performed using URAN and SYNTHE programs. These spectra allow us to determine the effective temperatures, surface gravities, microturbulent velocities and, chemical abundances. Bond et al. (2008) found chemical abundance for 11 elements, but using the Spectrum synthesis method we have so far determine about 30 elements. We have derived iron metallicity [FeI/H] = -0.42±0.03, [FeII/H] = -0.43±0.012, and surface gravity, log g = 4.48, in good agreement with values from previous investigation. This research was supported by the Korea Astronomy and Space Science Institute under the R&D program(Project No. 2015-1-320-18) supervised by the Ministry of Science, ICT and Future Planning.

[구 ST-11] Bright stars observed by FIMS/SPEAR

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In this paper, we present a catalogue of the spectra of bright stars observed during the sky survey using the Far-Ultraviolet Imaging Spectrograph (FIMS), which was designed primarily to observe diffuse emissions. By carefully eliminating the contamination from the diffuse background, we obtain the spectra of 70 bright stars observed for the first time with a spectral resolution of 2-3Å over the wavelength of 1370-1710 Å. The far-ultraviolet spectra of an additional 139 stars are also extracted with a better spectral resolution and/or higher reliability than those of the previous observations. The stellar spectral type of the stars presented in the catalogue spans from O9 to A3. The method of spectral extraction of the bright stars is validated by comparing the spectra of 323 stars with those of the International Ultraviolet Explorer (IUE) observations.

태양 및 우주환경

[박 SS-01] Steady-State Solution for Solar Wind Electrons by Spontaneous Emissions

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The solar wind electrons are made of three or four distinct components, which are core Maxwellian background, isotropic halo, and super-halo (and sometimes, highly field-aligned strahl component which can be considered as a fourth element). We put forth a steady-state model for the solar wind electrons by considering both the steady-state particle and wave kinetic equations. Since the steady-state solar wind electron VDFs and the steady-state wave fluctuation spectrum are related to each other, we also investigate the complete fluctuation spectra in the whistler and Langmuir frequency ranges by considering halo- and superhalo-like model electron VDFs. It is found that the energetic electrons make important contributions to the total emission spectrum. Based on this, we complete the steady-state model by considering both the whistler and Langmuir fluctuations. In particular, the Langmuir fluctuation plays an important role in the formation and maintenance of nonthermal electrons.

[구 SS-02] Comparison of Empirical Magnetopause Location Models with Geosynchronous Satellite Data

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In this study, we identify 307 the geosynchronous magnetopause crossing (GMC) using geosynchronous satellite observation data from 1996 to 2010 as well as make an observational test of magnetopause location models using the identified events. For this, we consider three models: Petrinec and Russell (1996), Shue et al. (1998), and Lin et al. (2010). To evaluate the models, we estimate a Probability of Detection (PoD) and a Critical Success Index (CSI) as a function of year. To examine the effect of solar cycle phase, we consider three different time periods: (1) ascending phase (1996-1999), (2) maximum phase (2000-2002), and (3) descending phase (2003-2008). Major results from this study are as follows. First, the PoD values of all models range from 0.6 to 1.0 for the most of years. Second, the PoD values of Lin et al. (2010) are noticeably higher than those of the other models. Third, the CSI values of all models range from 0.3

to 0.6 and those of Shue et al. (1998) are slightly higher than those of the other models. Fourth, the predicted magnetopause radius based on Lin et al.(2010) well match the observed one within one earth radius, while that on Shue et al. (1998) overestimate the observed one by about 2 earth radii. Fifth, the PoD and CSI values of all the models are better for the solar maximum phase than those for the other phases, implying that the models are more optimized for the phase.

[구 SS-03] Collisionless Magnetic Reconnection and Dynamo Processes in a Spatially Rotating Magnetic Field

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Spatially rotating magnetic fields have been observed in the solar wind and in the Earth's magnetopause as well as in reversed field pinch (RFP) devices. Such field configurations have a similarity with extended current layers having a spatially varying plasma pressure instead of the spatially varying guide field. It is thus expected that magnetic reconnection may take place in a rotating magnetic field no less than in an extended current layer. We have investigated the spontaneous evolution of a collisionless plasma system embedding a rotating magnetic field with a two-and-a-half-dimensional electromagnetic particle-in-cell (PIC) simulation. In magnetohydrodynamics, magnetic flux can be decreased by diffusion in O-lines. In kinetic physics, however, an asymmetry of the velocity distribution function can generate new magnetic flux near O- and X-lines, hence a dynamo effect. We have found that a magnetic-flux-reducing diffusion phase and a magnetic-flux-increasing dynamo phase are alternating with a certain period. The temperature of the system also varies with the same period, showing a similarity to sawtooth oscillations in tokamaks. We have shown that a modified theory of sawtooth oscillations can explain the periodic behavior observed in the simulation. A strong guide field distorts the current layer as was observed in laboratory experiments. This distortion is smoothed out as magnetic islands fade away by the O-line diffusion, but is soon strengthened by the growth of magnetic islands. These processes are all repeating with a fixed period. Our results suggest that a rotating magnetic field configuration continuously undergoes deformation and relaxation in a short time-scale although it might look rather steady in a long-term view.

[구 SS-04] Dependence of spacecraft anomalies at different orbits on energetic electron and proton fluxes

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In this study we investigate 195 spacecraft anomalies from 1998 to 2010 from Satellite News Digest (SND). We classify these data according to types of anomaly : Control, Power, Telemetry etc. We examine the association between these anomaly data and daily peak particle (electron and proton) flux data from GOES as well as their occurrence rates. To determine the association, we use two criteria that electron criterion is >10,000 pfu and proton criterion is >100 pfu. Main results from this study are as flows. First, the number of days satisfying the criteria for electron flux has a peak near a week before the anomaly day and decreases from the peak day to the anomaly day, while that for proton flux has a peak near the anomaly day. Second, we found a similar pattern for the mean daily peak particle (electron and proton) flux as a function of day before the anomaly day. Third, an examination of multiple spacecraft anomaly events, which are likely to occur by severe space weather effects, shows that anomalies mostly occur either when electron fluxes are in the declining stage, or when daily proton peak fluxes are strongly enhanced. This result is very consistent with the above statistical studies. Our results will be discussed in view of the origins of spacecraft anomaly.

[구 SS-05] Prediction of Long-term Solar Activity based on Fractal Dimension Method

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Solar activity shows a self-similarity as it has many periods of activity cycle in the time series of long-term observation, such as 13.5, 51, 150, 300 days, and 11, 88 years and so on. Since fractal dimension is a quantitative parameter for this kind of an irregular time series, we applied this method to long-term observations including sunspot number, total solar irradiance, and 3.75 GHz solar radio flux to predict the start and maximum times as well as expected maximum sunspot number for