로 수행할 수 있도록 함으로써, N-body 시뮬레이션에의 접근성을 획기적으로 제고하였다. "SAVE"에 내장된 N-body 시뮬레이션 알고리즘은 SuperBox Code(Fellhauer et al. 2000)이며, 독자적인 기술로 핵심 알고리즘을 개선해 약 30배의 연산속도 향상을 이루었다. "SAVE"는 GPU를 기반으로 하는 DirectX를 사용해 시뮬레이션 결과물을 별도의 후처리 없이 3차원 입체공간에 실시간으로 표현할 수 있다. 이렇게 구현된 3차원 입체공간상에는 가상의 카메라를 배치, 원하는 위치와 각도로 이동/회전할 수 있고, 특정한 부분을 확대/축소할 수 있으며, 연속된 결과물 중에서 원하는 단계를 빠르게 찾아 갈 수 있어 기존 공간분석에 소요되는 시간과 수고를 크게 절약할 수 있다. "SAVE"는 저자에게 요청하여 설치프로그램을 받아 사용할 수 있다.

[GC-16] The Evolution of Satellite Dark Halos during merger

Dowon Yi, Taysun Kimm, Sukyoung K. Yi
Department of Astronomy, Yonsei University

We present a preliminary result of the dynamical evolution of the satellite halo during halo merger. For this purpose, we have performed a set of numerical n-body simulations using the GADGET2 code. We adopt the NFW or the Hernquist density profile as the halo models. Our simulations cover a wide parameter space in terms of mass ratio (Msat/Mhost), energy, and eccentricity. We find that the mass-loss of the satellites is primarily affected by the orbital parameter and the shape of the host halo potential, whereas mass ratio has a minor effect for each orbital period. Interestingly, the fractional mass-loss turns out to be nearly the same for each period. We also find that the shape of the host halo potential mainly determines the merging time-scale. We will discuss how internal structure of the satellite halo changes during merger.

[GC-17] The Satellite Overquenching Problem

Sukyoung K. Yi and Taysun Kimm
Department of Astronomy, Yonsei University

Satellite galaxies in groups and clusters show much more rigorous star formation activities compared to central galaxies. This comes from two effects: one is that some satellites are late type while centrals are mostly early type, the other is that even among the early types alone satellites show more star formation than centrals do. However, this empirical fact is reproduced by none of the realistic galaxy formation models built from theory ab initio. We call this 'the satellite overquenching problem'. We believe that this shortcoming of models is due to the currently-inaccurate prescriptions on the supply and stripping of hot gas on the satellites while they are accreted to the cluster/group halo. We present a new but preliminary solution to this problem, considering Ram pressure, tidal stripping and stellar mass loss realistically.

■ Session : 태양계 (SS)
4월 29일(수) 09:00 - 10:30 제2발표장

[SS-01] Integrated ray tracing simulation of spectral bio-signatures from high resolution 3D earth model

Dongok Ryu[1], Jinsuk Hong[2], Soomin Jeong[1], Yukyeong Jeong[1], Jae-Min Lee[3], Sun Jeong Ham[1] and Sug-whan Kim[1]
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A new Integrated Ray tracing (IRT) model capable of computing various spectral bio-signatures of the Earth is reported. The model includes the Sun, the full 3D earth and moon, and a hypothetical optical instrument, all combined into single ray tracing environment in real scale. The high resolution 3D earth surface is defined using GSHHS coastal line data, realistic reflectance and BSDF characteristics depending on wavelength, and vegetation types and their distributions. Using the in-house designed space optical instrument, we then examined the model validity by simulating earth observation from both L1 halo and Moon orbits respectively. This is followed by the derivation of phase dependent disk averaged spectra, light curves and NDVI indexes, leading to construction of the observed disk averaged spectra at the instrument detector plane. The details of model and computational procedure are presented with the simulation results.

[SS-02] MMT 시계열 관측 자료를 이용한 소행성 검출 및 광도곡선 분석

배영호[1,2], 변용익[1], 장서원[1,2], 임홍서[2]
[1]연세대학교 천문우주학과 [2]한국천문연구원

MMT 6.5미터 대형광학망원경을 이용하여 얻어진 시계열 영상자료를 대상으로 소행성 관측연구가 진행 중이다. 전체자료의 일부에서 약 120여 개의 소행성을 검출하였고, 이들에 대한 정밀측광을 수행하여 각 소행성들의 광도곡선을 얻었다. 시계열 영상자료 전체적으로는 약 300개 정도의 소행성이 촬영되었을 것으로 추정된다. 소행성의 광도곡선은 광학관측으로 소행성의 회전율(spin rate)을 측정할 수 있는 중요한 자료이다. 소행성 광도곡선분석에 대한 국외의 선행연구 결과에 따르면, 소행성의 회전율

은 그 크기와 밀접한 관련이 있는 것으로 알려져 있으며, 이들의 회전율 분포에 대한 통계적 접근방식으로 소행성의 생성과 진화에 관한 중요한 변수들을 연구할 수 있다. 이 연구에서 검출한 소행성들의 위치좌표를 MPC(Minor Planet Center)의 소행성 자료와 비교해 본 결과, 대부분 아직 공식적으로 보고되지 않은 것으로 밝혀졌다. 또한 이들의 회전주기를 측정한 결과 수십 분에서 수 시간 정도로 다양하게 나타나고 있고, 또 6.5미터 대형망원경의 집광력을 감안할 때 매우 작은 소행성들을 포함할 것이므로, 기존의 소행성의 회전율과 크기의 상관관계를 검증하고 나아가 확장할 수 있을 것으로 기대된다.

[SS-03] Population Model of Main Belt Asteroids by Debiasing Method

Hahn Yi[1,2], Yong-Ik Byun[1], and Hong-Kyu Moon[2]

[1]Department of Astronomy, Yonsei University
[2]Korea Astronomy and Space Science Institute

Understanding the inner solar system's evolution requires the study of the main asteroid belt structure and the population of asteroids. This is also necessary in order to estimate the probability of asteroid collisions with Earth. We are trying to build a four dimensional asteroid population model, i.e. functions of semi-major axis, eccentricity, inclination, and absolute magnitude, on a large set of observational data from major survey programs. All asteroid survey observations, however, are subjected to very severe observational biases. These biases originate not only from the asteroid orbits in relation to Earth's location, but also from the luminosity function and the distribution of observed angular velocity on the sky plane. We carefully define the bias function for each major survey program based on the observational data and pointing history kindly provided by the Minor Planet Center. Our study is based on the data from LINEAR, Catalina, SPACEWATCH, etc between 2003 and 2008. This is by far the largest data analyzed together for this purpose. Interim results will be reported for observational bias functions and populations of main belt asteroids.

[SS-04] The Interplanetary Dust Cloud Revealed by AKARI IRC All-Sky Survey Observations

Jeonghyun Pyo[1], Seung Soo Hong[1], Suk Minn Kwon[2], Munetaka Ueno[3,4], Masateru Ishiguro[5], Fumihiko Usui[4], Takafumi Ootsubo[4], Daisuke Ishihara[4], Tadashi Mukai[6], and AKARI IRC Team

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The AKARI's all-sky survey in six wavebands provides us with a priceless set of data for studying the global and local structures of the interplanetary dust cloud complex. We are currently analyzing the 9 and 18 μm band data taken by the Infrared Camera aboard AKARI. The zodiacal emission (ZE) dominates the sky brightness in these bands. This talk details the data reduction procedure and presents the resulting maps of the ZE brightness distribution. A careful comparison of the observed ZE maps with the ones synthesized with the model of Kelsall et al. (1998) suggests needs to revise their dust density profiles of the IRAS bands. We also found that the seasonal brightness variations of the north and south ecliptic poles cannot be fully reproduced by currently available models of the interplanetary dust cloud. Fourier-filtered brightness maps are prepared to resolve small-scale structures in the ZE distribution near the ecliptic plane. These will reveal new features of the faint dust bands discovered by Infrared Astronomical Satellite.

[SS-05] Retrieval of Emissivity and Temperature of the Local Interplanetary Dusts

Suk Minn Kwon[1], Jeonghyun Pyo[2], Seung Soo Hong[2], Munetaka Ueno3[,4], Masateru Ishiguro[5], Fumihiko Usui[4], Takafumi Ootsubo[4],and AKARI IRC Team

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We analyzied AKARI IRC pointing observations(IRC02) which were carried out at around perihelion and aphelion positions along the ecliptic with both NIR/MIR-S and MIR-L. By applying Lambda-differentiation method, we retrieved mean volume emissivity of the local interplanetary dusts(IPDs) at 6 IR wavelengths. The IPD temperature and mean volumetric absorption cross-section were also determined after making color correction. This is the first direct measurement of mean volume emissivity and temperature of the local IPDs. We will also discuss heliocentric distance variations of temperature and emissivity which will give some constraints to the power-law exponents in the relation for the dust temperature and IPD density.

[SS-06] Photometric Observation of Jupiter Family Comet 17P/Holmes