

population in our population synthesis models for the old stellar systems. Our models are based on the updated Y2 isochrones and HB evolutionary tracks with enhanced Helium abundance, and are calibrated to reproduce the color-magnitude diagram morphology and/or FUV color of EHB GCs in the Milky Way and in M87. We find that our composite models for the 12–13 Gyr old early-type galaxies (ETGs) can naturally reproduce both the far-UV upturn and the Balmer absorption lines of nearby ETGs. We also show, for the first time, that passive evolution of these models back to the past Universe can reproduce the GALEX UV ($0 < z < 0.2$) and the SDSS ($z \sim 0.1$) and the DEEP2 ($z \sim 0.9$) optical data. Moreover, our models with EHB population resolve the well-known discrepancy in ages derived from different Balmer lines, producing consistent ages both from the H-beta and H-delta lines. All of these are significant development compared to the previous models without EHB population.

[GC-09] The Star Formation History of Low Surface Brightness Galaxies

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The star formation histories of low surface brightness galaxies are interesting but poorly constrained. These objects tend to be rather blue, contradicting the initial impression that they may simply be faded remnants of higher surface brightness galaxies whose star formation has finished. Other scenarios span a broad range: a young mean age, less dust, a lower metallicity, perhaps even a variable IMF. Distinguishing between these scenarios requires sufficient information to build stellar population synthesis models which, if not unique, at least exclude certain possibilities. The total stellar mass (M_*) of a galaxy is most closely traced with the K_s-band light. Considering that this mass must form over a Hubble time, this in effect gives a measure of the time averaged star formation rate ($\langle \dot{M}_* \rangle$ [approximate] $M_* H_0$). H α emission traces the location of star formation, and also provides a fairly robust quantitative measure of its current rate (\dot{M}_*). We have obtained near-infrared broadband photometry and H α photometry of a large sample of low surface brightness galaxies to measure the current and the time-averaged star formation rate in order to constrain their star formation histories. The current star formation rates of LSBGs generally are higher than their past star formation rate, suggesting that the mean age of their stellar population is relatively young. This may stem from either a late epoch of

formation or a sluggish evolution. In the latter case, the star formation efficiency may be an increasing function of time, perhaps due in part to the slow build up of metals and dust. Nevertheless, star formation remains sporadic and is generally not well organized across the disk. We find a strong correlation between the ratio of current to past average star formation rate and the gas mass fraction. Galaxies with large reservoirs of gas have relatively high current SFRs. There is a conspicuous absence of high gas mass fraction, low SFR galaxies, suggesting that the observed trend is not driven by bursts of star formation with short duty cycles.

[GC-10] An HST/ACS Survey of Star Clusters in the Irregular Galaxy IC10

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We present the result of a survey of star clusters in the Local Group irregular galaxy IC10 using F435W, F606W, & F814W images obtained with the Hubble Space Telescope (HST) Advanced Camera for Surveys (ACS). Bright star clusters in IC10 are partially resolved into stars, allowing us to obtain their Color-Magnitude Diagrams (CMDs). We have found 36 star clusters based on their morphological and photometric informations. The star clusters in IC10 are divided two groups by their morphology. One third of star clusters are circular, and the others are irregular. We estimate ages of the star clusters using the CMDs. Several clusters are young, and most of them are embedded in HII regions. We also find several globular cluster candidates. We discuss the photometric and physical properties of these star clusters in regard to the formation history of star clusters in IC10.

[GC-11] An Ultraviolet Study of Star-Forming Regions in M31

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We present a comprehensive study of star-forming (SF) regions in the nearest large spiral galaxy M31. We use GALEX far-UV (1344–1786 Å, FUV) and near-UV (1771–2831 Å, NUV) imaging to detect young massive stars and trace the recent star formation across the galaxy. The FUV and NUV flux measurements of the SF regions, combined with ground-based data for estimating the

reddening by interstellar dust from the massive stars they contain, are used to derive their ages and masses. The GALEX imaging, combining deep sensitivity and entire coverage of the galaxy, provides a complete picture of the recent star formation in M31 and its variation with environment throughout the galaxy. The FUV and NUV measurements are sensitive to detect stellar populations younger than a few hundred Myrs. We detected an measured 894 SF regions, with size ≥ 1600 pc² above an average flux limit of ~ 26 mag arcsec⁻², over the whole 26 kpc galaxy disk. We derive the star-formation history of M31 within this time span. The star formation rate (SFR) from the youngest UV sources (age ≤ 10 Myrs) is comparable to that derived from Ha, as expected. We show the dependence of the results on the assumed metallicity. When star formation detected from IR measurements of the heated dust is added to the UV-measured star formation (from the unobscured populations) in the recent few Myrs, the SFR is slightly decreasing in the recent epochs, with a possible peak between 10 and 100 Myrs, and an average value of SFR ~ 0.8 or 0.9 M yr⁻¹ (for metallicity Z=0.02 or 0.05 respectively) over the last 400 Myrs.

[GC-12] Globular Cluster System of Sombrero Galaxy

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We carried out wide field multi-band observations of Sombrero galaxy (M104) using mosaic camera equipped with CTIO 4m Blanco telescope. To investigate the physical properties of globular cluster system (GCS) of M104 we first select the GC candidates based on UBV_I photometry. By applying a similar selection method applied to the study of GCS in NGC 1399 in Fornax cluster (Kim et al 2009) we found hundreds of GC candidates in Sombrero galaxy. We present both photometric properties and spatial distribution of GCs in M104. We confirm the clear bimodality of GC color distributions based on a large number of GCs. We also find that GCs in M104 are spatially more concentrated into the galaxy center. Using the archival data of Chandra X-ray observatory we compare the optical properties of GCs with the x-ray properties of low-mass X-ray binaries in M104.

■ Session : 은하/우주론 III (GC)
4월 29일(수) 16:25 - 17:55 제1발표장

[초GC-13] Three theoretical issues in physical cosmology: nonlinear clustering, dark matter, and dark energy

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We present our recent studies on three theoretical issues in physical cosmology. (1) We probe the pure Einstein's gravity contributions to the second-order density power spectrum. (2) We prove that the axion as a coherently oscillating scalar field acts as a cold dark matter in nearly all cosmologically relevant scales. (3) We study the roles of dark energy perturbation on the large-scale structure and the cosmic microwave background radiation power spectra.

[GC-14] Simulation of the Cosmic Near-Infrared Background from the Early Universe

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The diffuse near-infrared background, which has been observed by DIRBE (Diffuse Infrared Background Experiment) and IRTS (InfraRed Telescope in Space), consists of zodiacal light, radiation from low-redshift ($z < 6$) sources, and radiation from high-redshift ($z > 6$) sources. Radiation sources in the high-redshift universe are expected to be strong Lyman alpha line emitters, which contribute to the band of micro-meter range as redshifted lines. We use a structure-formation and cosmic reionization simulation results to produce a preliminary mock data for this cosmic near-infrared background from the early universe. We also tailor this data to fit the proposed specification of MIRIS (Multi-purpose InfraRed Imaging System), to be onboard the 3rd Korean Science Satellite.

[GC-15] SAVE : 사용자 친화적인 천문우주학 수치모사 프로그램

윤기윤, 배현진, 윤석진

연세대학교 천문우주학과 & 자외선우주망원경연구단

천문우주학적 N-Body 시뮬레이션을 효율적으로 구동하고 (simulate), 그 결과물을 실시간으로 분석하고(analyze), 입자의 공간분포 실시간으로 시각화하고(visualize), 누구나 쉽게 실행할 수 있어 교육용(educate)으로도 활용할 수 있는 인터페이스 프로그램인 "SAVE"(Simulating, Analyzing, Visualizing, and Educating N-body)를 개발하였다. "SAVE"는 N-Body 시뮬레이션에 관련된 모든 제반 사항(즉, 인수조정, 구동조건조정, 결과 확인, 분석처리, 동영상제작 등)을 직관적 조작이 가능한 GUI(Graphic User Interface) 프로그램 안에서 one-stop 방식으