17.06
Coronal Densities and Filling Factors from SERTS
by Fe XII Diagnostics

Roger J. Thomas (NASA/GSFC)

Density-sensitive intensity ratios of Fe XII lines have been used to
derive spatially resolved characteristics of the coronal plasma over a solar
active region observed in the EUV by SERTS. We find density varia-
tions up to two orders of magnitude, with little obvious correspondence
to structural features such as sunspots or a filament channel. There is
a slight density enhancement at the site of a subtare in its early stages,
but even that location seems to be less dense than an undistinguished
position near the main sunspot. Two semi-independent line ratios give
reasonable agreement, as do the relative variations derived from two dif-
f erent theoretical line calculations. However, there is a systematic offset
of 0.6 dex in the densities from these two calculations, one from Keenan
and the other from Monsignori-Fossi. Using emissivities predicted by
Monsignori-Fossi, some assumptions about the source thickness and Iron
abundance, along with the derived line-ratio densities, we find that lo-
calized "filling factors" range between 1 and 1/1000 at various locations
in the active region.

This work was supported under NASA RTOP 879-11-38.

17.07
Flows Observed in the Solar Corona with SERTS

J. Davila (NASA/GSFC)

The Solar Extreme Ultraviolet Telescope and Spectrograph (SERTS) was flown on May 7, 1991 aboard a
sound rocket launched from White Sands, NM. Imaged spectra of both the active and quiet sun in the
wavelength range of 250-650 Å were obtained with a spectral resolution of order 55 Å.

Systematic Doppler shifts were observed over the active region in lines of He II and Fe XV and XVI were
observed. Typical velocities are 20 km/sec in the He line and 10 km/sec in the hotter, (Iron) lines.

In addition line profiles were derived. Some of the lines observed show evidence for non-thermal broadening
after subtraction of the instrument and thermal widths. These data provide information on unresolved flows in the
corona, and could be relevant for coronal heating models. These results and others will be presented in
this paper.

17.08
Density Distributions in the Solar Corona (1.2 - 4.0 Rsun)

Fran Bagenal (University of Colorado)

Independent calibrations of the HAO Mark III K-Coronameter and the SMM C/P instrument show remarkable agreement in values of
coronal brightness, values which are significantly higher than previous estimates. We have used the combined, re-calibrated data sets
and the simple Van der Hulst inversion to derive density distributions in the corona between 1.2 and 4.0 Rsun under varying
solar conditions. Radial profiles for streamers and coronal holes are compared with similar previous studies (Saito, Poland and
Munro, 1977; Munro and Jackson, 1977; Withbroe, 1988; Guhathakurta, 1989) and with full 3-dimensional modeling (see
Gibson & Bagenal paper).

17.09
Coronal Electron Density Measurements from the Total Solar Eclipse of 11 July 1991

M.J. Penn (NSO/SP), J. Arnaud (Observatoire de Toulouse),
D.I. Mickey, B.J. LaBonte (IfA, Univ. Hawaii)

We report on observations made during the 11 July 1991 total solar eclipse from the University of Hawaii 61-cm South telescope of the
Mauna Kea Observatories. The eclipse observations entail CCD imaging of an active region corona using four near infra-
red wavelength channels isolated with narrow-band interference
filters. We obtain two long exposure images in each channel
including the continuum (λ = 10690 Å) two Fe XIII emission
lines, (λ = 10747 Åand λ = 10798 Å) and the He I line (λ =
10830 Å). Our field-of-view (FOV) is about 160x200 arcseconds
centered 60 arcseconds above the south-east limb; each image
has 0.5 arcsecond pixels with about 1.5 arcsecond seeing.

The ratio of emission from the two Fe XIII lines provides a
direct measure of the coronal electron density. Although we
lack calibration data, we use physical arguments to put a limit on
electron density we observe; in the most dense regions of our
FOV we find the electron density is N_e ≥ 1.38x10^9 cm^-3. Making
reasonable guesses for the continuum level in each emission line
image we arrive at a map of the electron density for our FOV;
we compare these density structures with the structures seen
in the continuum image. We see strong He I emission from a
prominence in our FOV, but we find no cold coronal emission in
this line.

17.10
Observations of Solar Wind 'Halo' Electrons

P.L. Hick, B.V. Jackson (UCSD), D.F. Webb (ISR, Boston Coll.)

The plasma experiments on board the HELIOS 1 (1974-1985) and HE-
LIOS 2 (1976-1980) spacecraft included an electron analyzer for observing
electrons in the energy range 0-1.5 keV. This energy range includes the
supra-thermal (>100 eV) 'halo' population, which carries the bulk of
the heat flux in the solar wind. Observations of countstreaming halo
electron populations are usually interpreted as indicating the presence
of closed magnetic field configurations. It has been claimed that they are
the most reliable in situ signature of coronal mass ejections (CMEs) in
the heliosphere. We have initiated a study to investigate the relationship
between CMEs, detected by the HELIOS sidosical light photometers, and
countstreaming events using the HELIOS electron observations. Here
we briefly present the principles used to detect the electrons and various
samples of measured electron populations.