

구두발표초록

초청강연

[초 IT-01] SDSS-V: Pioneering Panoptic Spectroscopy

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I will describe the current progress within the Fifth Generation of SDSS. SDSS-V is an unprecedented all-sky spectroscopic survey of over six million objects. It is designed to decode the history of the Milky Way galaxy, trace the emergence of the chemical elements, reveal the inner workings of stars, and investigate the origin of planets. It will provide the most comprehensive all-sky spectroscopy to multiply the science from the Gaia, TESS and eROSITA missions. SDSS will also create a contiguous spectroscopic map of the interstellar gas in the Milky Way and nearby galaxies that is 1,000 times larger than the state of the art, uncovering the self-regulation mechanisms of galactic ecosystems. It will pioneer systematic, spectroscopic monitoring across the whole sky, revealing changes on timescales from 20 minutes to 20 years. I will highlight key areas of current scientific and technical development as well as opportunities to participate in the survey underway.

[초 IT-02] Infrared Space Missions in Korea for the Astronomical Research

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The unknown excess emission in the near-infrared is thought to be related to the evolution of galaxies in the early epoch of Universe. Due to its extremely faint brightness, it can be observed only in space. Many infrared space missions have been tried to trace the origin of the Cosmic Infrared Background through the measurement of its absolute brightness and its spatial fluctuation. In addition, the infrared observations can address questions ranging from the origin of first galaxies in the Universe to the formation of stars. I will overview the Korean infrared space missions and introduce the status of the recent international collaboration mission,

SPHEREx.

[초 IT-03] Evidence for a decelerating cosmic expansion from supernova cosmology

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Supernova (SN) cosmology is based on the assumption that the width-luminosity relation (WLR) in the type Ia SN luminosity standardization would not vary with progenitor age. Unlike this expectation, recent age datings of stellar populations in host galaxies have shown significant correlations between progenitor age and Hubble residual (HR). It was not clear, however, how this correlation arises from the SN luminosity standardization process, and how this would impact the cosmological result. Here we show that this correlation originates from a strong progenitor age dependence of the WLR and color-luminosity relation (CLR), in the sense that SNe from younger progenitors are fainter each at given light-curve parameters x_1 and c . This is reminiscent of Baade's discovery of two Cepheid period-luminosity relations, and, as such, causes a serious systematic bias with redshift in SN cosmology. We illustrate that the differences between the high- z and low- z SNe in the WLR and CLR, and in HR after the standardization, are fully comparable to those between the correspondingly young and old SNe at intermediate redshift, indicating that the observed dimming of SNe with redshift is most likely an artifact of over-correction in the luminosity standardization. When this systematic bias with redshift is properly taken into account, there is no evidence left for an accelerating universe, and the SN data now support a decelerating cosmic expansion. Since the SN cosmology has long been considered as the most direct evidence for an accelerating universe with dark energy, this finding poses a serious question to one of the cornerstones of the concordance model.

[초 IT-04] Prospects of the gravitational wave astronomy

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Since the first direct detection of the gravitational waves in 2015, more than 50 events coming from the merging of compact binaries composed of black holes and neutron stars have been observed. The simultaneous detection of

gravitational waves and electromagnetics waves from the merging of neutron stars opened up multi-messenger astronomy. The forthcoming observations with better sensitivity by the network of ground based detectors will enrich the gravitational wave source populations and provide valuable information regarding stellar evolution, dynamics of dense stellar systems, and star formation history across the cosmic time. The precision of the Hubble constant from the distance measurement of gravitational sources will improve with more binary neutron star events are observed together with the aftweglows. I will also briefly cover the expected scientific outcomes from the future detectors that are sensitive to much lower frequencies than current detectors.

외부은하 / 은하단

[구 GC-01] Statistical Analysis of Interacting Dark Matter Halos: On two physically distinct interaction types

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We present a statistical analysis of dark matter halos with interacting neighbors using a set of cosmological simulations. We classify the neighbors into two groups based on the total energy (E_{12}) of the target–neighbor system: *flyby* neighbors ($E_{12} \geq 0$) and *merging* ones ($E_{12} < 0$). First, we find a different trend between the flyby and merger fractions in terms of the halo mass and large-scale density. The flyby fraction highly depends on the halo mass and environment, while the merger fraction show little dependence. Second, we measure the spin–orbit alignment, which is the angular alignment between the spin of a target halo (\vec{S}) and the orbital angular momentum of its neighbor (\vec{L}). In the spin–orbit angle distribution, the flybying neighbors show a weaker prograde alignment with their target halos than the merging neighbors do. With respect to the nearest filament, the flybying neighbor has a behavior different from that of the merging neighbor. Finally, we discuss the physical origin of two interaction types.

[구 GC-02] Dual effects of ram pressure on star formation in multiphase disk galaxies with strong stellar feedback

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We investigate the impact of ram pressure stripping due to the intracluster medium (ICM) on star-forming disk galaxies with a multiphase interstellar medium maintained by strong stellar feedback. We carry out radiation-hydrodynamic simulations of an isolated disk galaxy embedded in a $1011 M_{\odot}$ dark matter halo with various ICM winds mimicking the cluster outskirts (moderate) and the central environment (strong). We find that both star formation quenching and triggering occur in ram pressure-stripped galaxies, depending on the strength of the winds. HI and H₂ in the outer galactic disk are significantly stripped in the presence of moderate winds, whereas turbulent pressure provides support against ram pressure in the central region, where star formation is active. Moderate ICM winds facilitate gas collapse, increasing the total star formation rates by $\sim 40\%$ when the wind is oriented face-on or by $\sim 80\%$ when it is edge-on. In contrast, strong winds rapidly blow away neutral and molecular hydrogen gas from the galaxy, suppressing star formation by a factor of 2 within ~ 200 Myr. Dense gas clumps with $nH \geq 10 M_{\odot} \text{ pc}^{-2}$ are easily identified in extraplanar regions, but no significant young stellar populations are found in such clumps. In our attempts to enhance radiative cooling by adopting a colder ICM of $T=106\text{K}$ only a few additional stars are formed in the tail region, even if the amount of newly cooled gas increases by an order of magnitude.

[구 GC-03] The Origin of the Spin–Orbit Alignment of Galaxy Pairs

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Galaxies are not just randomly distributed in space; instead, a variety of galaxy alignments have been found over a wide range of scales. Such alignments are the outcome of the combined effect of interacting neighbors and the surrounding large-scale structure. Here, we focus on the spin–orbit alignment (SOA) of galaxy pairs, the dynamical coherence between the spin of a target galaxy and the orbital angular momentum of its neighbor. Based on a recent cosmological hydrodynamic simulation, the IllustrisTNG project, we identify paired galaxies with mass ratios from $1/10$ to 10 at $z = 0$ and statistically analyze their