probability area in GW localization map, we expect to observe early light-curve of GW optical counterpart. After identification, follow-up observation with various KMTNet bands and other telescopes like Gemini and UKIRT will also be performed. We will study collision mechanism, progenitor, and characteristics of host galaxy using observation data of GW source.

KMTNet / 행성과학

[구 KP-01] Survey of Solar System Objects using KMTNet

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Solar system small bodies are unusual objects in astronomical survey data in that they are moving on the celestial sphere. In addition, even in a normal status, their magnitudes are changing over time, firstly because their relative positions with respect to the Sun and Earth are continually changing, secondly because they are rotating bodies with non-spherical shapes. Furthermore, some of them might exhibit unexpected activities, which could be caused by mass ejection or disintegration. Detections and observations of such activities are challenging due to their abrupt nature. Therefore, continuous monitoring observations of large number of Solar system small bodies are required to systematically obtain detailed/transient information about them. Since 2018/2019 winter, we have launched a new project using Korea Microlensing Telescope Network (KMTNet) for detecting such transient phenomena of Solar system objects. Our main goal is to monitor the magnitudes and detect sudden brightness changes. We also plan to discover interesting new objects, and monitor rotational brightness oscillations of asteroids. We intend to monitor the magnitudes of ~ 20,000 known Solar system small bodies per night, and acquire lightcurves of ~ 1,000 asteroids.

[구 KP-02] Ecliptic Survey for Unknown Asteroids with DEEP-South

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Eight hundred thousand asteroids in the solar system have been identified so far under extensive sky surveys. Kilometer to sub-km sized asteroids, however, are still waiting for discovery, and their size and orbital distribution will provide a better understanding of the collisional and dynamical evolution of the solar system.

In order to study the number of asteroids which is detectable with 1.6 m telescope and their orbital distribution, we conducted a small observation campaign as a part of Deep Ecliptic Patrol of the Southern Sky (DEEP-South) project, which is an asteroid survey in the southern hemisphere with Korea Microlensing Telescope Network (KMTNet). We observed the ecliptic plane near opposition (2°x2° field of view centering on α=22h40m31s, δ =-08°22′58″) in August 2018, and identified 464 moving objects by visual inspection.

As a result, 266 of 464 moving objects turn out to be previously unknown asteroids, and their signal to noise ratio is below two on numerous occasions. Most of the newly detected objects are main belt asteroids (MBAs), while three Hildas, one Jupiter trojan, and two Hungarias are also identified. In this meeting, we report the differences in the orbital distributions between the previously known asteroids and newly discovered ones using statistical methods. We also talk about the observational bias of this survey and suggest future works.

[구 KP-03] A Recent Dust Ejection from an Inner Mainbelt Asteroid

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Active asteroids are celestial bodies that distinctively have asteroid-like orbital elements but show comet-like activity. They exhibit the activities due to the sublimation of volatile ices, impacts with small objects or break-up by rapid rotations. As of 2019 February, 30 active asteroids are detected in the outer main belt (i.e., the semimajor axes a>2.5 au) while only 3 of them in the inner main belt (a<2.5 au), suggesting that sublimation of remaining icy volatiles can be one of the most

fundamental mechanisms for the activities.

A sudden activity of (6478) Gault was reported in early 2019. The asteroid was discovered in 1988 and has exhibited its inactive appearance until the end of last year. Soon after the report, we have conducted imaging observations using the Seoul National University Observatory 1.0-m telescope and the Korea Microlensing Telescope Network (KMTNet) to monitor the activity. The observed images showed a primary dust tail that consists of dust grains ejected early November in 2018. Later, another tail developed, indicating further dust ejection occurred around late December 2018. Our model simulation to reproduce the morphology of the dust cloud suggests that the slightly-curved primary dust tail results from a continuous dust ejection over weeks. The total mass of ejecta was estimated to XX kg (XX% of the asteroid mass). Such continuous dust ejection for the inner active asteroids was unexpected because ice might have already sublimated from subsurfaces of inner main belt. Based on our observational evidence, we will discuss how inner asteroids are activated and eject dust continuously.

[구 KP-04] Thermal Radiation Pressure Force on Atmosphereless Bodies

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Thermal fracture and cracking near the perihelion are found to be a possible mechanism to produce the dust trail of the near-Earth asteroid, (3200) Phaethon (Jewitt and Li, 2013, ApJ 771, L36). It is, however, not well understood how the debris particles were escalated from the regolith against the asteroid's gravity. Thus, the scenario that these debris particles are responsible for the detected activities (Li and Jewitt, 2013, ApJ, 145, 154), is not complete yet. Here, we hypothesize that the thermal radiation pressure around the perihelion passage would exert substantial force outwards from the regolith on dust grains, and they can be lifted up and contributes the dust tail formation with further help of solar radiation pressure. Our modeling indicates that particles with sizes of roughly ~1-10 micron can be ejected from Phaethon by the mechanism, while a detailed model of gravitational field is required for accurate estimation of the particle size range. Our idea is not necessarily limited to Phaethon case, but is applicable to any atmosphereless bodies.

[구 KP-05] Polarimetry of solar system small bodies using the Seoul National University 61cm telescope and TRIPOL

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It is known that lights scattered by comets and asteroids are partially polarized. From polarimetric observations of those objects, we can investigate physical properties, such as albedos, sizes of cometary dust particles and regolith of asteroids. Since the polarization degrees of those objects highly depend on their phase angles (Sun-object-observer's angles), long-term monitoring observations are required. Moreover, comets show unforeseeable activations (i.e., outbursts) which need follow-up observations to understand the mechanism. In order to realize such monitoring and transient observations, we installed the Triple-Range Imager and POLarimeter (TRIPOL) on the 61cm telescope of Seoul National University (Hereafter, SNU) Gwanak campus. With this combination, we can obtain g', r', i' bands photopolarimetric images simultaneously with 8.0'×8.0' field of view and pixel resolution of 0.94" pixel^{-1}.

Here, we make a presentation regarding the photometric and polarimetric performances of TRIPOL on the SNU 61cm telescope. In addition, we introduce initial polarimetric results of asteroid and comets with the instruments. First, we determine the limiting magnitudes (defined as magnitudes for S/N=5) of 15.17±0.06 (g'-band), 15.68±0.01 (r'-band), 16.24±0.03 (I'-band), respectively, with total 240-seconds exposure (four 60-seconds exposure images, each was taken at different rotation angle for the half-wave plate). Second, we found that the instrumental polarization is negligibly small, (-0.32±0.04% in the g', -0.36±0.05% in the r' and -0.21±0.04% in the i'-bands), while the polarization efficiencies are large enough to maximize the performance (i.e., 97.52±0.03% in the g', 98.83±0.02% in the r' and 99.15±0.02% in the i'-bands). With the instruments, we made observations of three Jupiter-family comets, 21P/Giacobini-Zinner, 38P/Stephan-Oterma, and 46P/Wirtanen and plan to obs☆erve one near-Earth asteroid, (433) Eros, on a trial basis. Especially for comets, we discriminate signals from dust and gas to eliminate gas contamination, which are known to change observed degree of linear polarization, using multi-band images. We confirm that the phase angle dependency of these comets are consistent with previous observations, probably because