### 17.01

**Ultraviolet Spectroscopic Observations of Polar Coronal Holes During Spartan Mission 201-1**

J.L. Kohl, L.D. Gardner, D. Hassler, L. Strachan (CEA)

The Spartan Ultraviolet Coronal Spectrometer was used to observe coronal holes near the north and south solar poles on 11–12 April 1993. Spectral line profiles of H I Ly-alpha were obtained at heights between 1.35 and 2.5 solar radii from sun-center. Observations at 3.5 solar radii in the north polar hole indicated that the stray light rejection was acceptable. Ly-alpha observations of the solar disk were used to determine the solar limb Ly-alpha irradiance. The line profiles will be used to derive coronal kinetic temperatures and the intensities, together with visible polarized radiance measurements from a companion white light coronagraph, will be used to derive bulk outflow velocities. This presentation will describe the observations and a preliminary comparison to earlier observations.

This work was supported by NASA under Grant NAG 5–613 to the Smithsonian Astrophysical Observatory.

### 17.02

**Ultraviolet Spectroscopic Observations of a Helmet Streamer During Spartan Mission 201-1**

L. Strachan, L.D. Gardner, D. Hassler and J.L. Kohl (CEA)

The Spartan Ultraviolet Coronal Spectrometer was used to observe a helmet streamer beginning at 09:19 UT on 11 April 1993. Spectral line profiles of H I Ly-alpha and integrated line intensities of the O I doublet at 1032/1037 Angstroms were measured at heliographic heights between 1.5 and 3.5 solar radii. The spectral line profiles are used to derive kinetic temperatures and the intensities are used to determine outflow velocities which are derived from a Doppler dimming analysis. This presentation will provide a preliminary description of the observations. Measurements were also made above an active region near the west limb. Those observations also will be discussed.

This work was supported by NASA under Grant NAG 5–613 to the Smithsonian Astrophysical Observatory.

### 17.03

**The High Resolution Extreme-Ultraviolet Spectroheliometer (HIRES) Experiment: Capabilities and Observing Goals**


HIRES is a sounding rocket payload to be flown in late 1993. The instrument consists of a 450 mm f/15 Gregorian telescope and a 1-m toroidal grating spectrometer employing a 360x1024 pixel MAMA as the detector. The EUV wavelength scope is 70 Å adjustable within a first order range of 500 Å to 650 Å. Spectral resolution (λ/Δλ) of approximately 10^4 is achieved in first order. Spatial resolution of 0.5 arcseconds or better is expected. Temporal resolution of 100 msec is achievable. The wavelength range for the first flight is set between 570 Å and 640 Å and includes the following solar spectral lines:

<table>
<thead>
<tr>
<th>Ion</th>
<th>Wavelength Å</th>
<th>Temperature K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Si XI</td>
<td>581</td>
<td>3x10^6</td>
</tr>
<tr>
<td>He I</td>
<td>584</td>
<td>2x10^6</td>
</tr>
<tr>
<td>He II</td>
<td>303 (2)</td>
<td>5x10^4</td>
</tr>
<tr>
<td>O IV</td>
<td>606</td>
<td>2x10^5</td>
</tr>
<tr>
<td>Mg X</td>
<td>625</td>
<td>1x10^6</td>
</tr>
<tr>
<td>O V</td>
<td>630</td>
<td>3x10^5</td>
</tr>
</tbody>
</table>

Two observing modes are possible with the instrument: a spectrohelioograph mode in which a 3x3 arcminute square area on the Sun is imaged by slit scanning, and a spectrometer mode in which the slit is held stationary for high resolution spectral line studies. Observing time per flight is approximately 5 minutes. The main objectives for the first flight include EUV observations of small scale explosive events which have been previously studied in the C IV 1548 Å line, coronal hole fine scale boundary structure, and quiet Sun transition region limb structure.

This work is supported by NASA Grant NAGS-664.

### 17.04

**Differential Emission Measure of a Magnetized Transition Region**

Y. Mok and G. Van Hoven (University of California, Irvine)

The thermal structure of the chromosphere-corona transition is often studied through its differential emission measure (DEM). However, there have been discrepancies at T < 10^7 K between the observed DEM and theoretical predictions based on a classical heat-flow model of the transition region (TR). In this work, we have developed a self-consistent atmosphere, taking into account the local energy balance at all altitudes as well as the dynamic influences of magnetic forces, pressure gradients and gravity. Steady states of the atmosphere are obtained for both open-field and closed-field (arcade) regions. In the open-field case (Athay 1990), the plasma distorts the magnetic field in the lower TR due to inhomogeneous heating, resulting in a large angle between \( \nabla T \) and \( B \). The thermal structure, therefore, is determined by \( \kappa_1 (\nabla T)^{1/2} \) instead of \( \kappa_1 (T^{1/2}) \) as in the conventional model. In the closed-field regions, the thermal structure in the lower TR is naturally determined by \( \kappa_2 \), and by the stability boundary between hot and cool loops (Mok et al. 1991). In both cases, the calculated DEM in the lower TR agrees with observations.

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### 17.05

**Measurements of Radiative Lifetimes of the 2s2p^2(3P) Metastable Levels of C II and N III**

W.H. Parkinson (CSA), Z. Fang, V.H.S. Kwong, J. Wang (UNLV)

The radiative decay rates of the inter-system lines, 2s2p 3P^0 - 2s2p 3P^1, at wavelengths near \( \lambda = 223 \) nm (C II) and 175 nm (N III) of the B-like ions of C and N have been measured in the laboratory. A cylindrical radio frequency ion trap was used to store the electron-impact produced ions. The observed multi-exponential decays agree with the multi-exponential form of the solutions to the coupled rate equations which describe the effects of the \( 3P \) populations of inter-system transitions and collisions between the stored ions and the source gases. The radiative decay and collision rates were obtained from multi-exponential least squares fits to the data. The measured radiative decay rates to the ground term are (140.6±3.3) cm/s and for 2s2p^2 3P^1 for C II and 109.8±14.7 cm/s and for 2s2p^2 3P^1 for N III. Comparisons of the measured values with theoretical values are presented. This work is supported in part by a NSF, EPSCOR grant to the University of Nevada system, and by NASA grant NAGW-1687 and 1596 to Harvard University.