 \mathrm{km/s}$ and sonic Mach number $M_s \sim 3$. These shocks also produce curved radio spectra that steepen gradually over $(0.1 - 10)\nu_{br}$ with a break frequency $\nu_{br} \sim 1 \mathrm{GHz}$ if the duration of electron acceleration is ~60–80 Myr. However, the abrupt increase in the spectral index above ~1.5 GHz observed in the Sausage relic seems to indicate that additional physical processes, other than radiative losses, operate for electrons with the Lorentz factor, $\gamma_e > 10^4$.

[구 GC-07] Compact Stellar Systems and Dwarf Galaxies in the Pandora's Cluster Abell 2744

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   Abell 2744 is a giant merging cluster, called the Pandora's Cluster, at the redshift of z=0.308 (corresponding to a distance of 1270 Mpc). Taking the advantage of the deep high resolution images in the Hubble Frontier Field program, we study the properties of compact stellar systems including globular clusters and ultracompact dwarfs (UCDs) as well as dwarf galaxies in this cluster. We find a rich population of globular clusters and UCDs in Abell 2744. The spatial distribution of these objects is consistent with the mass map derived from lensing analysis, while showing a significant offset from the X-ray map of hot gas. The faint end of the luminosity function of the galaxies in the red sequence is fit by a flat slope, showing no faint upturn. We discuss these finding in relation with the origin of UCDs, formation of red sequence dwarf galaxies, and formation of the Pandora's cluster.

[구 GC-08] Kinematic properties of the Ursa Major Cluster

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   We present a kinematic analysis of 172 likely member galaxies of the Ursa Major Cluster. In order to understand the dynamical state of the cluster, we investigate the correlation of the cluster morphology with rotation, the velocity dispersion profile, and the rotation amplitude parallel to the global rotation direction. Both the minor axis and the rotation are very well-aligned with the global rotation axis in the outer region at half radius ($> 0.5\ R_{\max}$), but not in the inner region. The cluster exhibits low velocity dispersion and rotation amplitude profiles in the inner region, but higher in the outer. Both profiles exhibit outwardly increasing trends, suggesting an inside-out transfer of angular momentum of dark matter via violent relaxation, as revealed by a recent off-axis major-merging simulation. From Dressler-Schectman plots in the plane of galactic positions, and velocity versus position angle of galaxy, we are able to divide the Ursa Major Cluster into two substructures: Ursa Major South (UMS) and Ursa Major North (UMN). We derive a mass of $3.2 \times 10^{14} M_\odot$ for the cluster through the two-body analysis by the timing argument with the distance information (37 for UMN and 36 for UMS)

and the spin parameter of $\lambda = 0.049$. The two substructures appear to have passed each other 4.4 Gyr ago and are moving away to the maximum separation.

[구 GC-09] Probing galactic and intergalactic magnetic fields using Faraday tomography (optionally title in Korean in parentheses)

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For probing magnetic fields in the universe, rotation measure (RM) have been often used. RM allows us to obtain the information of integrated (or averaged) magnetic fields along a line of sight (LOS). On the other hand, the new technique so-called Faraday tomography will be used in practical in the near future thanks to the wide-band polarimetry by Square kilometre Array and/or its precursors. The technique allows us to obtain so-called Faraday dispersion function (FDF). FDF is the distribution function of magnetic fields and polarized sources along a LOS. Because of this fact, it is expected that the studies of magnetic fields associated with various astronomical objects will progress dramatically. Since FDF also includes information of cosmic-rays and thermal electrons, the investigation of FDF may advance the studies of dynamics of external galaxies and/or the star formation activities.

We have studied the potentials of Faraday tomography such as a tool to probe the intergalactic magnetic field associated with filaments of galaxies in the large scale structure. We have also studied the realistic FDFs of galaxies for understanding global magnetic field, cosmic-ray and thermal electrons of external galaxies. In the talk, we briefly introduce the Faraday tomography technique and report the results related to the Faraday tomography.

[구 GC-10] Near-Infrared Polarization Source Catalog of Northeastern Regions in the Large Magellanic Cloud

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We present a near-infrared photometric and polarimetric catalog of sources in the 39′ × 69′ fields on the northeastern part of the Large Magellanic Cloud (LMC), which was observed using SIRPOL, an imaging polarimeter of the Infrared Survey Facility (IRSF). This catalog contains 1,858 sources brighter than 14 mag at H band with polarization signal-to-noise ratio greater than 3 in at least one of J, H, and Ks bands. We examined the polarization structures around the star-forming regions, where coherent polarization position angle distributions are seen. We also estimated magnetic field strengths in some selected fields using Chandrasekhar and Fermi analysis. The magnetic field strengths are estimated to be 3 ~ 25 μG. The wavelength dependence of polarization degrees indicates that the polarization is most likely to be originated from dichroic extinctions by the local interstellar dusts in the LMC. We found that the polarization patterns are well aligned along the molecular clouds around star-forming regions.

[구 GC-11] ISM Properties and Star Formation Activities in IC 10 : 2D Cross Correlation Analysis of Multi-wavelength data

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We present the physical properties of star forming regions in IC 10 obtained from Korea VLBI Network (KVN) 22GHz, the Submillimeter Array (SMA) CO, Very Large Array (VLA) HI 21cm, optical (U, B, V and H-alpha), and Spitzer infrared observations. IC 10 is a nearby (~0.7Mpc) irregular blue compact dwarf (BCD) galaxy which is likely to be experiencing an intense and recent burst of star formation. This nearby infant system showing high star formation rate but low metallicity (<20% of that of the Sun) provides critical environment of interstellar medium (ISM) under which current