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"Early Results of JOP161: A Detailed Study of Loop Footpoint Dynamics"

Modeling of the energy balance in coronal loops requires the observations of distribution of temperature, density, and velocity at the footpoints of these loops. To achieve this, a Joint Observing Program (JOP161) was carried out 15 April, 2003, with coordination between SOHO (CDS, SUMER, MDI & EIT) and TRACE . This poster will concentrate on studying emission line intensities and velocities in the region of candidate foot-points derived from the CDS rasters, EIT and TRACE EUV data. We study the line profiles from spectra of He I, He II, O III, O V, Ne VI and Mg IX from rapid CDS rasters across the region of interest in concert with the full SUMER spectral frame around the Ne VIII line pair (765-785Å) time series, to build up a detailed temperature profile of the loop footpoint region. We see that although line intensity information is useful to spatially isolate the loop-footpoints, the variations in the measured Doppler velocities provide the key to providing the physical information needed to understand the process occurring in these loops.

The study so far:

The CDS (Coronal Diagnostic Spectrometer) data for this study came from a time series of 20 image maps with a cadence of about 4 minutes 30 seconds over a time period of about 3 hours and 25 minutes. A Gaussian fit was applied to the data.

Fitted parameters for one of these image maps, centered at -80.3 degrees (x center) and -62.8 degrees (y center) was used in the calculation of doppler shift velocities.

The wavelength position of H I, H II, O III, O V, Ne VI and Mg IX for 5 spectral rasters at (1,5), (1,22), (1,37), (1,47) and (1,57) was used in the calculation.

To better estimate these relative velocities, the effective temperature/velocity curve (Chae et. al., 1998) was used with a variety of backgrounds to formulate corrections to the observed velocities. The three main backgrounds were non-active region (grey background) coronal-hole quiet Sun (quiet Sun background) and average Sun (average background).

Different correction velocities were found from these backgrounds as seen in the graphs.

Connected lines are only to help discern the different wavelengths observed.

The graph of doppler shift velocities for grey, quiet and average sun background, show that Mg IX has large positive relative doppler shift velocities (away from Sun center) for quiet sun of around 133 KM/S. The other wavelengths appear better behaved for all backgrounds with negative doppler shift velocities of between 35 and 75 KM/S (down flows).

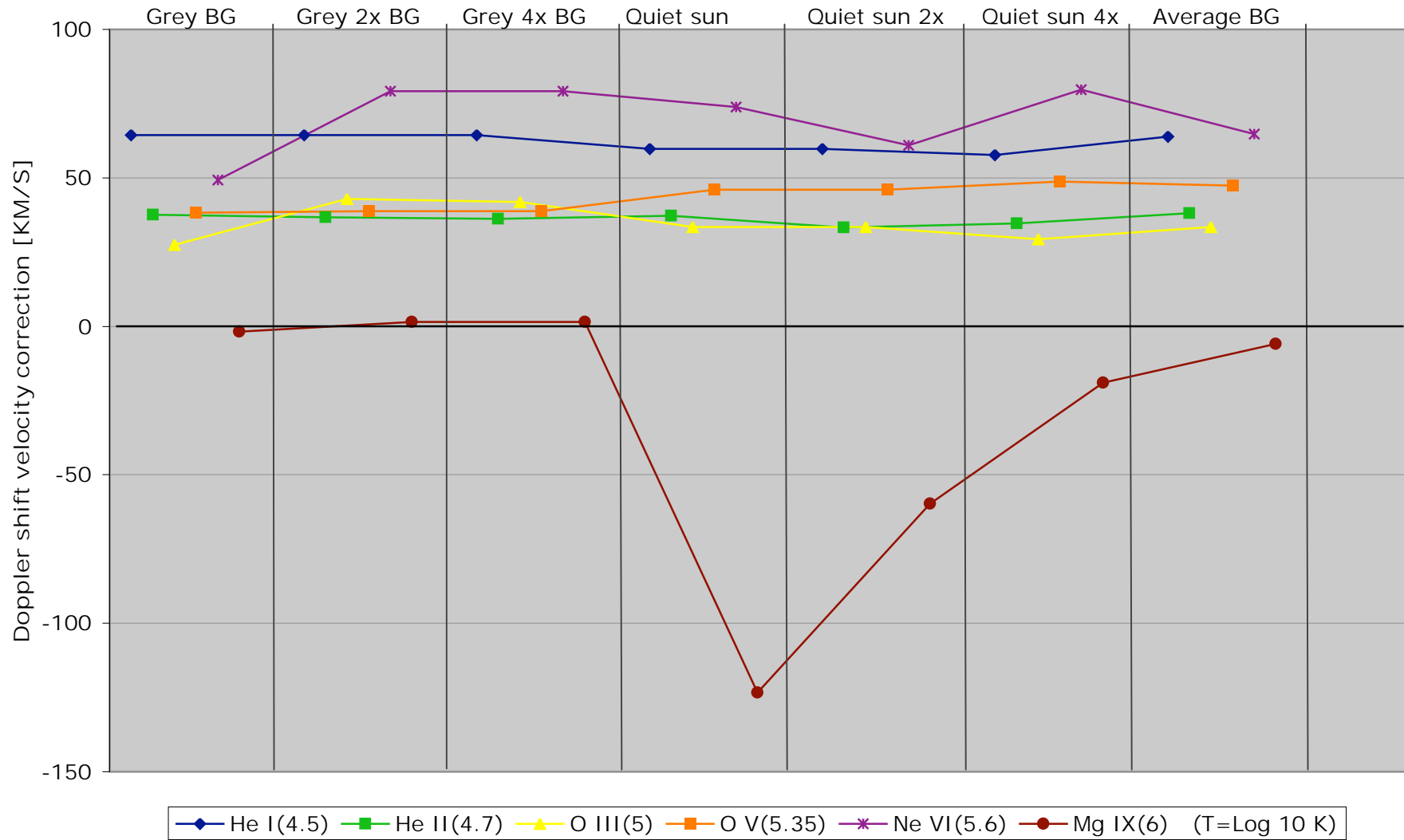
CDS spectral image maps of the various wavelengths H I, H II, O III, O V, Ne VI and Mg IX are shown. TRACE (Transition Region and Coronal Explorer) and EIT (Extreme Ultraviolet Imaging Telescope) images are shown from the same time period as the CDS spectral image map.

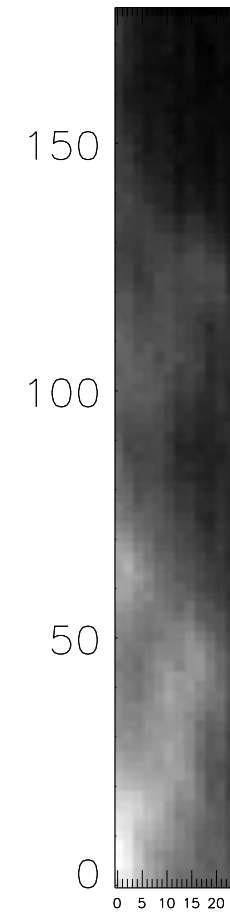
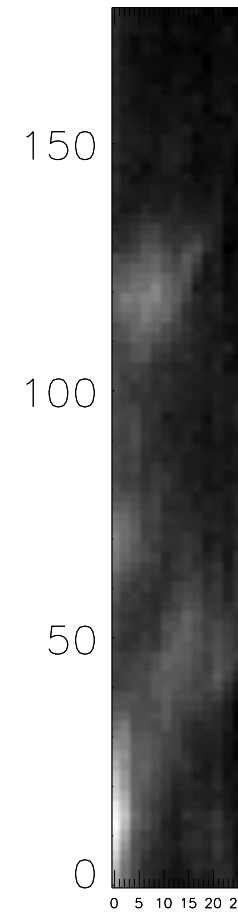
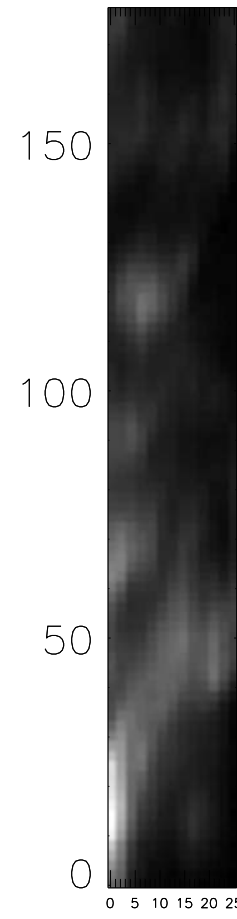
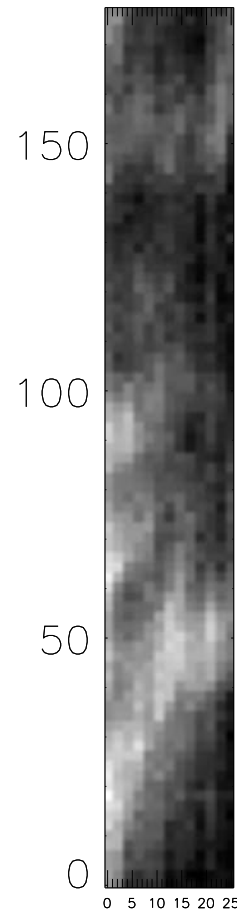
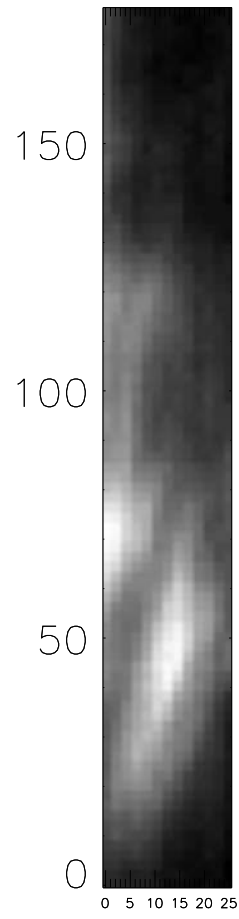
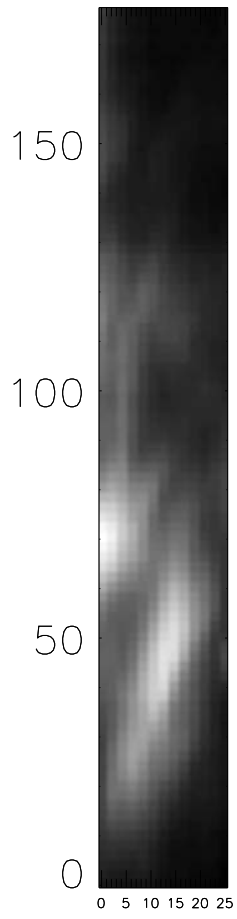
Future investigation:

The next step in this early study of JOP 161, will be to calculate relative doppler shift velocities of the remaining 20 image maps and to map these on to TRACE and EIT images in the search for coronal loops.

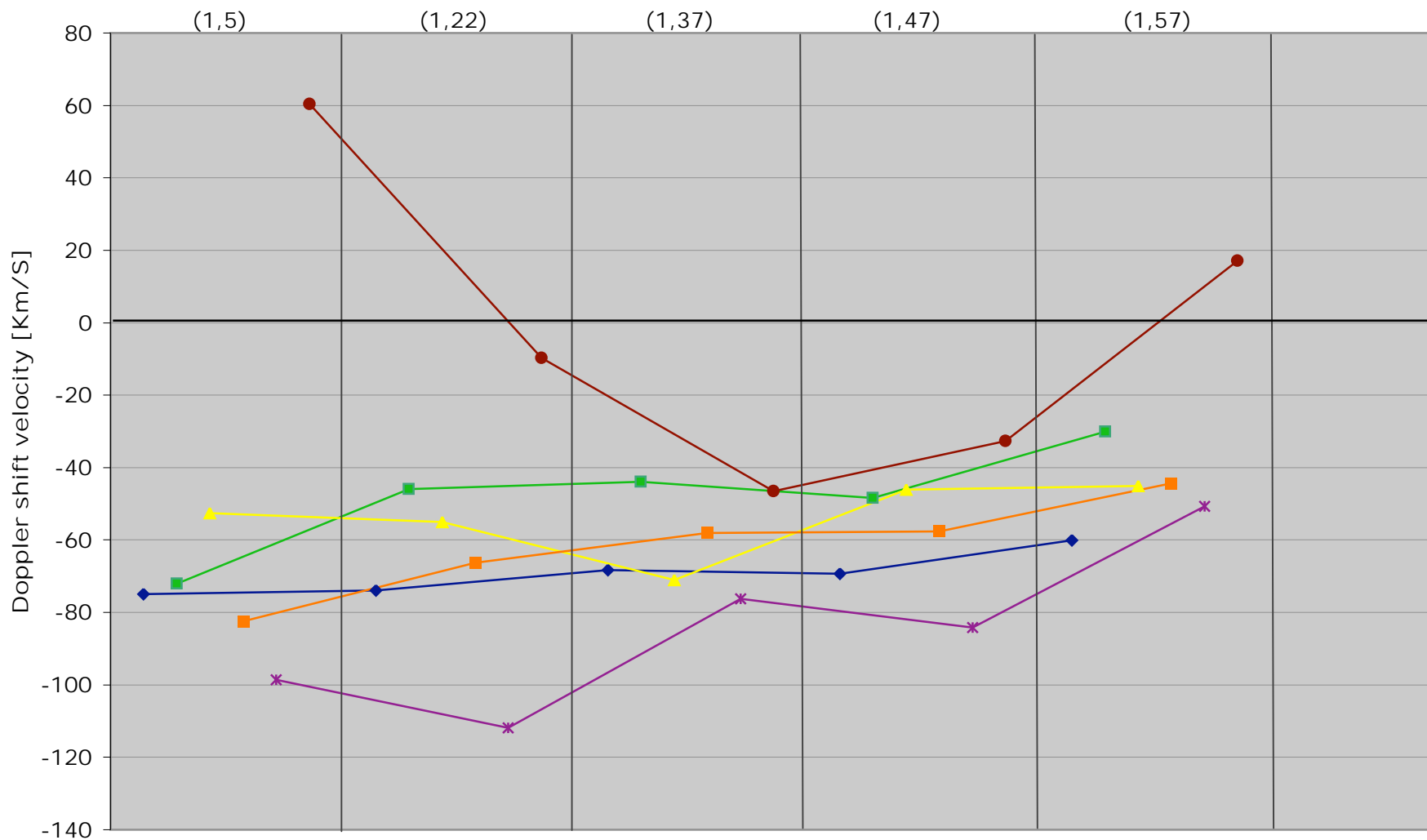
Chae J., Yun, H. S., and Poland, A. I. 1998, ApJ 114, 162

Doppler shift velocity corrections for grey, quiet and average sun BG correction (Fig.18, P.162, Chae et. al. 1998)



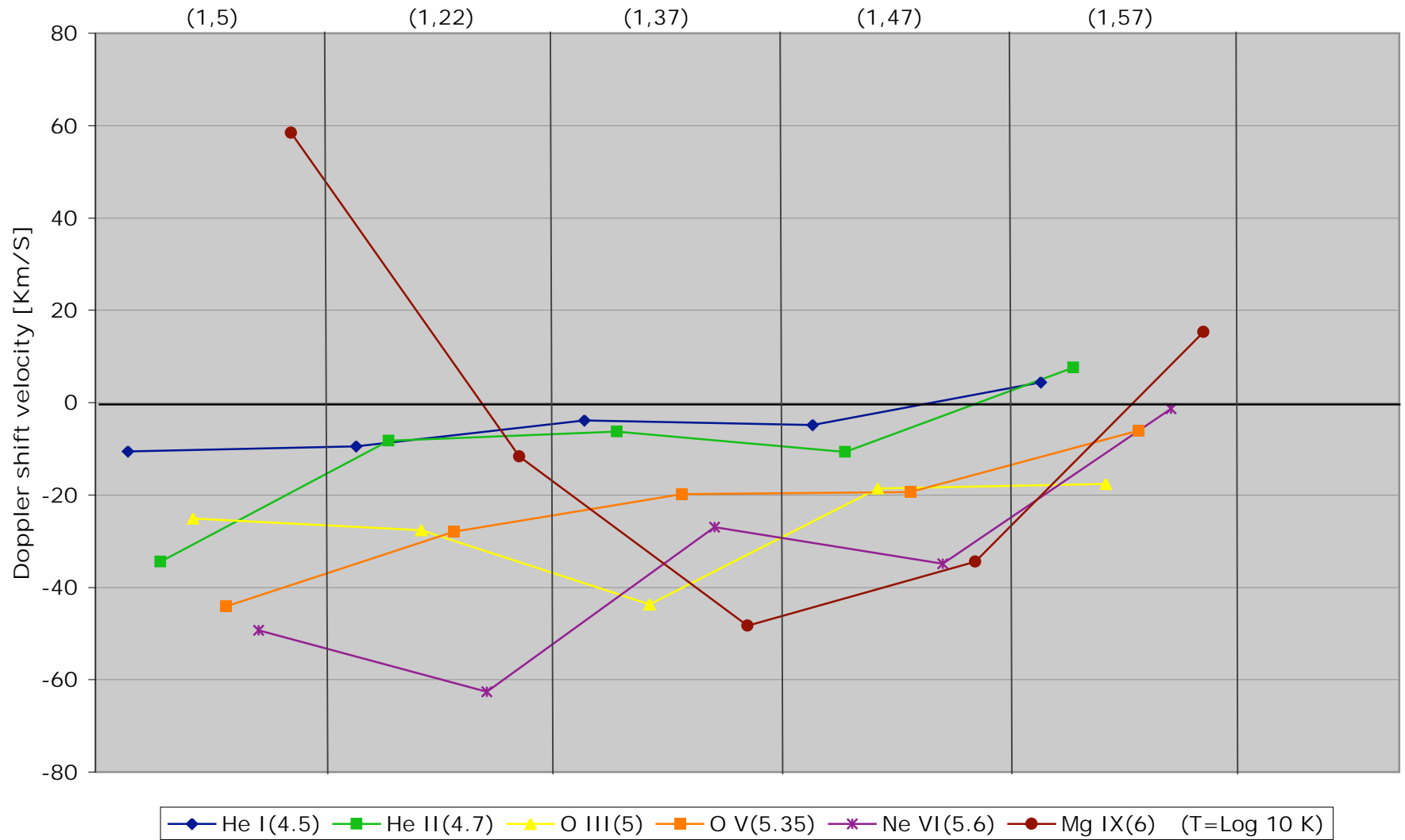


Doppler shift velocities of 5 rasters without BG correction

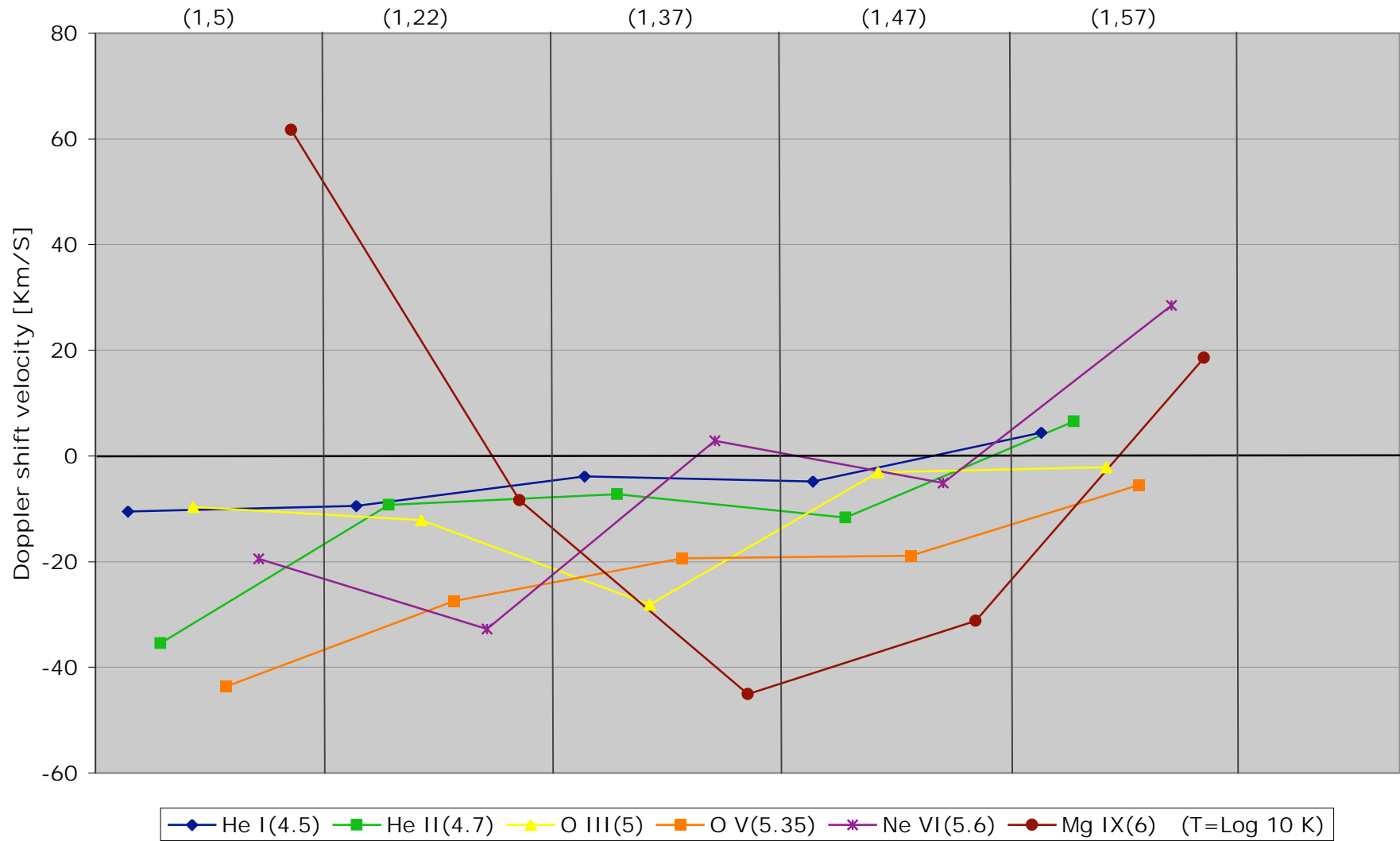


He I(4.5) He II(4.7) O III(5) O V(5.35) Ne VI(5.6) Mg IX(6) (T=Log 10 K)

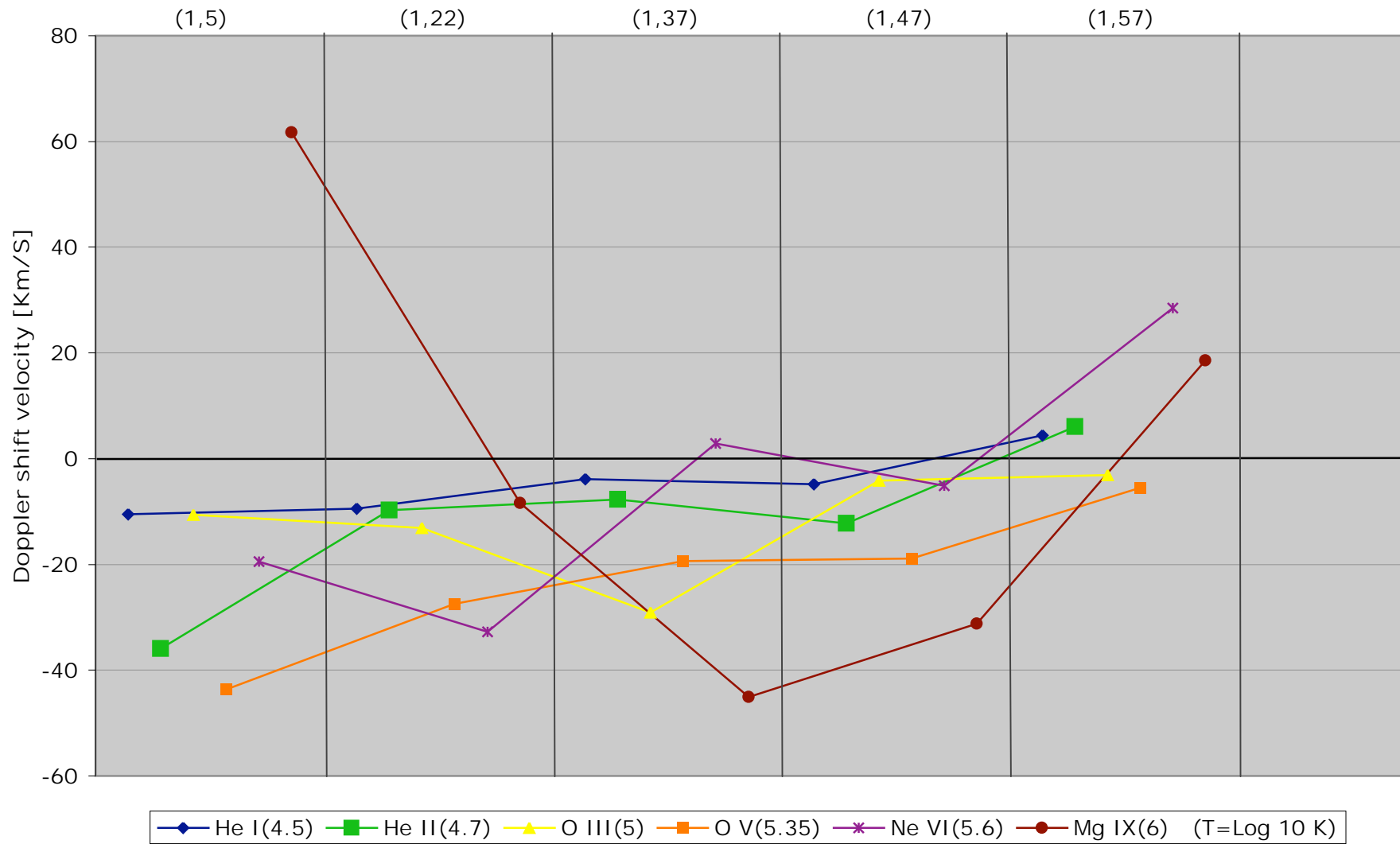
Doppler shift velocities of 5 rasters with grey BG correction (Fig.18, P.162, Chae et. al. 1998)



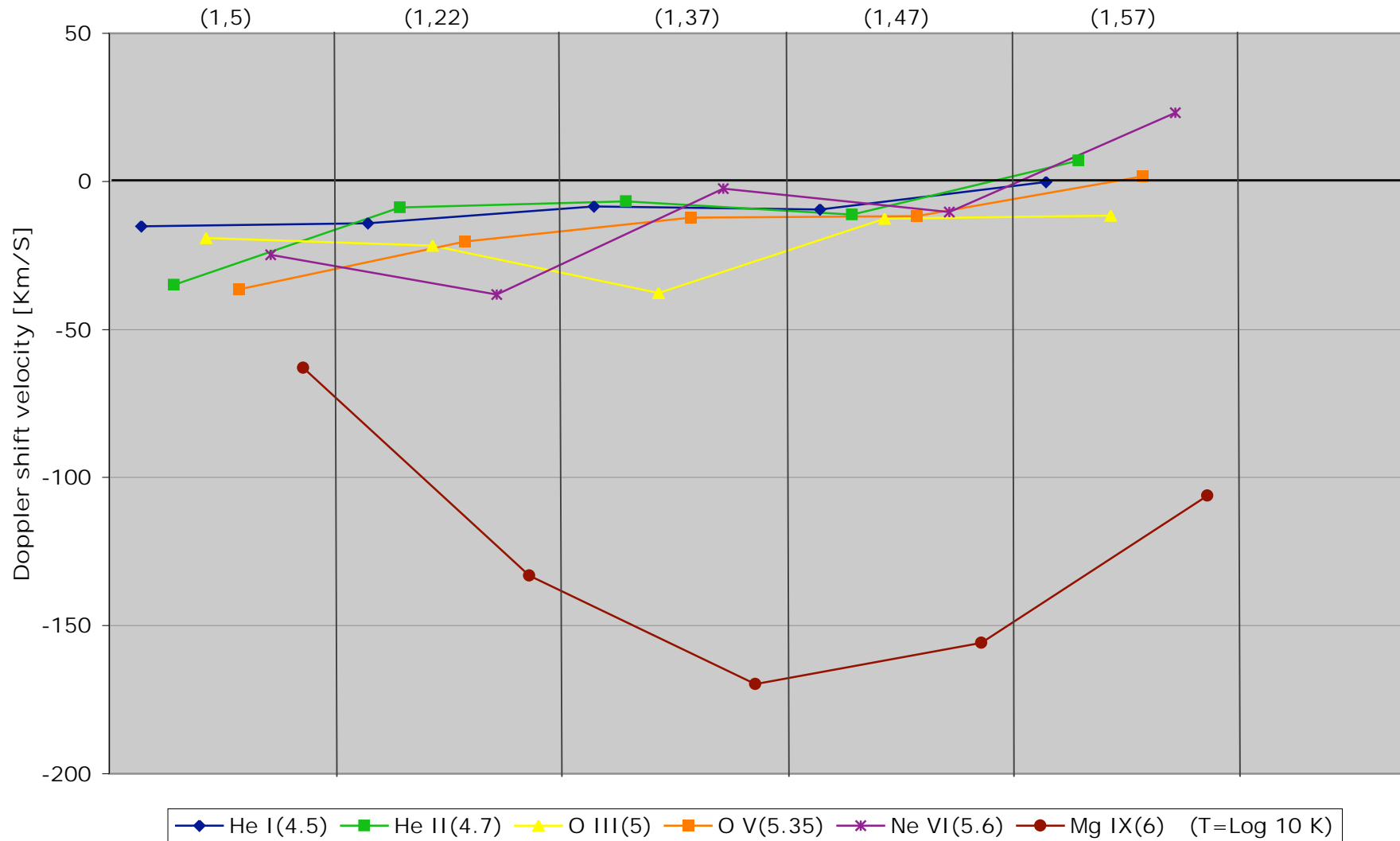
Doppler shift velocities of 5 rasters with 2x bin grey BG correction (Fig.18, P.162, Chae et. al. 1998)



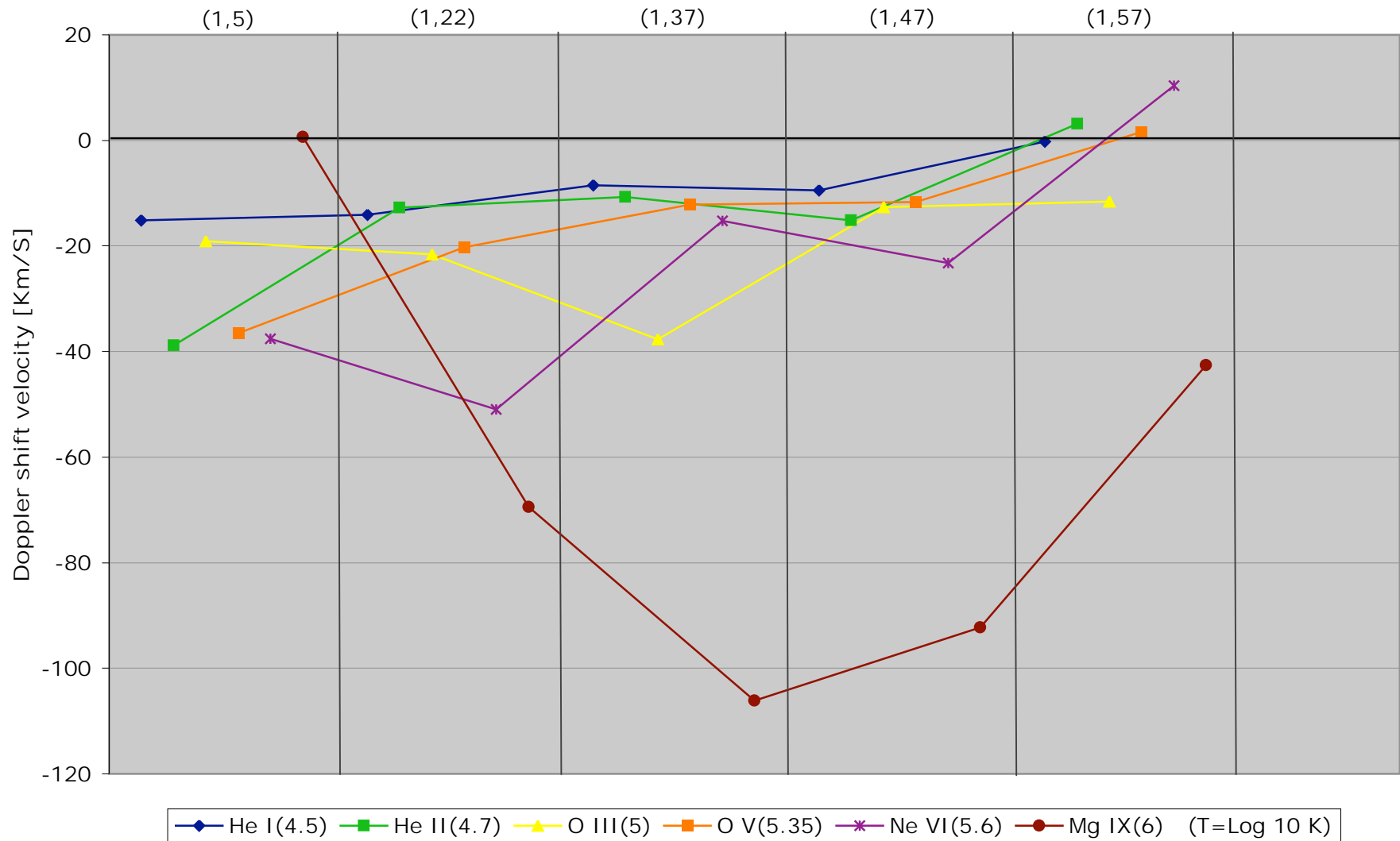
Doppler shift velocities of 5 rasters with 4x bin grey BG correction (Fig.18, P.162, Chae et. al. 1998)



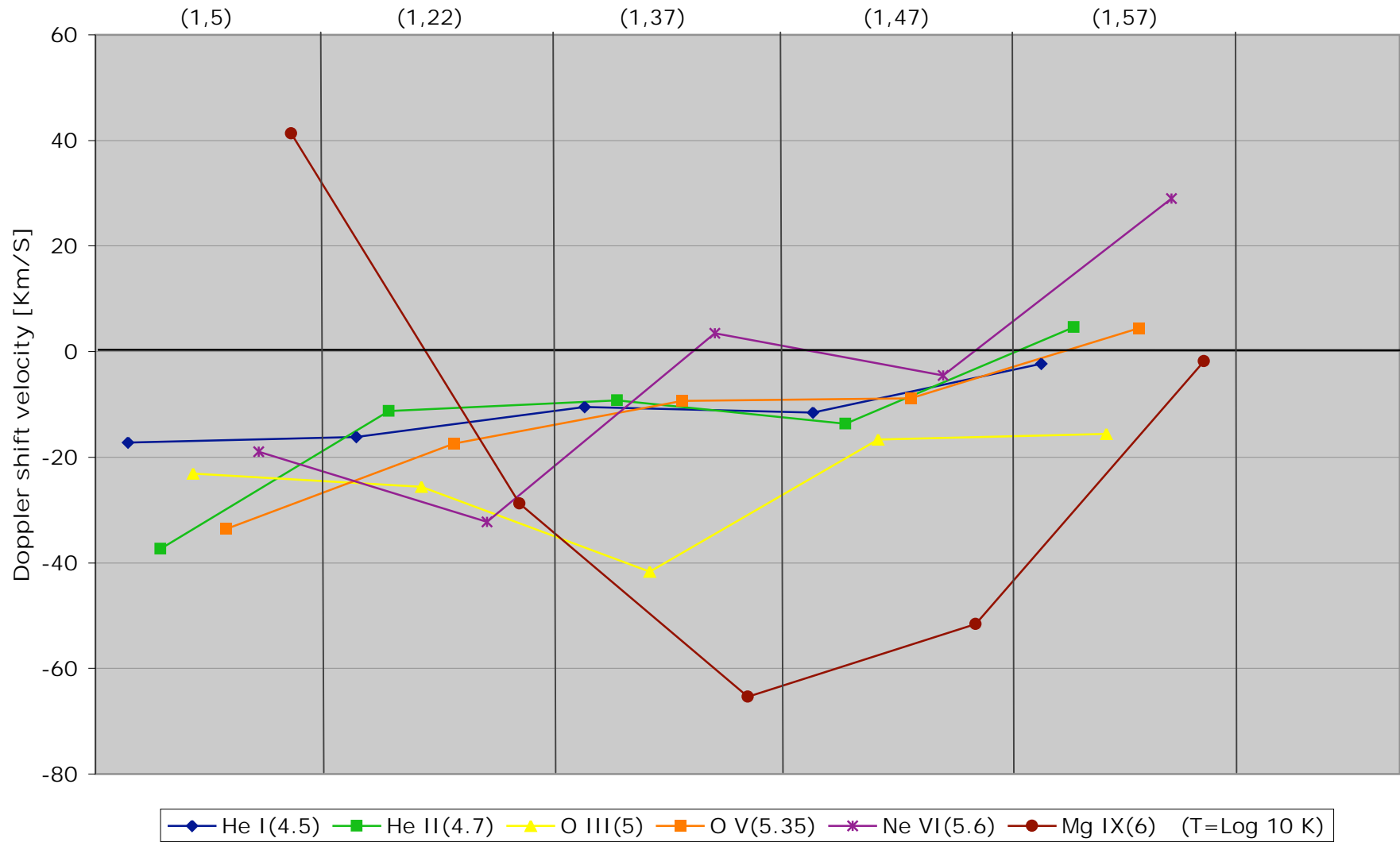
Doppler shift velocities of 5 rasters with quiet sun BG correction
(Fig.18, P.162, Chae et. al. 1998)



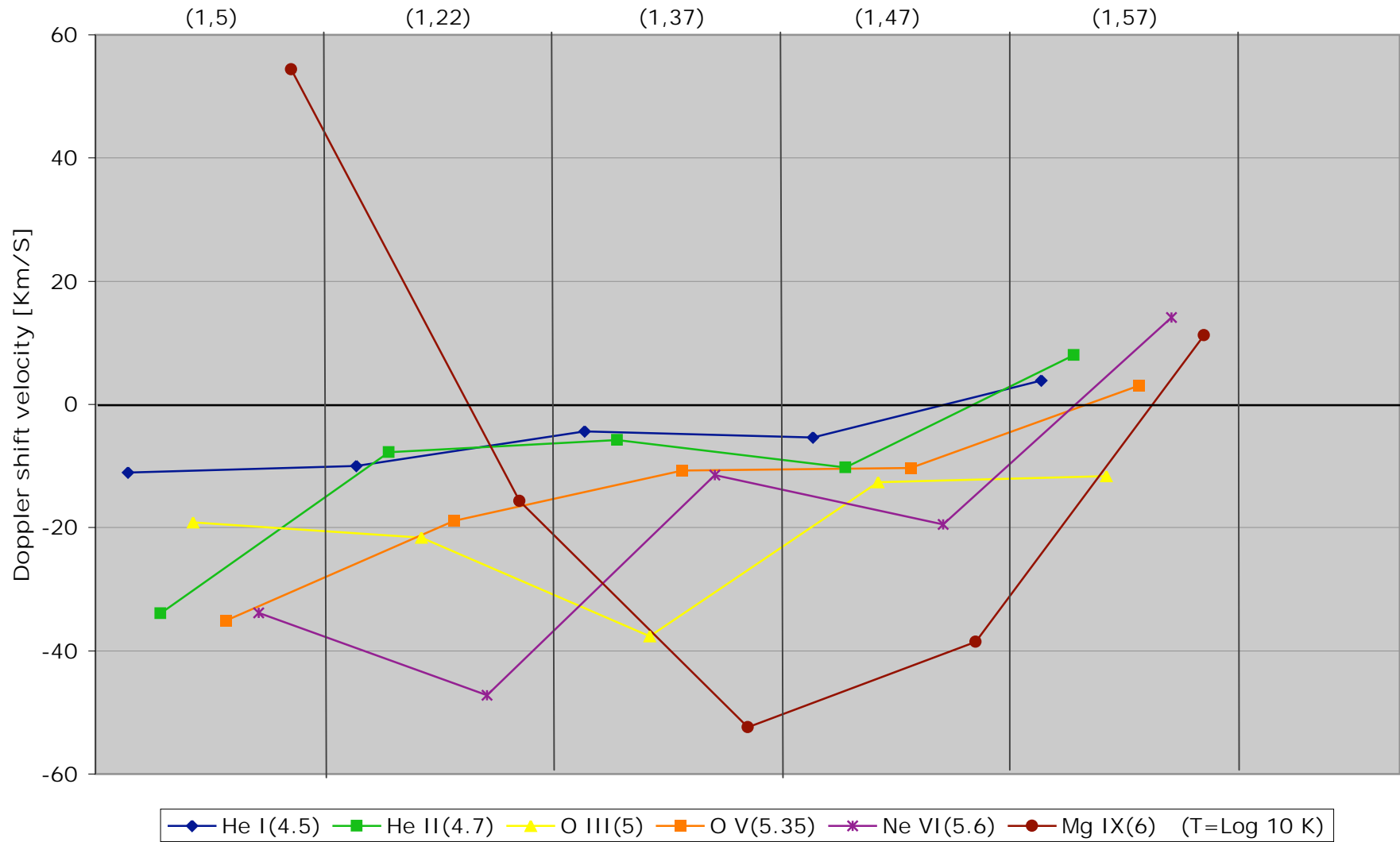
Doppler shift velocities of 5 rasters with 2x bin quiet sun
BG correction (Fig.18, P.162, Chae et. al. 1998)



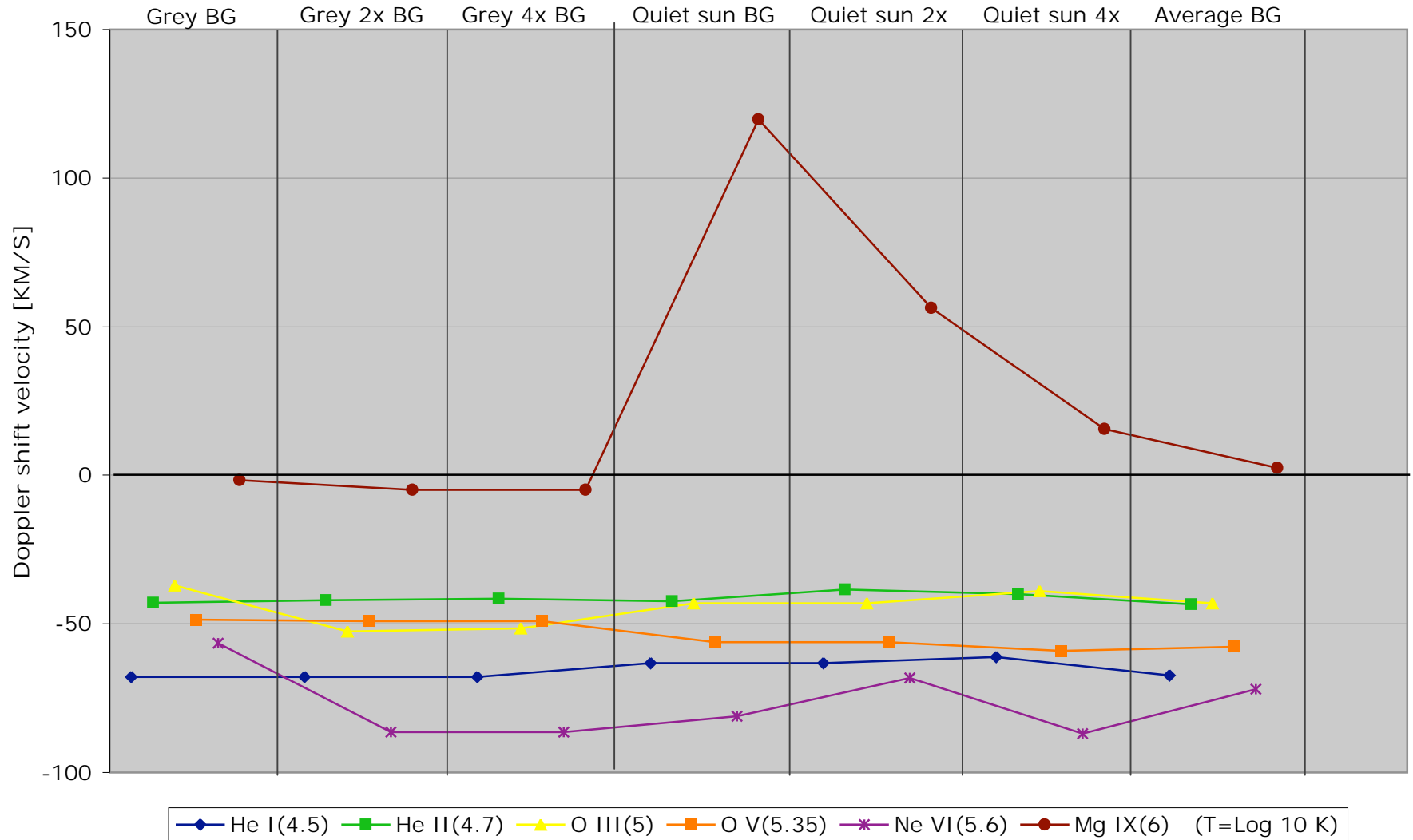
Doppler shift velocities of 5 rasters with 4x4 bin quiet sun BG correction (Fig.18, P.162, Chae et. al. 1998)

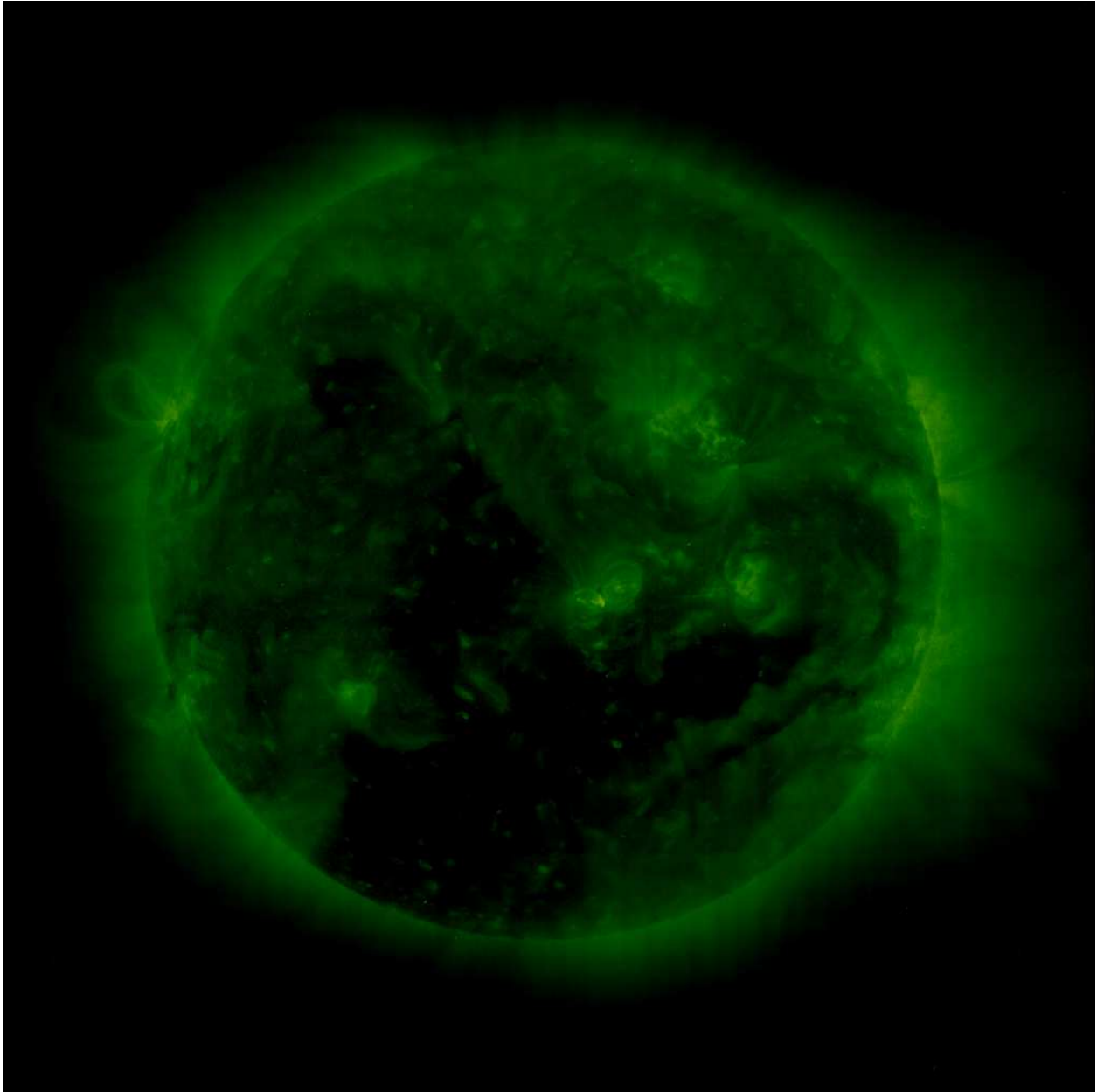


Doppler shift velocities of 5 rasters with average sun BG correction
 (Fig.18, P.162, Chae et. al. 1998)



Doppler shift velocities for grey, quiet and average sun BG
 (Fig.18, P.162, Chae et. al. 1998)

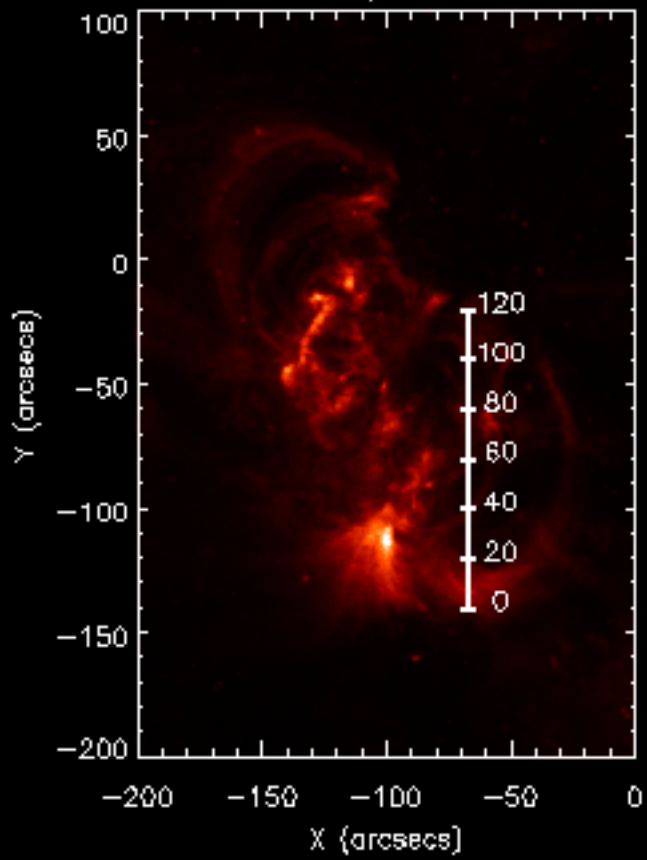




SOHO – EIT Fe XII 195Å
2003/03/15 16:00 UT



TRACE TRACE 171 15-Apr-2003 16:01:28.000 UT





TRACE TRACE 195 15-Apr-2003 16:02:28.000 UT

