SDSS galaxy sample and cosmological simulations

Sungwook E. Hong[1], Inkyu Park[1], Hyunmo Gu[1], Jua Kim[1], Yungi Kwon[1], Hannah Ji[1]
[1]*University of Seoul*

We introduce a newly established cosmology research group at the University of Seoul. We also present our recent progress with SDSS Main Galaxy samples and various types of cosmological simulations as follows: (1) A hint for the periodicity of very large-scale structures is found in both SDSS observation and the Horizon Run 4 (HR4) simulation. (2) New galaxy clustering and void finding algorithms, which are thought to be sensitive to the topological shape of galaxy distribution, are developed and tested in both SDSS and HR4 data. (3) Properties such as radial distribution of galaxies or cosmological shock waves are studied in hydrodynamic simulations.

특별세션 KMTNet

[포 KMT-01] Spin and 3D shape model of Mars-crossing asteroid (2078) Nanking

Dong-Heun Kim[1,2], Jung-Yong Choi[3], Myung-Jin Kim[2], Hee-Jae Lee[1,2], Hong-Kyu Moon[2], Yong-Jun Choi[2,4], Yonggi Kim[1]
[1]*Department of Astronomy and Space Science, Chungbuk National University,* [2]*Korea Astronomy and Space Science Institute,* [3]*Ilsan Astrocamp,* [4]*University of Science and Technology.*

Photometric investigations of asteroids allow us to determine their rotation states and shape models (Apostolovska et al. 2014). Our main target, asteroid (2078) Nanking's perihelion distance (q) is 1.480 AU, which belongs to the Mars-crossing asteroid (1.3 < q < 1.66 AU). Mars-crossing asteroids are objects that cross the orbit of Mars and regarded as one of the primary sources of near-Earth asteroids due to the unstable nature of their orbits. We present the analysis of the spin parameters and 3D shape model of (2078) Nanking. We conducted Cousins_R-band time-series photometry of this asteroid from November 26, 2014 to January 17, 2015 at the Sobaeksan Optical Astronomy Observatory (SOAO) and for 25 nights from March to April 2016 using the Korea Microlensing Telescope Network (KMTNet) to reconstruct its physical model with our dense photometric datasets. Using the lightcurve inversion method (Kaasalainen & Torppa 2001; Kaasalainen et al. 2001), we determine the pole orientation and shape model of this object based on our lightcurves along with the archival data obtained from the literatures. We derived rotational period of 6.461 h, the preliminary ecliptic longitude (λ_p) and latitude (β_p) of its pole as $\lambda_p \sim 8^\circ$ and $\beta_p \sim -52^\circ$ which indicates a retrograde rotation of the body. From the apparent W UMa-shaped lightcurve and its location in the rotation frequency-amplitude plot of Sheppard and Jewitt (2004), we suspect the contact binary nature of the body (Choi 2016).

[포 KMT-02] Searching for Dwarf Galaxies in deep images of NGC 1291 obtained with KMTNet

Woowon Byun[1,2], Minjin Kim[1,3], Yun-Kyeong Sheen[1], Hong Soo Park[1], Luis C. Ho[4,5], Joon Hyeop Lee[1,2], Hyunjin Jeong[1], Sang Chul Kim[1,2], Byeong-Gon Park[1,2], Kwang-Il Seon[1,2], Jongwan Ko[1,2]
[1]*Korea Astronomy and Space Science Institute,* [2]*University of Science and Technology, Korea,* [3]*Kyungpook National University,* [4]*Kavli Institute for Astronomy and Astrophysics, China,* [5]*Department of Astronomy, School of Physicys, Peking University, China*

We present newly discovered dwarf galaxy candidates in deep wide-field images of NGC 1291 obtained with KMTNet. We initially identify 20 dwarf galaxy candidates through visual inspection. 13 out of 20 appears to be high priority candidates, according to their central surface brightness ($\mu_{0,R}$ ~ 22.5 to 26.5 mag arcsec^{-2}) and effective radii (350 pc to 1 kpc). Structural and photometric properties of dwarf candidates appear to be consistent with those of ordinary dwarf galaxies in nearby groups and clusters. Using imaging simulations, we demonstrate that our imaging data is complete up to 26 mag arcsec^{-2} with > 70% of the completeness rate. In order to find an optimal way to automate detecting dwarf galaxies in our dataset, we test detection methods by varying parameters in *SExtractor*. We find that the detection efficiency from the automated method is relatively low and the contamination due to the artifacts is non-negligible. Therefore, it can be only applicable for pre-selection. We plan to conduct the same analysis for deep images of other nearby galaxies obtained through KMTNet Nearby Galaxy Survey (KNGS).