ABSTRACTS OF PAPERS FROM OTHER JOURNALS


Collision strengths for transitions between terms of the first four configurations of Fe XV have been calculated in the distorted wave approximation and show good agreement with Coulomb-Born results of Bély and Blaha (1968). The computed ratio of the intensity of the $3s^2\ 1S_0 - 3s3p^2P^1_1$ transition to that of the $3s^2\ 1S_0 - 3s3p^1P^1_1$ transition agrees within a factor of two with the most recent observations by Hall and Hinteregger (1970) of the intensity ratio of the solar lines at 417 Å and 284 Å. The possibility of other contributors to the observed line at 417 Å is discussed. (Authors’ abstract.)

J.-C. HENOUX


An empirical minimum equator model of the solar transition layer and inner corona is constructed.

The one parameter model of solar active region (Reimers, 1971) which establishes quantitative relations between the temperature and density of the corona and the temperature gradient in the solar transition layer is confirmed by the extreme ultraviolet spectroheliograms from OSO IV and by radio spectra of active regions. In very strong active regions, the mechanical energy flux is enhanced by factors up to 20.

J.-C. HENOUX


The propagation of acoustic waves, their transformation into shock waves and their dissipation has been computed on basis of the Harvard Smithsonian Reference Atmosphere (HRA) for the Sun. Acoustic frequency spectra of Stein (1968) were used and the effect of radiative damping included. Good agreement was found between the heating produced by these waves and the computed radiative losses in the chromosphere. Coronal heating proved more difficult to explain. (Author’s abstract.)

J.-C. HENOUX


Simultaneous observations of solar-particle events at low ($< 1$ MeV) energies have been obtained by using intercalibrated solid-state detectors on Mariner 5, Explorer 35, Mariner 4 during days 200 to 271, 1967. An examination of the intensity-time profiles, anisotropies, intensity ratios of protons to $\alpha$ particles ($j_p/j_\alpha$), ratios of $\alpha$ particles to $Z \geq 3$ ($M$-nuclei) ($j_\alpha/j_M$), and the proton energy spectrums from several events has led to the following results: (a) There are finite differences in particle intensity onsets following flares even when spacecraft are located close to the same interplanetary magnetic-field line. (b) When particle fluxes have reached a quasi-stationary state, identifiable features in the intensity profile can often be observed to be convected by the solar wind past widely separated
 (> 0.1 AU) spacecraft. (c) Several flare-associated and nonflare intensity peaks are found to corotate with the Sun. (d) Anisotropies are large during the onset phase of flare-associated events with the maximum intensity coming from the solar quadrant (±45° to the Sun-spacecraft line) and still larger for corotating events. (e) The proton spectrum hardens during event onsets and becomes softer as the event progresses at both spacecraft. (f) The \( j_p/j_a \) time profile generally follows the proton profile and varies considerably during events; also \( j_p/j_a \) decreases as the proton spectrum hardens in accordance with Schatzman's (1963) model. (g) The \( j_a/j_M \) ratio is relatively less variable than the \( j_p/j_a \) ratio. (h) Few intensity increases can be reliably associated with specific flares on the Sun. It is concluded that, in view of the observations, multi-spacecraft studies should allow the development of more sophisticated models for the understanding of low-energy solar-particle events. (Authors' abstract.)

L. D. de Feiter


Using an anisotropic diffusion model, with a lateral diffusion coefficient increasing with the square of the heliocentric distance and a constant radial diffusion coefficient, the effects of the solar boundary conditions on the time profiles of solar flare particle fluxes near 1 AU is investigated. It is shown that, for most times of interest in a flare event, the choice of the solar boundary condition should not significantly affect quantitative intensity versus time results in interplanetary space, aside from a constant factor.

L. D. de Feiter


A detailed signature for individual substorms is sought in the interplanetary medium. Hourly values of interplanetary field and plasma parameters are correlated with hourly averages of the \( AE \) index. An interplanetary variable involving the southward component of the interplanetary field in the solar magnetospheric coordinate system is shown to be singularly important for the generation of substorms. The parameter best correlated with \( AE \) (0.8 correlation coefficient) is the integral or summation of \( B_s \) south over time for the hour preceding the \( AE \) hourly average. The magnitude of this integral appears to be linearly related to the hourly average of \( AE \). The linearity suggests that the southward interplanetary field represents a continuing dynamic mechanism for the production of substorms rather than just being a trigger for the release of energy that has been stored in the magnetospheric tail. Furthermore, the additional energy that the southward component of the interplanetary field apparently puts into the tail is not accumulated for longer than about 1 hour before it appears as a substorm. A linear fit to \( AE \) that uses interplanetary parameters is obtained for two time intervals of data. (Author's abstract.)

L. D. de Feiter


Twenty-seven-day averages of the solar-wind density and flow speed, observed by Vela 3 and 4 spacecraft between July 1965 and July 1968, are found to vary with the heliographic latitude of observation. High average densities and low average flow speeds were measured near the solar equator; low average densities and high average flow speeds were measured near the northern and southern extremes of the Earth’s heliographic latitude excursion. Possible instrumental and statistical explanations of this pattern of variations are discussed and found to be unlikely. The variations can be reasonably interpreted in terms of a latitude-dependence in the structure of high-speed solar-wind streams related to solar activity. (Authors’ abstract.)

L. D. de Feiter

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It is shown that the magnetic field in sunspots affects the dissociation equilibrium of molecular lines. A study of the molecular lines CO, CN, C₂, OH, NH and CH in pores to the largest spots may allow one to understand the role of the magnetic field in sunspot models in the layers where the molecular lines are formed.

The equivalent widths of two first overtone lines of CO belonging to the 0–2 vibration-rotation band as a function of the magnetic field strength are also given. It appears that up to 2500 G the equivalent widths change linearly with magnetic field strength.

P. AMBROŽ


The value of the electric conductivity at different optical and geometrical depths in the Bilderberg model of the photosphere and low chromosphere and in the Chapman’s model of faculae is given.

In the higher layers of the solar atmosphere the electric conductivity in faculae is higher than the electric conductivity in the photosphere and in the lower layers of the solar atmosphere it is vice versa.

P. AMBROŽ


The low-energy (3–10 keV) X-ray spectra observed during solar impulsive bursts of E > 10 keV X-rays reported by Kane and Anderson are analyzed. In two of these bursts we can separate the total low-energy X-ray emission into thermal and nonthermal components. The inferred nonthermal electron spectrum is discussed in relation to acceleration by electric fields. The electron spectrum allows a determination of the minimum value of $E_{\gamma}/n_e$, the ratio of electric field strength to electron density. (Authors' abstract.)

JAY M. PASACHOFF


The results of calculations of the 0.5–70 Å X-ray spectrum of a high-temperature, low-density plasma are presented. The temperature range is $6 \times 10^6$–$10^8$ K, and the elemental abundances characteristic of the solar corona have been assumed. We have considered the processes of line emission following electron collisional excitation, radiation resulting from recombination, bremsstrahlung, and two-photon decay following the excitation of the metastable $2S$ state in hydrogenic and helium-like ions. (Authors’ abstract.)

JAY M. PASACHOFF