LATE-PAPER ABSTRACTS
FROM THE 19th MEETING
OF THE AAS SOLAR PHYSICS DIVISION
5-8 JUNE 1989
LAUREL, MARYLAND

Abstracts of Presented Papers

27.01
An Explanation of the Correlation Between 3He Rich Flares and Non-relativistic Electron Events
P.J. Cargill (U. Maryland), S. Ramadurai, D. V. Reames
(NASA/GSFC)

A mechanism to explain the strong correlation between Type III bursts, interplanetary electron events and 3He rich flares is proposed. The electrons are assumed to be accelerated on open field lines by strong electromagnetic waves generated in a flaring loop in the impulsive phase of the flare. These energetic electrons then drive a return current which can be unleashed to electromagnetic cyclotron waves. Such waves can then stochastically accelerate the 3He to energies high enough that further acceleration by some form of Fermi process can occur (Fisk, 1978; Varvoglis and Papadopoulos, 1983). Preliminary estimates based on observable parameters suggest that modest efficiencies are needed for the mechanism to work. A discussion of how such a mechanism compares with the more detailed features present in the data will also be presented.


27.02
Solar Flares and Dynamics of Langmuir Waves in Current-Carrying Plasmas
M. Karlický, K. Jungwirth (Czechoslovak Academy of Sciences)

The dynamics of intense Langmuir waves in current-carrying plasmas is studied both analytically and numerically. Starting with the widely used Zakharov equations, adapted to these systems, specific features of this problem are pointed out. Further, the role of resonant particles is analyzed. By using 1-D macro-particle numerical code nonlinear regimes of the modified-decay and modulational instabilities are then modeled. Efficient cooperation of essentially ponderomotive and electron-ion drift effects is demonstrated.

It appears that the heating of a current-carrying plasma can be activated through releasing of the inductively stored energy, due to the enhanced conversion of energy associated with the electron drift motion. The underlying physics is discussed and its relationship to the solar flare theory is suggested.

27.03
The Evolution of a Sheared Potential Magnetic Field in a Gravity Stratified Atmosphere
J.T. Karpen, S.K. Antiochos (E.O. Hulburt Center for Space Research, NSSL, Washington, DC 20375-5000)

Several authors (e.g., Moffatt, Aly, Low, and Wolfson) have argued that current sheets can occur in the solar corona without a null point being present in the initial, potential magnetic field. In their model, current sheets form wherever the coronal magnetic field dips down and is parallel to the photosphere along some neutral line. We have investigated this scenario by means of 2 1/2 -dimensional numerical simulations with MAG25D, a new FCT-based MHD code. Our calculations begin with a potential, quadrupole magnetic field in a hydrostatic-equilibrium atmosphere typical of the interface between the solar photosphere and the chromosphere/low corona. A constant shear force is imposed on a portion of the high-β plasma, and the subsequent evolution of the "dipped" field is followed. Our results differ substantially from the predictions of the analytic treatments mentioned above, for the following reasons. Line-tilted boundary conditions are invalid at the type of neutral line described by these authors so that, contrary to their assumptions, the dipped coronal field lines are not "anchored" to the photosphere. It is clear that the response of the high-β plasma to magnetic stress must be taken into account. We show the simulation results, and discuss their possible relevance to dynamic solar events such as spicules and surges.

* This work was supported by the Office of Naval Research, the NASA Solar-Terrestrial Theory Program, and the NASA Solar and Heliospheric Branch.

27.04
Prominence Fine Structure
J.B. Zirker (NSO/SP), S. Koutchmy (CNRS, Paris France)

The vertical fine structure in a quiescent prominence was modeled as an assembly of very narrow, optical thin threads. Random clusterings of the threads account for the observed contrast and Hα line profiles of the fine structures. In this picture, each structure consists of a cluster of 20-50 elementary threads.

27.05
Observations of the Solar Corona with an EUV Imaging Spectrograph
W. M. Neupert, G. L. Epstein, and R. J. Thomas
(NASA/Goddard)

We report initial results of observations made with an extreme ultraviolet (EUV) imaging spectrograph (SEFTS) launched from White Sands Missile Range on a boosted Black Brant rocket on May 5, 1989. The instrument consists of a normal incidence toroidal grating spectrograph covering the spectral range from 240 A to 450 A combined with a Wolter Type II grazing incidence telescope. The solar image formed by this telescope is imaged on the entrance aperture of the spectrograph, which is in the form of an hourglass. The central, narrow, portion of the aperture provides stigmatic spectra with 45 mA resolution over a 3 arcmin long x 1.4 arcmin wide region of the Sun while the two outer portions provide 5 x 8 arcmin spectroheliograms with 5-10 arcsec spatial resolution. Spectral resolution is adequate to determine emission line widths for coronal emission lines and search for Doppler displacements produced by line-of-sight