Study of the
Minimum Solar Corona on
the Period August-October 1996

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Introduction

**Aim:** Study the dynamics of the solar corona at minimum of activity using LASCO-C1 spectral data.
## Data Used

<table>
<thead>
<tr>
<th>Date</th>
<th>Xsize (pixels)</th>
<th>Ysize (pixels)</th>
<th>bin</th>
<th>Exp. time (s)</th>
<th>( \lambda_{\text{on min}} ) (Å)</th>
<th>( \lambda_{\text{on max}} ) (Å)</th>
<th>( \lambda_{\text{off}} ) (Å)</th>
<th>( \lambda - \text{step} ) (Å)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug - Oct 1996</td>
<td>832</td>
<td>672</td>
<td>1</td>
<td>25</td>
<td>5300.90</td>
<td>5303.95</td>
<td>5309.24</td>
<td>0.3</td>
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<tr>
<td>Aug - Oct 1996</td>
<td>832</td>
<td>672</td>
<td>1</td>
<td>16</td>
<td>6374.11</td>
<td>6377.94</td>
<td>6380.95</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Each on-line image: emission corona + continuum corona + stray light

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Data Reduction

- normalize by exposure time
- bias correction
- cosmic rays removal

Correction of FP transmittance

Fe XIV: Calibration of wavelengths using the main absorption line

\[ \frac{n \cdot d \cdot \cos \theta}{\cos \lambda} = \frac{m \cdot \lambda}{2} \]

Fe X: Exposure time correction

\[ n \cdot d \cdot \cos \theta = m \cdot \lambda / 2 \]
Determination of LOS Velocities

from the position of the emission line peak with respect to the reference line peak (average over the whole corona)

=> LOS velocities

(0.1 Å ~ 5.6 km/s)
(0.1 Å ~ 4.7 km/s)
Determination of Effective Temperatures

from the line width value, after correcting for the instrumental profile

$\Rightarrow$ effective temperatures

$(0.7 \, \text{Å} \sim 2\text{MK})$

$(0.6 \, \text{Å} \sim 1\text{MK})$
Slow Solar Wind

$d = 1.3 \, R_{\odot}$

$V_{\text{los}} = 5 \, \text{km/s}$

$V = 15 \, \text{km/s}$

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Streamers:

\( T_e \sim 1.35 \text{ MK at } 1.03 \, R_\odot \) (Feldman et al. 1998 - SUMER)

\( T_e \sim 1.8 \text{ MK at } 1.15 \, R_\odot \) (Li et al. 1998 - Yohkoh SXT)

\( T_e \sim 1.4 \text{ MK at } 1.4 \, R_\odot \) (Gibson et al. 1999, Parenti et al. 2000 - CDS)

\( T_e \sim 1.6 \text{ MK at } 1.5 \, R_\odot \) (Raymond et al. 1997 - UVCS)

\( T_e \sim 1.6 - 2.0 \text{ MK at } 1.1 - 2.0 \, R_\odot \) (Ichimoto et al. 1996 - model)
Effective Temperatures
Effective Temperatures
Conclusions (1)

Slow Solar Wind:
- is associated with streamers
- radial speeds of around 10 – 15 km/s at ~ 1.3 R☉ were deduced

![Graph showing outflow speed vs. distance (R☉)]

- LASCO-C1 observations
- Abbo and Antonucci 2002
- Antonucci et al. 2005
- Strachan et al. 2002
- Poletto et al. 2002
- Frazin et al. 2003
- Sheeley et al. 1997
Conclusions (2)

*Fe X emission is associated with cooler closed loops*

*Fe XIV emission is associated with the hotter plasma at the base of the streamers*