

places to test galaxy evolution models in connection to the environments. The environment studies of galaxies at $z \sim 1$ are important because the environmental quenching seems to be an important mechanism to reduce star formation activities in galaxies at $z < 1$.

However, there have been not many studies about high redshift galaxy clusters at $z \sim 1$ because of the lack of wide and deep multi-wavelength data. We have used the multi-wavelength data from the UKIDSS DXS (J and K band), the SWIRE (4 IRAC bands), and the PAN-STARRS (g, r, i, z, y bands) in the ELAIS-N1 field. We identified galaxy cluster candidates at $0.2 < z < 1.6$ using the multi-wavelength data.

We found several superclusters where cluster candidates are concentrated on few tens of Mpc scale. Interestingly, some of the supercluster candidates consist of galaxy clusters which have high blue galaxy. We will present high redshift galaxy cluster and supercluster candidates in ELAIS-N1 field and galaxy properties in different environments including dense clusters and fields.

성간물질 / 별생성 / 우리은하

[포 IM-01] Outflow properties of DIGIT embedded sources

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We present a study of outflows on 24 embedded young stellar objects selected from the source list of the Dust, Ice, and Gas in Time (DIGIT) Herschel key program. To study the relation between the CO outflows observed in low-J transitions and the properties of protostars more consistently with a homogeneous data set, we mapped the CO outflows of the selected targets in the $J = 1-0$ and $J = 2-1$ lines with two Korean telescopes (SRAO and TRAO). We compare CO outflow force (F_{CO}) with the bolometric luminosity, (L_{bol}) bolometric temperature, and the FIR molecular line luminosities of CO, H₂O, OH, and [O I] detected by the Herschel-PACS observations. We find that F_{CO} of $J = 1-0$ is greater than that of $2-1$ by a factor of ~ 2 . The well known correlation between $F_{CO\ 2-1}$ and L_{bol} is not very evident in our sample as a

whole, but they show a rather strong correlation when IRAM 04191+1522 is excluded. IRAM 04191+1522 has relatively high $F_{CO\ 2-1}$ in spite of its low L_{bol} . This object is a well-known VeLLO, which is believed in the quiescent phase of the episodic mass accretion in the embedded stage. L_{bol} traces a current accretion, but $F_{CO\ 2-1}$ traces accretion happened long ago. Therefore, the low- L_{bol} with the high- $F_{CO\ 2-1}$ can be explained by the episodic accretion. $F_{CO\ 2-1}$ shows little correlation with individual FIR line luminosities of CO, H₂O, OH, while [O I] and total FIR line luminosity seem to have correlations with $F_{CO\ 2-1}$. This result is interpreted as the accretion energy deposits on species differently depending on shock properties, but the total FIR line luminosity sums the total accretion energy dispersed to different species.

[표 IM-02] Chemical Distributions of Carbon-Enhanced Metal-Poor (CEMP) Stars from the Baryon Oscillations Spectroscopic Survey (BOSS)

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We present spatial and chemical distributions of Carbon-Enhanced Metal-Poor (CEMP) stars in the Milky Way's halo, as observed by the Baryon Oscillation Spectroscopic Survey (BOSS). Although the BOSS was designed to obtain spectra of galaxies and quasars, it also observed numerous metal-poor main-sequence turnoff stars for the purpose of flux calibration. The stars observed in the BOSS are two magnitudes fainter ($15.5 < g < 19.2$) than those in the legacy SDSS, thus it is an extremely useful sample to probe the distant halo. Using effective temperatures, surface gravities, [Fe/H], and [C/Fe] derived for these stars by the SEGUE Stellar Parameter Pipeline (SSPP), we investigate the spatial distribution of [Fe/H] and [C/Fe], the distribution of [C/Fe], and frequency of CEMP stars among these stars. These tools enable characterization of the origin of the halo and its initial mass function.

[표 IM-03] Dark Matter Content in Three Galactic Globular Clusters - 47 Tuc, NGC 1851, and M 15

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Globular clusters (GCs) are known to have a very small amount of or no dark matter (DM). Several studies propose that GCs may have formed in individual dark halos. Thus, some of the current GCs might have a non-negligible DM content. Using the Fokker-Planck (FP) calculations, we investigate the dynamical evolution of the Galactic GCs residing in mini DM halo. We trace the initial amount of DM of 47 Tuc, NGC 1851, and M15, which is a 'disk/bulge' cluster, an 'old halo' cluster, and a 'young halo' cluster, respectively. We find that the three GCs have initially insignificant amounts of DM, less than 20 percent of the initial stellar mass of the each cluster.

[포 IM-04] A bright star catalog observed by FIMS/SPEAR

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FIMS/SPEAR is a dual-channel far-ultraviolet imaging spectrograph on board the Korean microsatellite STSAT-1, which was launched on 2003 September 27. While the instrument is optimized for the observation of diffuse emissions, it was able to observe a number of bright stars without much contamination from the diffuse background or other faint stars. In this paper, we present a catalog of the far-ultraviolet spectra for 543 stars observed by FIMS/SPEAR during its mission lifetime of a year and a half, covering over the 80% of the sky. Of these, 296 stars were also observed by the International Ultraviolet Explorer (IUE), which covered a wide spectral band including the FIMS wavelength band (1370--1710 Å). The stellar spectral types involved in the catalog span from B0 to A3. We compare the new spectra with those of IUE when they are available, and discuss some examples. We also revised the

effective area of FIMS that the FIMS stellar spectra are consistent with the IUE spectra.

[포 IM-05] Photometric monitoring of V1057 Cyg

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FU Orionis 형 천체는 태양 질량의 2배 이하인 T Tauri 별 중에서도 급격한 밝기 변화를 보이는 별들로서, 광도 증가폭이 최대 5등급에 이르는 것으로 알려져 있다. 이러한 현상의 원인은 FU Orionis를 둘러싼 강착 원반에서 나타나는 불안정성에 의해, 원반 안쪽의 물질이 한꺼번에 중심별로 쏟아져 내리기 때문인 것으로 분석된다. V1057 Cyg는 FU Orionis 형 천체 중 하나로, 1969년에 급격한 밝기 변화를 일으키며, 기존의 16등급에서 변화 직후 9등급 후반에 이르는 광도 증가를 보였다. 우리는 V, R, I 필터 대역에서 관측을 수행하였으며, 본 발표에서는 2013 ~ 2014년에 걸쳐 소백산, 레몬산 천문대 및 경희천문대에서 관측한 결과를 보고한다.

천문우주관측기술

[포 AT-01] CFRP - New Material for Telescope Manufacturing

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Carbon Fiber Re-enforced Polymer (CFRP) has replaced steel, especially for mobile devices. As CFRP is stiff and light-weight, it has been applied to airplane, sport car, golf clubs, semiconductor transporter, satellites, etc. In the telescope, the plastic material was introduced to the supporting tubes or rods connecting the primary mirror assembly and the secondary mirror structure. Nowadays, even the mirror itself is produced by CFRP. In this poster, material properties and production of CFRP telescopes are presented, and pros and cons are discussed.

[포 AT-02] Astrochem 코드를 활용한 천체에서의 화학반응

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