[구 KMT-09] DEEP-South: The Progress Report

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Deep Ecliptic Patrol of the Southern Sky (DEEP-South) observation is being made during the off-season for exoplanet survey, using Korea Microlensing Telescope Network (KMTNet). An optimal combination of its prime focus optics and the 0.3 billion pixel CCD provides a four square degrees field of view with 0.4 arcsec/pixel plate scale which is also best suited for small body studies. Normal operation of KMTNet started in October 2015, and a significant portion of the allocated telescope time for DEEP-South is dedicated to targeted observation, Opposition Census (OC), of near-Earth asteroids for physical and taxonomic characterization. This is effectively achieved through multiband, time series photometry using Johnson-Cousins BVRI filters.

Uninterrupted monitoring of the southern sky with KMTNet is optimized for spin characterization of a broad spectrum of asteroids ranging from the near-Earth space to the main-belt, including binaries, asteroids with satellites, slow/fast- and non-principal axis-rotators, and thus is expected to facilitate the debiasing of previously reported lightcurve observations. Our software subsystem consists of an automated observation scheduler, a pipelined data processing system for differential photometry, and an easy-to-use lightcurve analysis toolkit. Lightcurves, spin periods and provisional determination of class of asteroids to which the lightcurve belongs will be presented, using the dataset from first year operation of KMTNet. Our new taxonomic classification scheme for asteroids will also be summarized.

[구 KMT-10] DEEP-South: P/2000 XO8 shows its true colors (P/2000 XO8 본색을 드러내다)

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고전적인 소행성과 혜성의 경계는 무너지고 있다. 처음 발견했을 때는 소행성으로 분류됐던 천체도, 예기치 않은 활동성이 나타나면 혜성의 일원이 된다. 소행성은 충돌이나 회전가속에 의해 갑자기 활동성을 나타내기도 하지만, 강한 태양복사를 견디지 못하고 오랜 시간 간직해온 휘발성 물질을 우주 공간으로 흩뿌리기도 한다. 한국천문연구원 딥사우스 (DEEP-South) 팀은, 이렇게 태양 근방에서 혜성으로 탈바꿈할 것으로 예상되는 소행성으로 2000 XO8을 지목하고, 근일점을 막 지난 2017년 10월 말부터 KMTNet 망원경으로 약 한 달간 지속 관측을 하였다. 이 기간 동안 2000 XO8은 활동성이 급격히 증가하여 선명한 꼬리를 나타냈고, 이내 검출 한계 이하로 활동성이 줄어드는 것까지 확인하였다. 이번에 혜성으로 밝혀진 2000 XO8은 한국인 또는 한국 기관에서 새로 발견 및 동정한 것으로 알려진 혜성 중에 그 주기가 8.8년으로 가장 짧다. 이는 궤도장반경이 목성보다 안쪽에 위치한다는 점에서 이례적인 일이다. 우리는 궤도 실험을 통해 2000 XO8이 현 궤도에 자리 잡은 지 오래 되지 않았으며, 또 다른 주기 혜성 265P/LINEAR에서 쪼개져 나온 조각일 가능성을 제시하고자 한다.

[구 KMT-11] Transformation of Surface Brightness Profile Types of Dwarf Galaxies : KMTNet Supernova Program Data

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We investigate surface brightness profiles (SBPs) of dwarf galaxies in field, group, and cluster environments. Using images from the Korea Microlensing Telescope Network (KMTNet) Supernova Program (KSP) for the NGC 2784 group and SDSS for the Virgo cluster, SBP types are classified into profiles with single exponential (Type I), double exponential (Type II and Type III). Type II and Type III have smaller and larger outer sizes than inner sizes, respectively. SBP types of field dwarfs are compiled from a previous study. The distributions of SBP types are different in three environments. After comparing sizes of dwarfs in different environments, we suggest that since sizes of some dwarfs are changed due to the environmental effects, SBP types are able to be transformed. It makes that the distributions of SBP types in three environments are different.

[구 KMT-12] Optimal strategy for low surface brightness imaging with KMTNet

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