ABSTRACTS

energy range collapse after a time $t = 10^3(q/q_0)_{1/3}$. Thus the coronal soliton radiation comes from a front merely a few km thick and must portray the very first electrons arriving in a beam. However, the threshold energy density for waves to begin nonlinear evolution is rather high in the corona. Indeed, the rarity of U-type bursts may be due to closed magnetic field lines having hotter gas and thus a higher threshold. Only a fairly intense beam, $q/q_0 > 10^{-4}$ both survives the initial energy losses and makes solitons intense enough to radiate. The theoretical fluxes of both the harmonic and the circularly polarized part of the fundamental are comparable to observed values. Their ratio depends on the beam energy through soliton wavenumber and oscillation frequency. — An open question is how the beam instability is restricted to a very low level once the initial solitons have collapsed, in a volume orders of magnitude larger than the front. Its radiation is at least comparable to that from the front. This is also suggested by the observations. Thus a one-dimensional soliton treatment alone appears insufficient for coronal type III radio bursts. — This work is supported by the NSF Atmospheric Research Section.

17.10 Correlations of Solar Microwave Bursts With Prompt Ev20 MeV Proton Events, S. W. Kahler, AFGL-Wright-Patterson AFB, USA. We examine correlations between solar microwave burst parameters and associated prompt proton event parameters. The published data from the DAS/C20/40 and 45/80 MeV proton detectors on the IMP 7 and 8 spacecraft during the period 1973-1979 were used. For each proton event with a clearly associated flare the three microwave parameters of peak flux, total integrated flux, and effective duration time were derived for four frequencies (1415, 2695, 8800, and 15400 MHz). A total of 50 events were used in the study, and a long term correlation was applied to the proton fluxes. The correlation coefficients of peak proton fluxes with the various microwave parameters range from 0.30 to 0.65, in some cases substantially lower than those found earlier by other investigators. Most of the microwave correlating coefficients were lower than that of the peak 1-8 A fluxes with peak proton fluxes ($r=0.30$), but coefficients as high as 0.64 were obtained for the time-integrated fluxes at 8800 and 15400 MHz. The spectra of the proton fluxes were also found to be independent of the spectra of the microwave bursts. These results suggest that the microwave bursts, while useful for proton event forecasting, are not closely associated with the actual proton acceleration process.

17.11 Cosmic Ray Intensity Variations and Two Types of High Speed Solar Streams, D. Venkatesan, University of Chicago, A.K. Shukla and S.P. Agrawal, A.P.S. University. This study deals with the short term variations of cosmic ray intensity during the interval 1973-76. Daily means of high latitude neutron and meson monitors from the same station and those of a low latitude neutron monitor have been used for the investigation. The method of analysis is the well-known three analysis, or suppositional epochs.

The zero epoch for the three analyses corresponds to the day of a substantial increase (100 km/sec) in the solar wind speed to values of 655 km/sec and which persists at such high values for an interval of at least three days. The investigation reveals two types of cosmic ray intensity variations with distinctly different spectral characteristics. During the interval 1973-76, relative changes in the neutron and meson monitor rates are nearly equal, indicating an almost flat rigidity spectrum of variation. During 1977-78, however, the spectrum acquires a negative spectral character similar to that observed for protons in the 1977-78 interval. We suggest that events of the 1973-76 interval are essentially due to high speed streams associated with solar coronal holes and that events of the 1977-78 interval are due to streams from solar active regions with flare activity which produce interplanetary disturbances.

17.12 The Ionization State of the Solar Wind, S.P. Owocki, HAO.

The interplanetary ionization state differs from other solar wind properties in that it is determined primarily by the electron temperature, electron density, and ion velocity at the coronal base within a few solar radii of the photosphere. Measurements of the ions at 1 a.u. can therefore potentially yield information about conditions in the coronal regions from which the solar wind emanates, but reliable interpretation of these data still requires a detailed theoretical understanding of all the factors which can influence the ionization state. We find that a relatively straightforward extension of the simple "freezing-in" description of previous authors does provide a basis for understanding the solar wind ionization state.

In principle, a multi-stage ion distribution formed by flow through a varying temperature will be skewed relative to a static equilibrium distribution, but this effect is sufficiently subtle that its exploitation as a diagnostic of the base temperature gradient will be difficult until atomic rates are more accurately known. Furthermore, differential acceleration of the various ionization stages can result in a distribution in which the effect of a temperature gradient is either masked or exaggerated; thus independent determination of base values of the ion acceleration, ion flow speeds, and electron density will be needed if the observed interplanetary ionization state is to be fully exploited to constrain possible values of the electron temperature at the base of the solar wind.

17.13 Mixing and Low-Z Solar Models, W.B. Fechner, MIT.

Numerous authors have suggested that "low-Z" solar models (nuclear burning region depleted in heavy elements) can at least partially explain the paucity of neutrinos detected by the Davis experiment. We have examined viability of such models in two ways. First, we have constructed low-Z solar models with interior heavy element mass fractions (Z) from 5% to 100% of the observed surface value. Models with Z < 0.005 and an age of 4.7 x 10^9 years were found to produce neutrino counting rates consistent with Davis's experimental results. Second, we examined the effect of five mixing mechanisms on the chemical abundances in the surface layers, which were assumed to have a specified "contamination" of heavy elements relative to the low-Z interior. These processes were microscopic diffusion, meridional circulation, turbulent diffusion and convective overshoot, Ekman pumping and thermochemical convection. Several of these processes may cause a significant washing out of the composition inhomogeneities in the surface layers after 4.7 x 10^9 years, unless the heavy element contamination of the solar surface was rather large.