[포 GC-04] Photometric Reverberation Mapping of Active Galactic Nuclei with Medium-band filters and LSGT

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Reverberation mapping is one of the best way to investigate structure and kinematics of broad-line regions around central supermassive black holes of active galactic nuclei (AGN). It is usually used to estimate masses of supermassive black holes.

So far, reverberation mapping studies have achieved good results for dozens of AGN by spectroscopic monitoring. However, spectroscopic monitoring is time consuming and high cost. Here, we present result of photometric reverberation mapping with medium-band observation.

We monitored five nearby AGN which are already studied, have short time-lag, and show bright H-alpha emission lines. Observation has been performed for ~3 months with ~3 days cadence using three medium-band filters installed in LSGT (Lee Sang Gak Telescope).

We found 0.01-0.06 magnitude variations by differential photometry. Also time-lags between continuum light-curves and H-alpha emission line light-curves are calculated using Javelin software.

The result shows that our study and previous studies are consistent within uncertainty range. From verification of availability in this study, photometric reverberation mapping could be used as a powerful tool to measure central supermassive black holes for large samples and high-redshift AGN in the future.

[포 GC-05] Constraining Dust Properties of high-z Lyα Emitters using the ALMA Archive

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고적색편이의 Lyα 방출은하(Lyα emitter; LAE)는 UV 연속복사에 비해 강한 Lyα 방출선을 내는 천체로서 매우 젊고, 낮은 금속함량을 가진 원시은하이다. LAE의 강한 Lyα 방출선은 먼지가 매우 적기 때문에 소광이 거의 없이 은하에서 탈출하거나, 먼지의 국지적인 분포 때문에 나타나는 것으로 추정된다. 그러나 기존 전파관측 시설의 낮은 감도 때문에 LAE의 먼지성분은 잘 알려져 있지 않다. 우리는 Atacama Large Millimeter/Submillimeter Array (ALMA)에 의해 우연히 관측된 LAE을 찾아 먼지연속복사를 직접적으로 검출하는 시도를 해 보았다. COSMOS와 ECDFS 영역에서 발견된 약 954개의 LAE 중에서 총 38개가 ALMA로 관측된 영역에 우연히 위치한다는 것을 발견하였고, 이 중 18개의 LAE에 대해 ALMA 관측영상을 모두 더하는 방법(image stacking)을 이용하여, LAE에서 방출되는 먼지연속복사의 상한선을 결정하였다: S(0.50−0.67mm) < 63.2μJy, S(0.21−0.38mm) < 46.7μJy. 본 연구에서는 비록 직접적인 검출에는 실패하였으나, 주어진 LAE 샘플에 대한 ALMA archive 검색, 원자료 다운로드, 영상 만들기, 이미지 합침 과정을 자동화하는 Python 파이프라인을 완성하였다. 이 자동화된 과정을 이용하면, 앞으로 ALMA archive가 늘어남에 따라 감도가 높아진 실험을 쉽게 반복할 수 있을 것으로 기대된다.

[포 GC-06] The evolution of dark matter halo profiles in a cosmological context

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Environment has a significant impact on the evolution of dark halo profiles. We used a cosmological N-body simulation based on WMAP5 cosmology to study environmental effects on halo profiles.

Host haloes located in sparse regions are highly concentrated, and more massive haloes have higher concentration index. This is because mass accretion affects only the outer part of the halo and consequently increase the virial radius having no effect on the scale radius. Conversely, host haloes located in dense regions have low concentration index. This is because frequent mergers affect even the inner part of the halo. So, scale radius increases with the growth of virial radius.

Evolutions of subhalo profiles are essentially different from those of host haloes because subhaloes undergo tidal stripping. The stripping begins once a subhalo approaches closer than ~3 virial radii of the host halo. During the stripping, the inner part of the subhalo keep following NFW profile, but the mass of the outer part gradually decreases. As a result, when the subhalo reaches the pericenter of its host, only about inner 30% of the subhalo follows the NFW profile.

[포 GC-07] Parsec-scale radio properties of the X-ray selected AGN sample

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