표에서는 거대 망원경 가동이 가동되기까지의 세계 천문학계 연구 동향과 거대망원경 시대의 전망을 조망함으로써 우리나라 광학천문학 분야의 중기 및 장기적 미래 전망에 대하여 고찰한다.

■ Session : 우주환경 I
4월 29일(금) 13:00 - 14:00 제1발표장

[Ⅴ-1-1] Focal Plane Damage Analysis by the Space Radiation Environment in Aura Satellite Orbit

Dai Ho Ko[1], Jeoung Heum Yeon[1], Seonghui Kim[1], Sang Soon Yong[1], Seunghoon Lee[1], Enu Sup Sim[1], Cheol Woo Lee[2], Johan de Vries[3]

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Radiation-induced displacement damage which has caused the increase of the dark current in the focal plane adopted in the Ozone Monitoring Instrument (OMI) was studied in regards of the primary protons and the secondaries generated by the protons in the orbit. By using the Monte Carlo N-Particle Transport Code System (MCNPX) version 2.4.0 along with the Stopping and Range of Ions in Matter version 2010 (SRIM2010), effects of the primary protons as well as secondary particles including neutron, electron, and photon were investigated. After their doses and fluxes that reached onto the charge-coupled device (CCD) were examined, displacement damage induced by major sources was presented.

[Ⅴ-1-2] Comparison of CME radial velocities from the flux rope model and the ice cream cone model

Tae-Hyeon Kim, Yong-Jae Moon, Hyeon-Ok Na

School of Space Research, KyungHee University, Korea

Coronal Mass Ejections (CMEs) are enormous eruptions of plasma ejected from the Sun into interplanetary space, and mainly responsible for geomagnetic storms and solar energetic particle events. It is very important to infer their direction of propagation, speed and their 3-dimensional configurations in terms of space weather forecast. Two STEREO satellites provide us with 3-dimensional stereoscopic measurements. Using the STEREO observations, we can determine the 3-dimensional structure and radial velocity of the CME. In this study, we applied three different methods to the 2008 April 26 event: (1) Ice cream Cone Model by Xue (2005) using the SOHO/LASCO data, (2) Flux rope model by Thernisien (2009) using the STEREO/SECCHI data, (3) Flux rope model with zero angle using the STEREO/SECCHI data. The last method in which separation angle of flux rope is zero, is similar to the ice cream cone model morphologically. The comparison shows that the radial speeds from three methods are estimated to be about 750km/s and are within ±120km/s. We will extend this comparison to other CMEs observed by STEREO and SOHO/LASCO.

[Ⅴ-1-3] Comparison to Cone Models for Halo Coronal Mass Ejections

HyeonOck Na, Yong-Jae Moon

School of Space Research, KyungHee University, Korea

Halo coronal mass ejections (HCMEs) are mainly responsible for the most severe geomagnetic storms. To minimize the projection effect of the HCMEs observed by coronagraphs, several cone models have been suggested. These models allow us to determine the geometrical and kinematic parameters of HCMEs : radial speed, source location, angular width, and the angle between the central axis of the cone and the plane of the sky. In this study, we compare these parameters form two representative cone models (the ice-cream cone model and the asymmetric cone model) using well-observed HCMEs from 2001 to 2002. And we obtain the root mean square error (rms error) between observed projection speeds and calculated projection speeds for both cone models. It is found that the average rms speed error (89 km/s) of the asymmetric cone model is a little smaller than that (107 km/s) of the ice-cream cone models, implying that the radial speeds from both models are reasonably estimated. We also find that the radial speeds obtained from two models are similar to each other with the correlation coefficient of about 0.8.

■ Session : 우주환경 II
4월 29일(금) 14:10 - 15:30 제1발표장

[Ⅵ-1-1] The Probability of Solar Proton Events (SPEs) depending on solar and interplanetary type II bursts

Sae-Poom Youn[1], Young-Jae Moon[1,2] ,and Jin-Hye Park[2]

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Solar Proton Events (SPEs, ≥ 10 $cm^{-1}s^{-1}sr^{-1}$ with >10 MeV) are very important for space weather forecasting. It is well known that they are associated with solar flares and/or CME-driven shocks. Especially, the CME-driven shocks have been observed as solar and interplanetary type II bursts. In this study, we estimated the occurrence probability of SPEs depending on three groups: (1) metric, (2) decameter-hectometric (D-H), and (3) meter-to-kilometric (m-to-km) type II bursts. For this work, we used SPEs and all available type II burst data in 1996-2004. The primary findings of this study are as follows. First, the majority (77%) of the m-to-km type II bursts are associated with SPEs and its probability is noticeably higher than D-H type II bursts

(56%) and metric type II bursts (45%). Second, the SPE probability strongly depend on longitude: eastern (0%), center(45%), and western (33%) for X-class associated metric type II bursts, eastern (15%), center (55%), and western (50%) for X-class associated D-H type II bursts, eastern (17%), center (77%), and western (64%) for X-class associated m-to-km type II bursts. Third, for m-to-km type II bursts, the SPE probability increases with CME speed: 400km/s≤V <1000km/s (36%), 1000km/s ≤V<1500km/s (40%), 1500km/s≤V (66%). Finally, we expect that these results will be used for setting up more reasonable solar proton event forecasting models.

[VI-1-2] Relationship between plasma flows and the near-Earth tail dipolarizations

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The magnetic dipolarizations at the tail are often, if not always, associated with plasma flows of some magnitude. The associated flow direction is known to be earthward most often but not necessarily always. It is the primary goal of this paper to clarify the association between dipolarizations and the associated flow characteristics in general, but with a primary emphasis on tailward flow cases. Based on a number of dipolarizations that we identify at the near-Earth tail using the THEMIS tail observations we first confirm that dipolarizations can in general initiate in association with both earthward and tailward flows. Also, the main direction of the plasma flow, whether being earthward or tailward, is not critical in determining the intensity of the dipolarizations. We actually identify some events of tailward flow-associated dipolarizations that are as much intense as the earthward flow-associated events. The occurrence rate of the tailward flow-associated dipolarizations is mainly concentrated in the radial region of < 10 RE and in the local time region of 22-01 hr. However, its relative occurrence rate is rather low, ~19 % in the radial region and ~15.3 % in the local time region, as compared to that for the events associated with all other types of flows. Furthermore, the flow direction often changes no matter whether it is initially earthward or tailward near the onset time. As a consequence, the net transport of the magnetic flux during the main duration of the dipolarization process is earthward for nearly all of the dipolarizations that initiate with dominantly tailward flows near the onset, as is the case for those that initiate with dominantly earthward flows.

[VI-1-3] Kinetic Properties of Plasmas at Earth's Bow Shock

Ensang Lee[1], George Parks[2], Mark Wilber[2], and Naiguo Lin[2]
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Earth's bow shock is a transition layer across which properties of plasmas change irreversibly. Although some features of the bow shock are well described by continuities of fluxes of various macroscopic quantities, particle dynamics across the transition layer is very complicated. Observed phase space distributions show multiple ion beams and partially thermalized ions around the transition layer. In some cases, both hot magnetosheath ions and cold solar wind ions simultaneously exist in the magnetosheath. Electrons around the transition layer usually have flat-top distributions with temperature anisotropy. From the observed properties of the phase space distributions we will discuss thermalization processes that occur across the shock transition.

[VI-1-4] PIC simulation study of the turbulence of the Alfven ion-cyclotron waves induced by electromagnetic ion-cyclotron instability

Helen H. Kaang, Chang-Mo Ryu, Chinook Mok, and Kicheol Rha
Department of Physics, POSTECH

The turbulence in the nonlinear regime of the electromagnetic ion-cyclotron (EMIC) instability are investigated via a particle-in-cell (PIC) simulation. EMIC instability arises from anisotropic ion temperature and excites the Alfven ion-cyclotron (AIC) waves. The excited AIC waves undergo inverse-cascade via the nonlinear wave interaction of two AIC and one ion density modes. Induced ion density modes are the normal and second harmonic ion-acoustic (IA) waves. They have the same group velocity, but the second harmonic IA mode only generates the longitudinal electric field.

■ Session : 기기 I
4월 29일(금) 09:00 - 10:20 제2발표장

[IV-2-1] GMT 부경 FSM의 시험모델 개발 현황

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한국천문연구원은 Giant Magellan Telescope (GMT)의 부경 중의 하나인 Fast Steering Mirror (FSM)의 시험모델을 개발 중이다. 구경 1.06m의 비축 비구면 반사경을 시험제작하기 위하여 경량화 설계를 하였고 실제 가공 준비를 하고 있다. 반사경의 tip-tilt 제어를 위해서는 mathmatical model을 작성하고 실제 test-bed를 제작하였다. 이 논문에서는 FSM 시험모델의 개발