

# The Dynamics of Solar Flare Loops: Spectral Diagnostics Part 2

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# Wait, what am I doing again?

## Chromospheric Evaporation

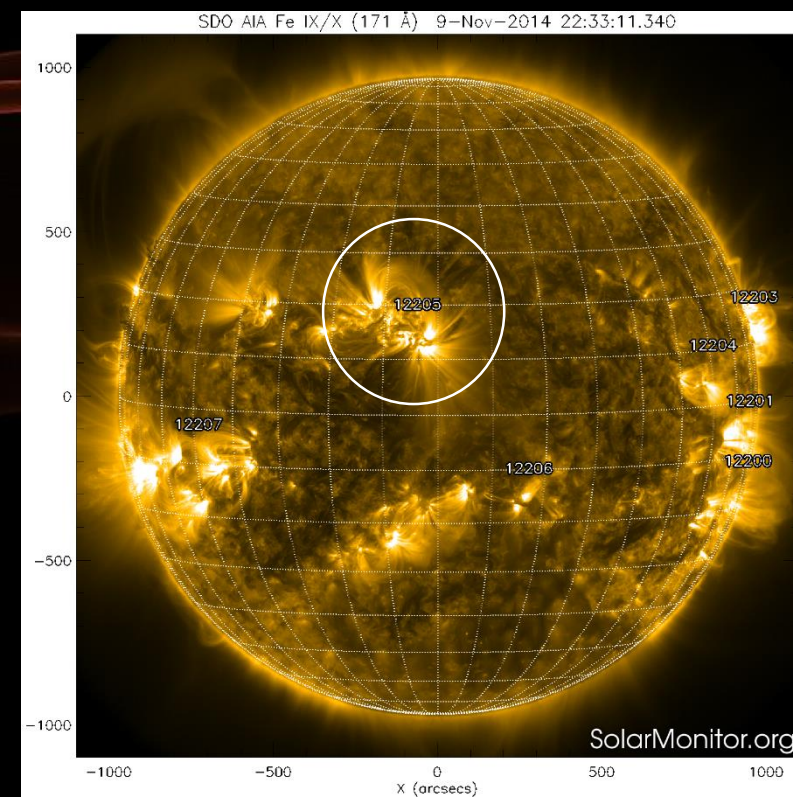
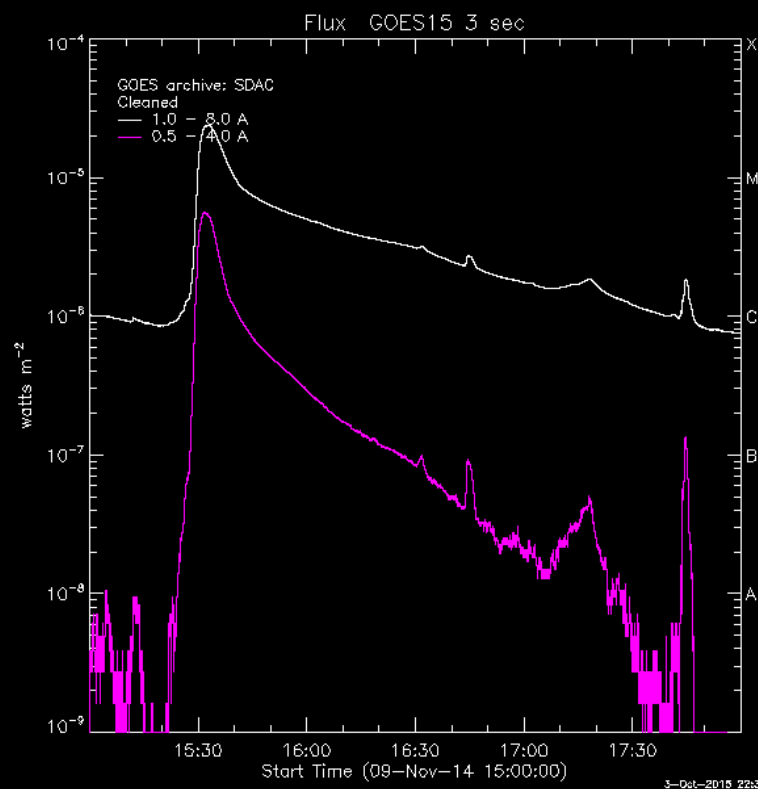
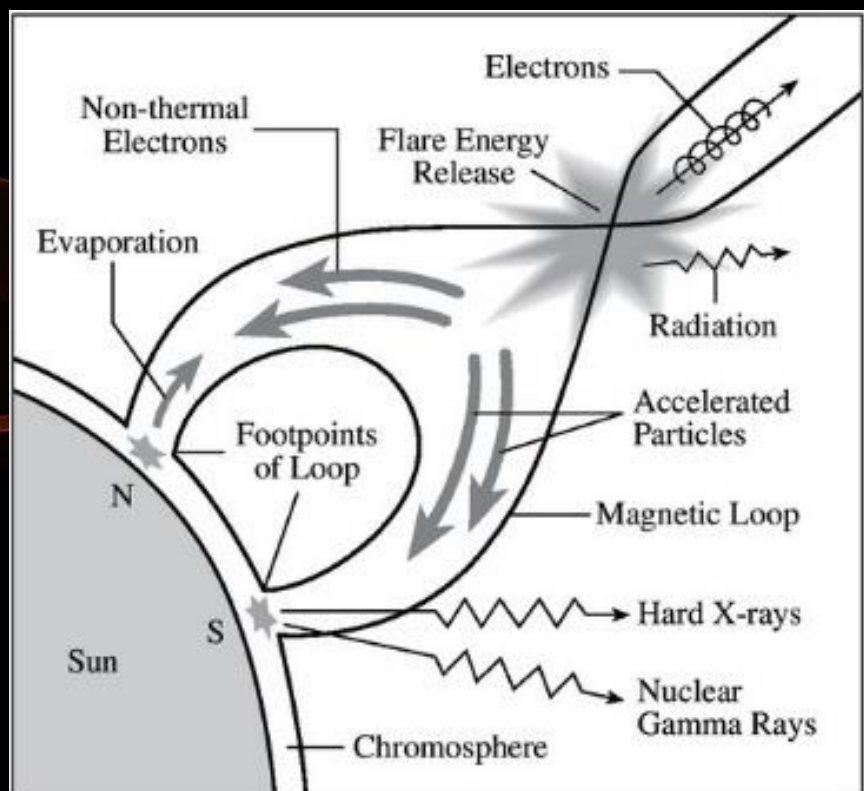
- Impulsive phase
- Blueshift in hot lines

## Chromospheric Condensation

- Impulsive phase
- Redshift in cool lines

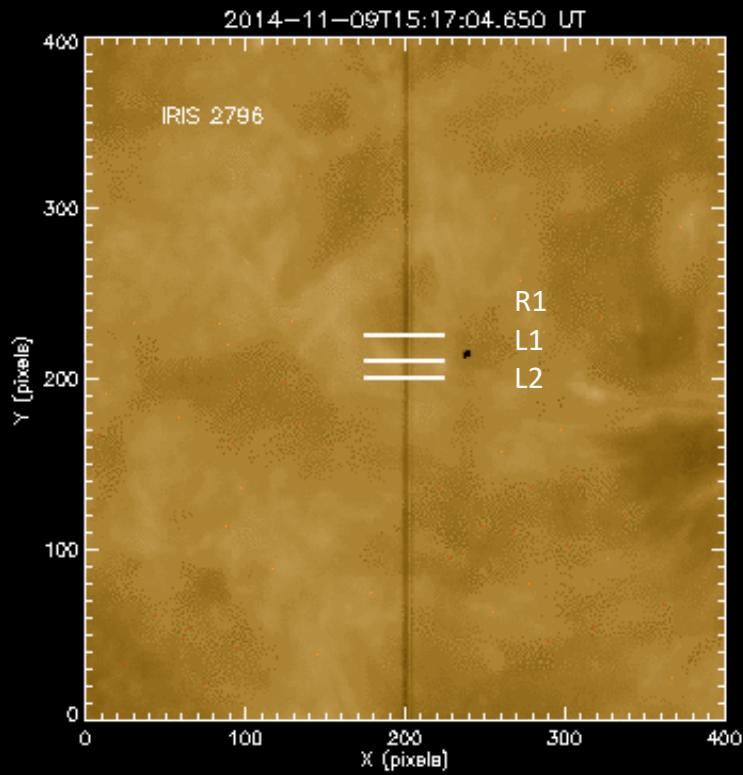
## Plasma Draining in Corona

- Decay phase
- Redshift in warm/cool lines

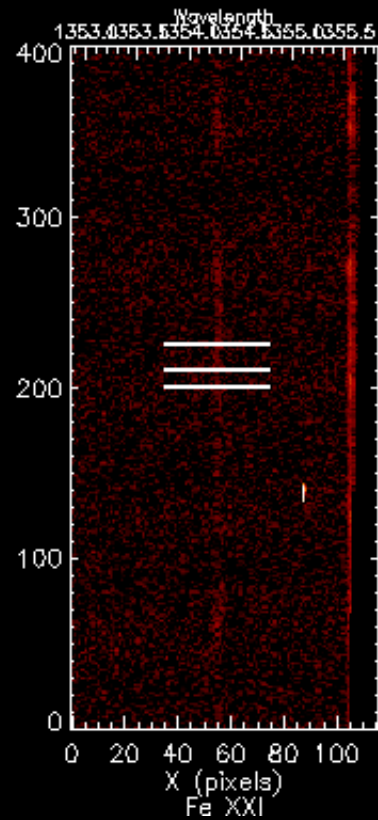


# Observation

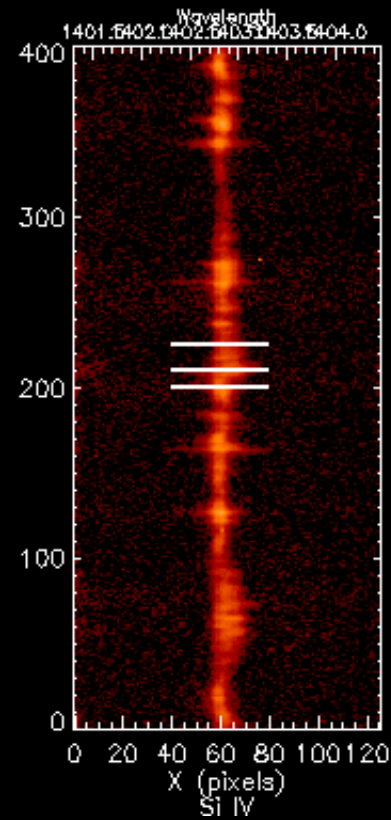
Slit Jaw Image in 2796



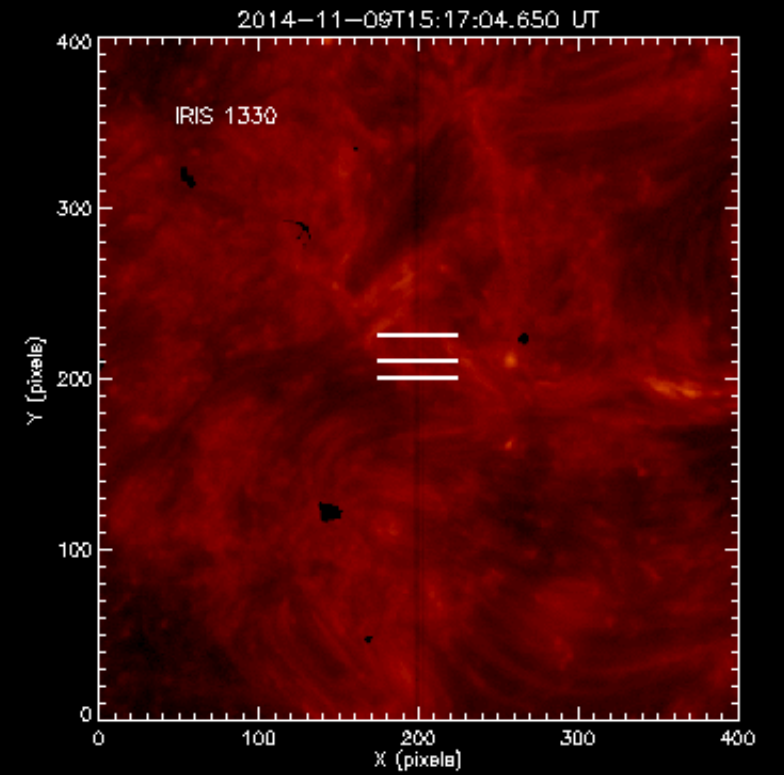
Fe XXI  
 $\sim 10^7$  K



Si IV  
 $\sim 10^5$  K

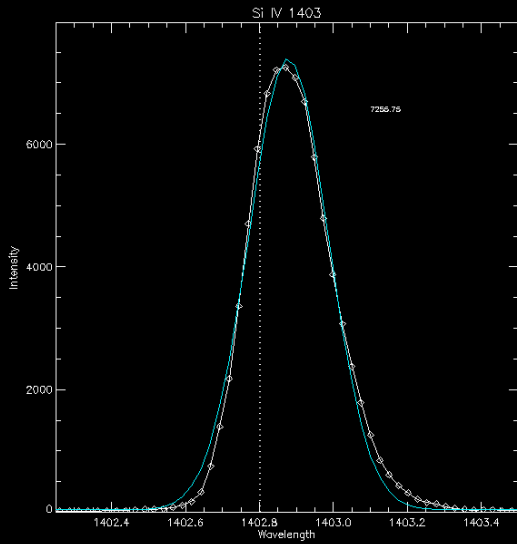


Slit Jaw Image in 1330



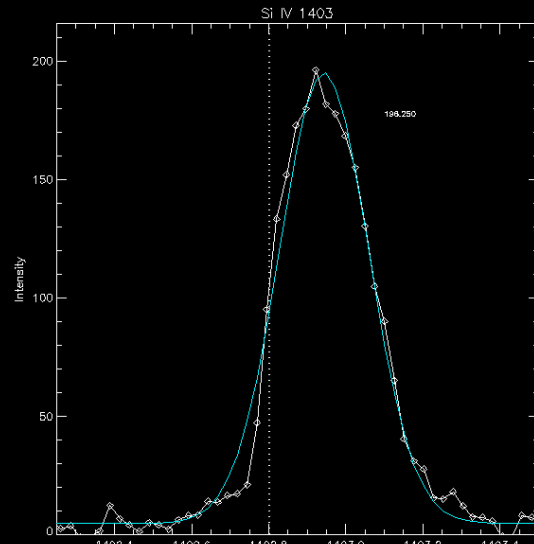
# Flashback

Si IV



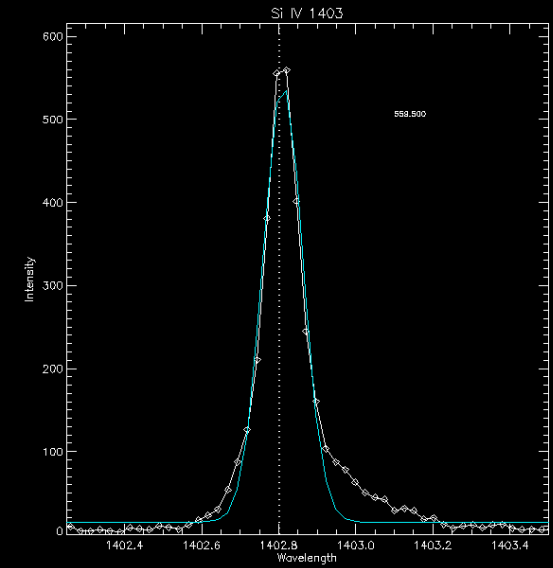
R1

Si IV



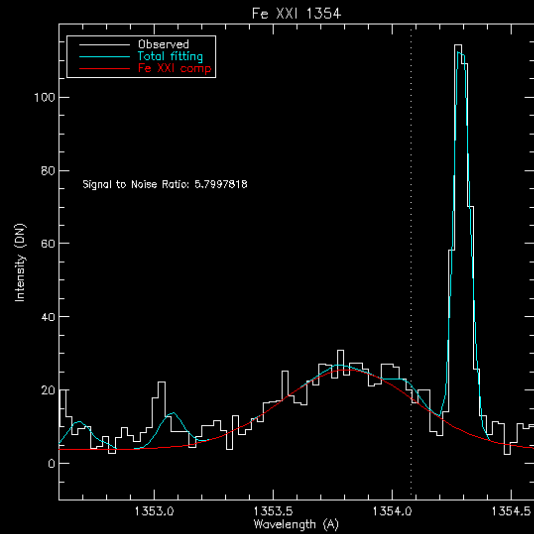
L1

Si IV

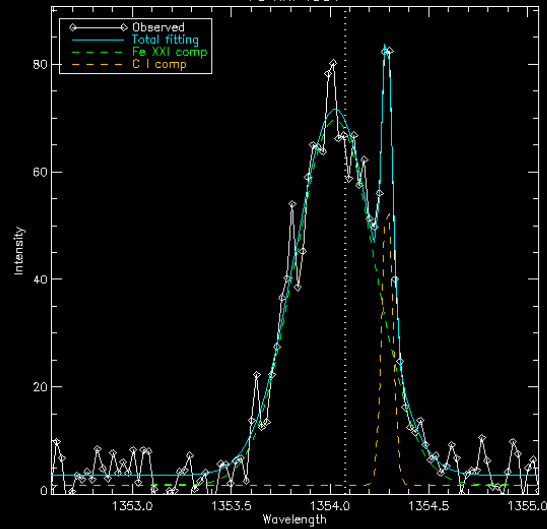


L2

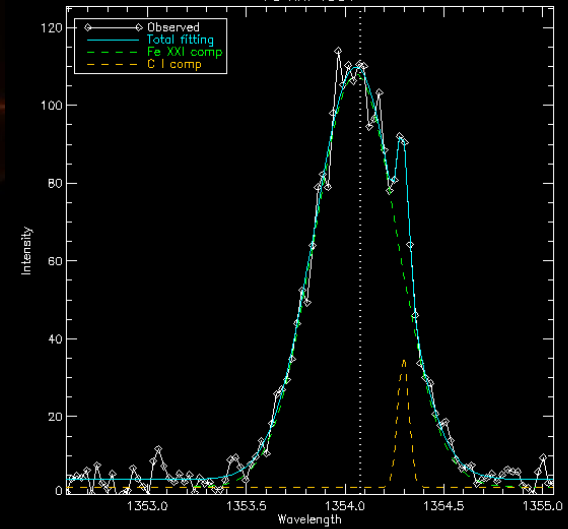
Fe XXI



Fe XXI



Fe XXI





# The Flaring Region

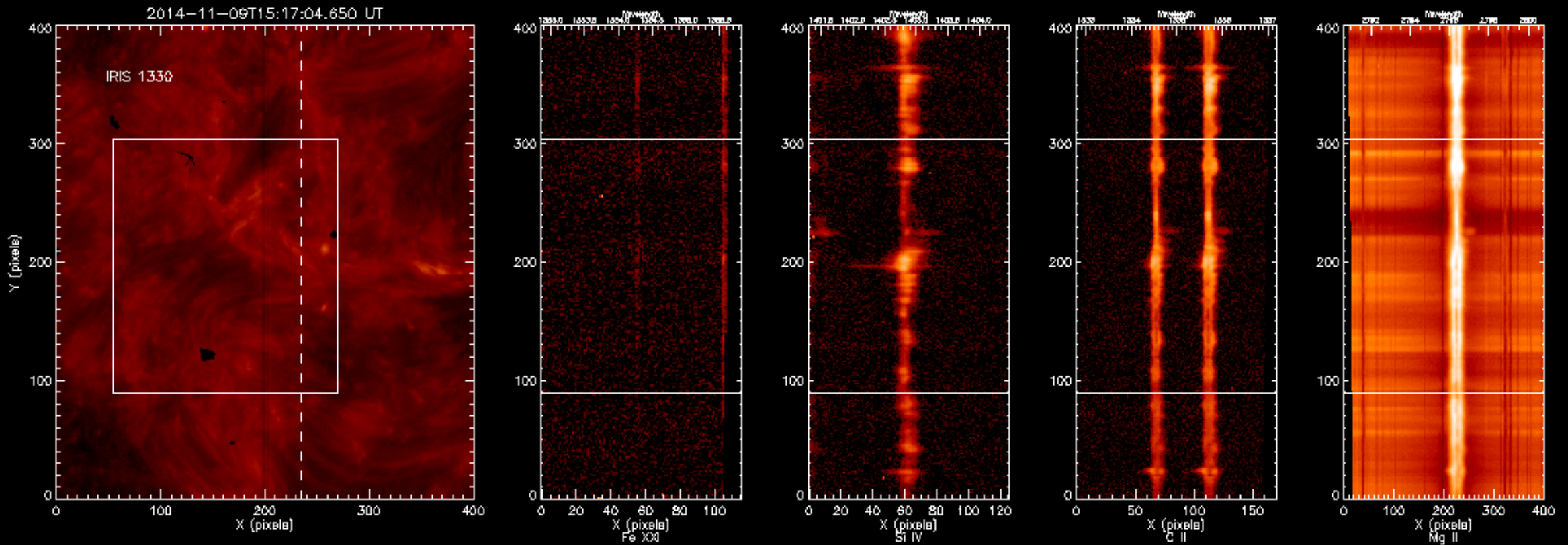
Slit Jaw Image in 1330

Fe XXI  
 $\sim 10^7$  K

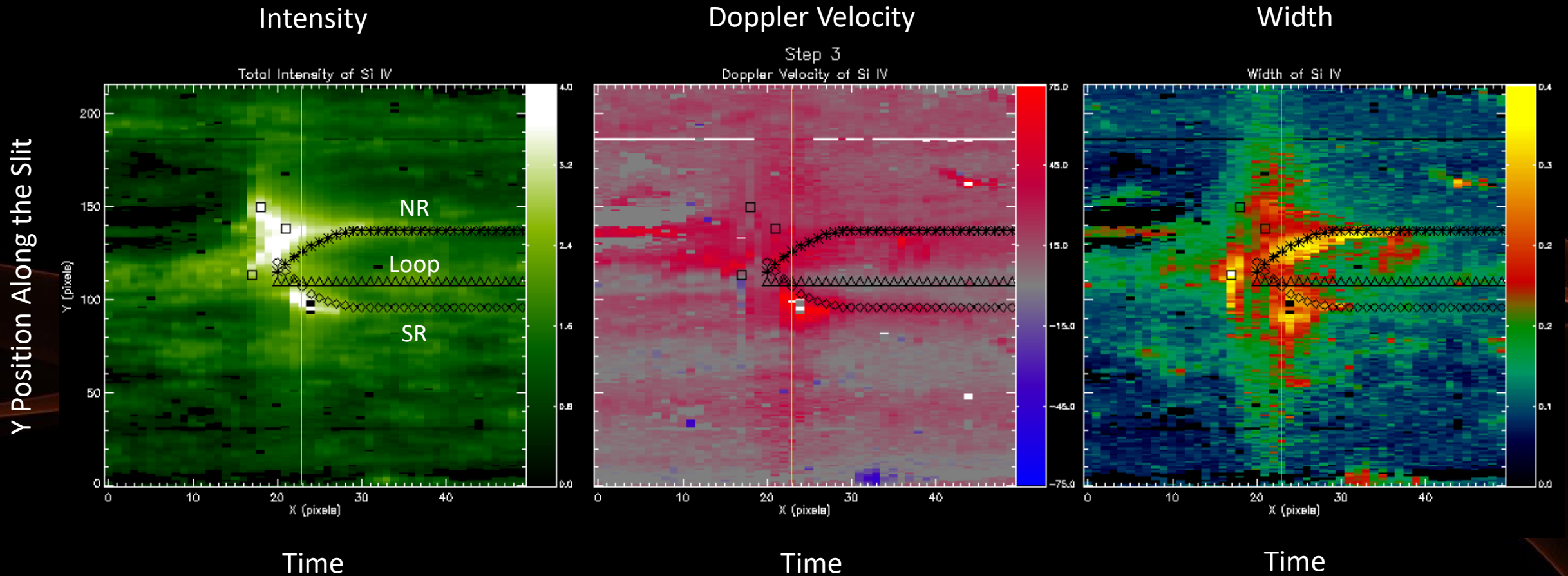
Si IV  
 $\sim 10^5$  K

C II  
 $\sim 10^{4.3}$  K

Mg II k  
 $\sim 10^4$  K

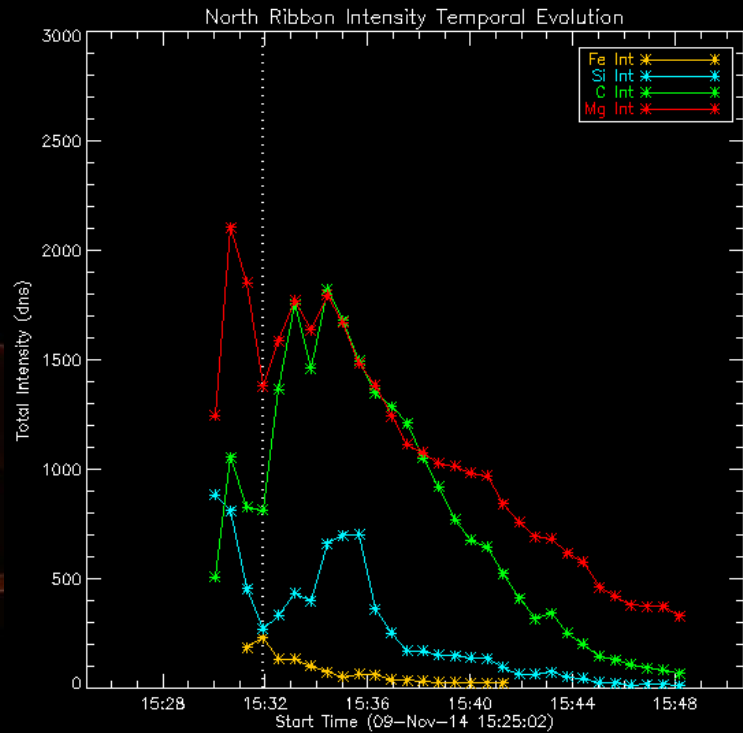


# Moment Analysis Si IV Flare Map

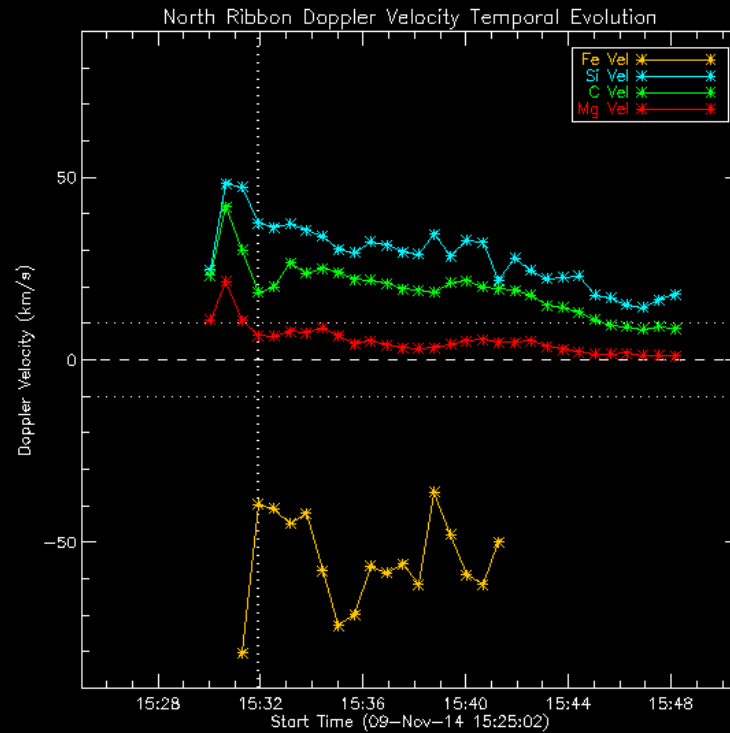


# Temporal Evolution for the North Ribbon

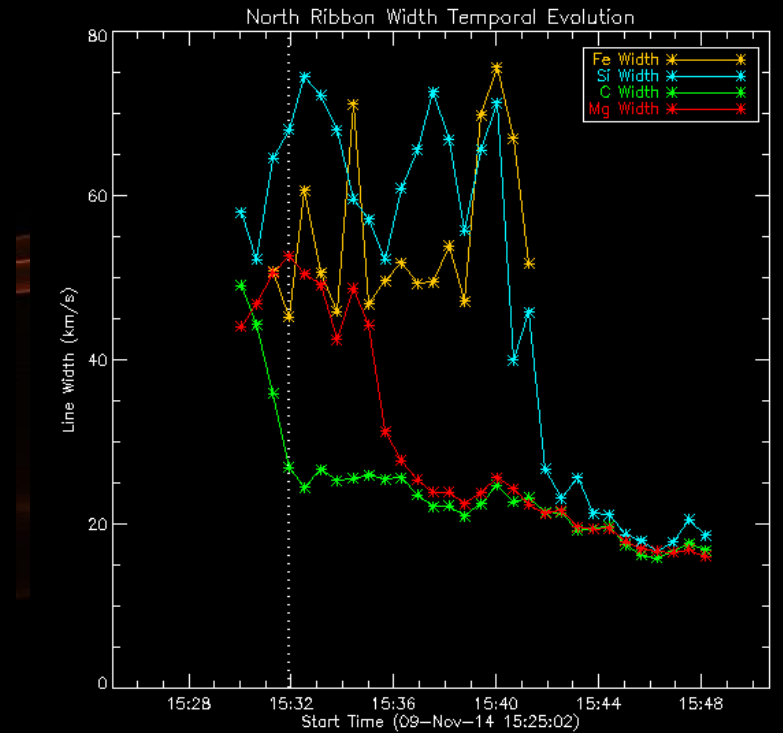
## Intensity



## Doppler Velocity

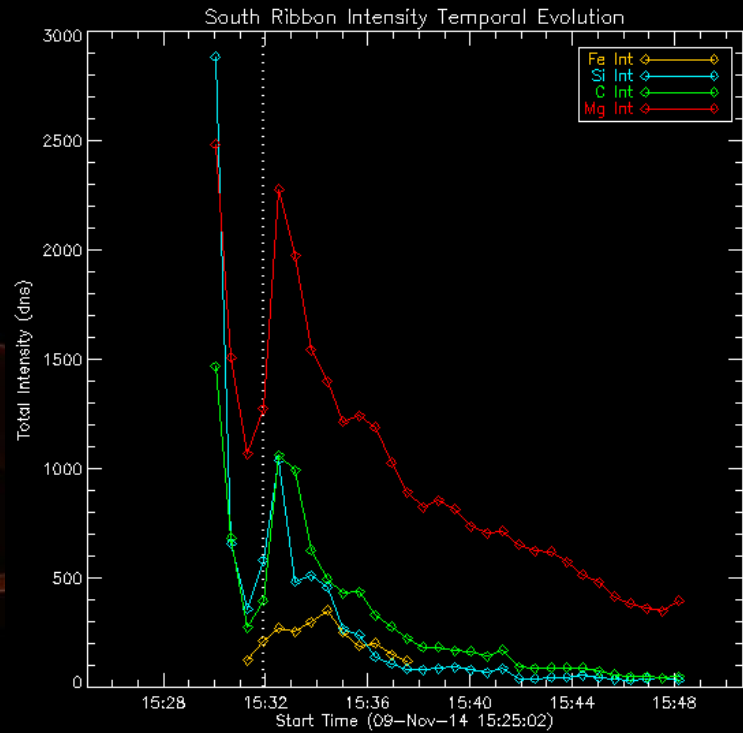


## Line Width

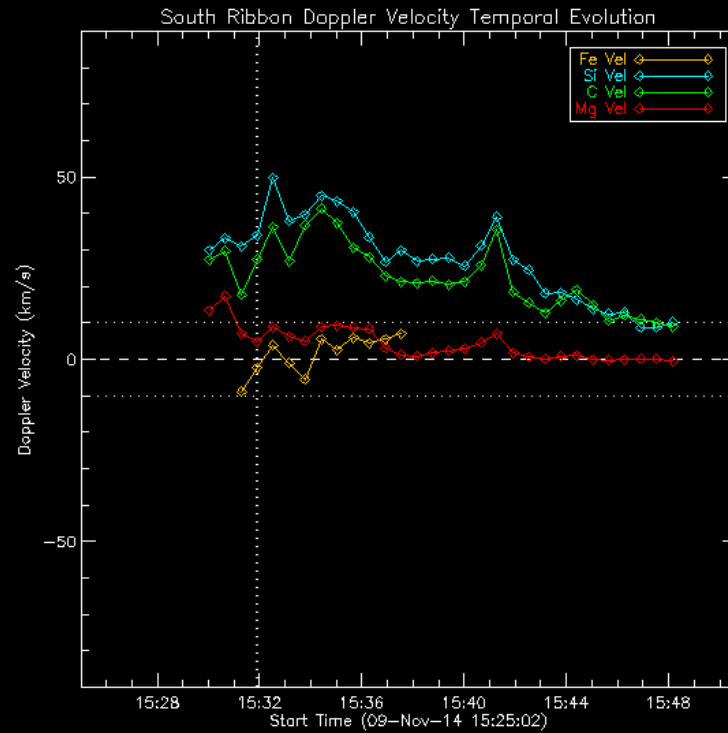


# Temporal Evolution for the South Ribbon

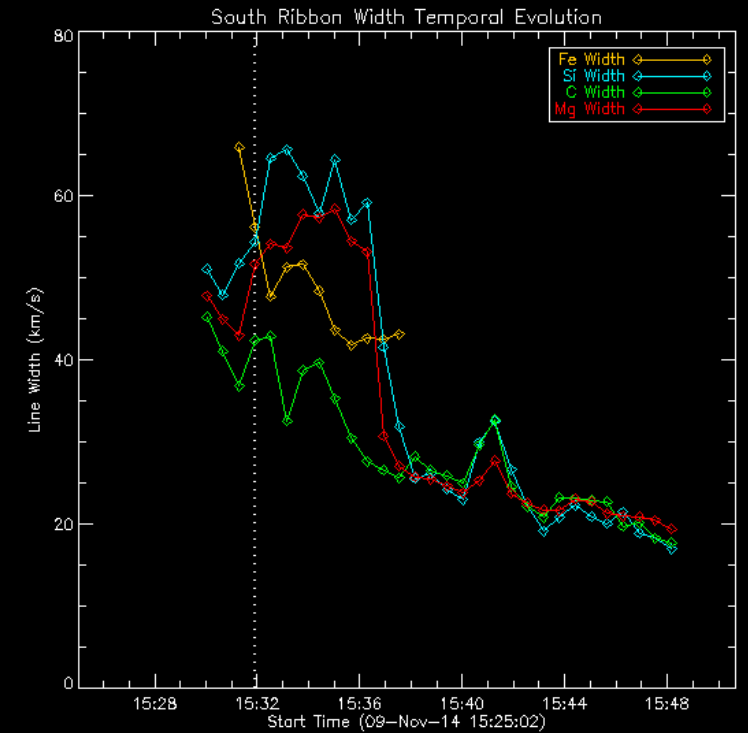
## Intensity



## Doppler Velocity



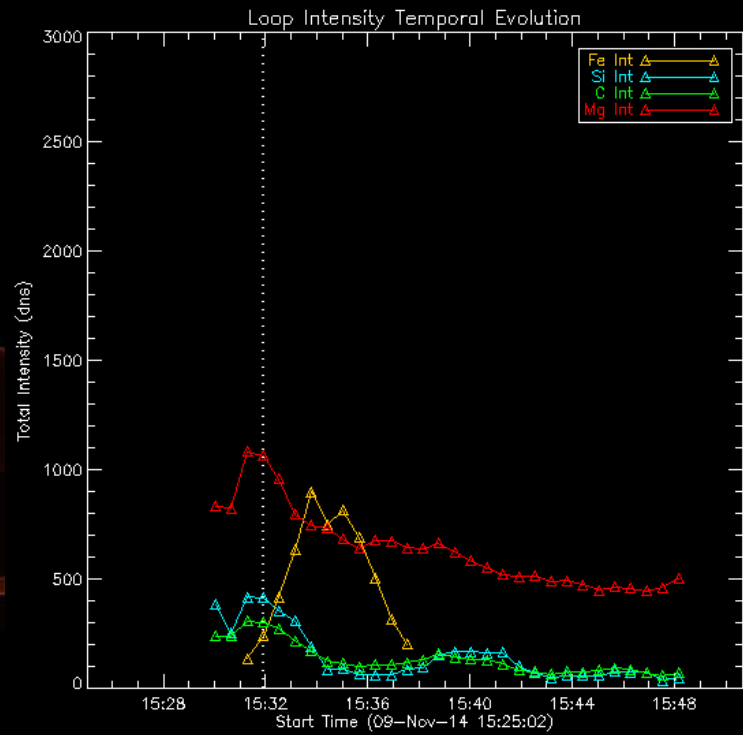
## Line Width



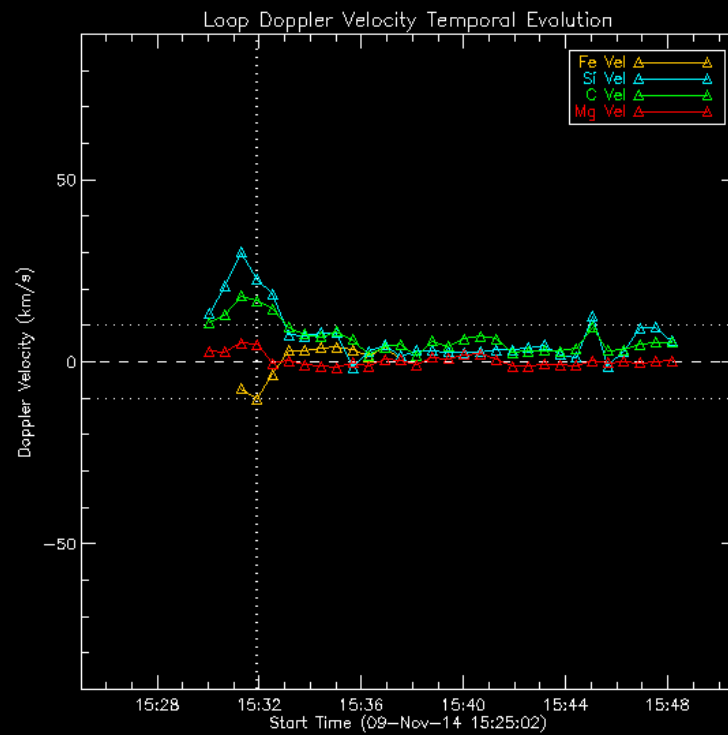


# Temporal Evolution for the Loop

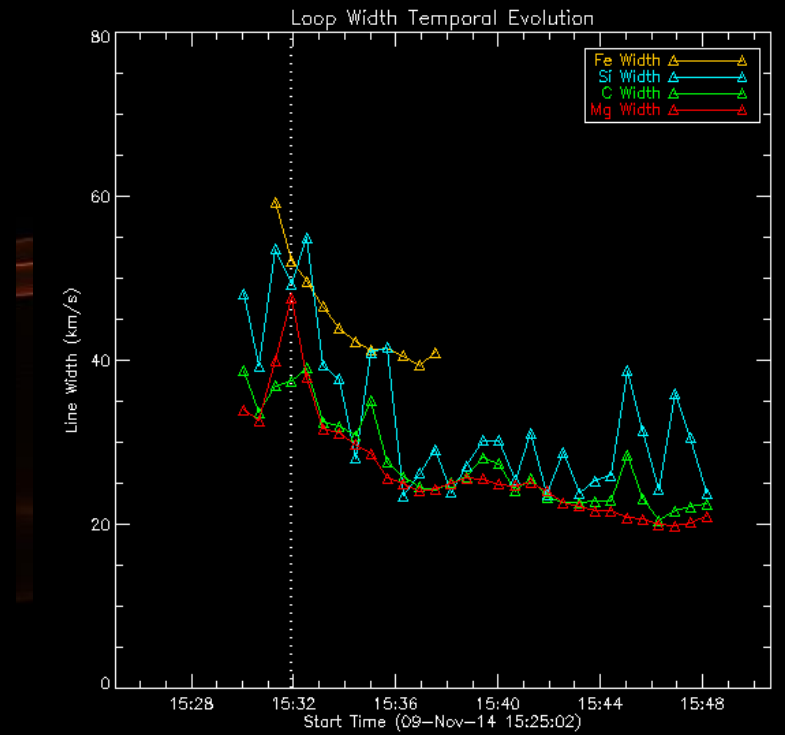
## Intensity

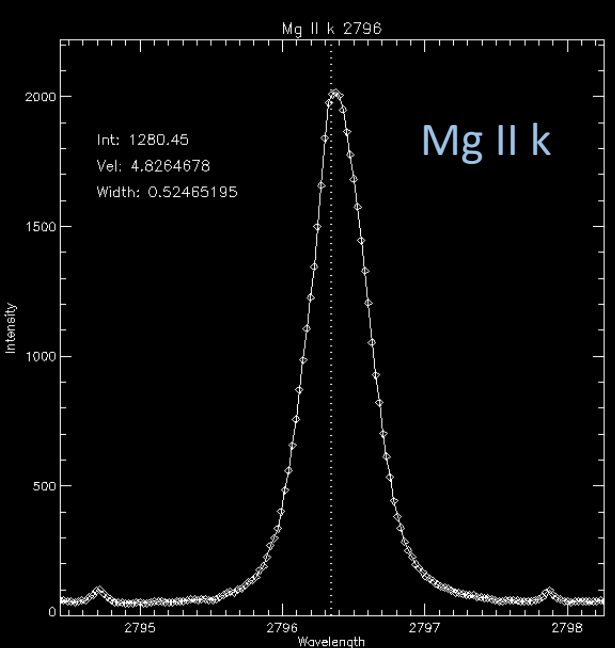
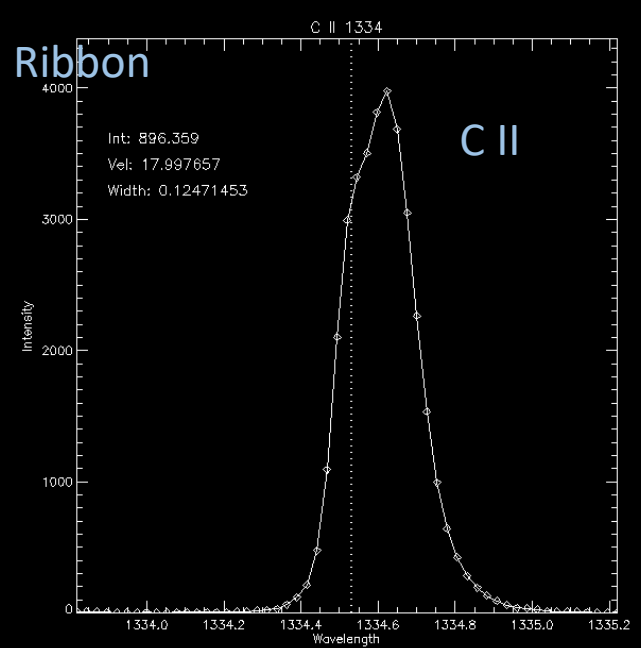
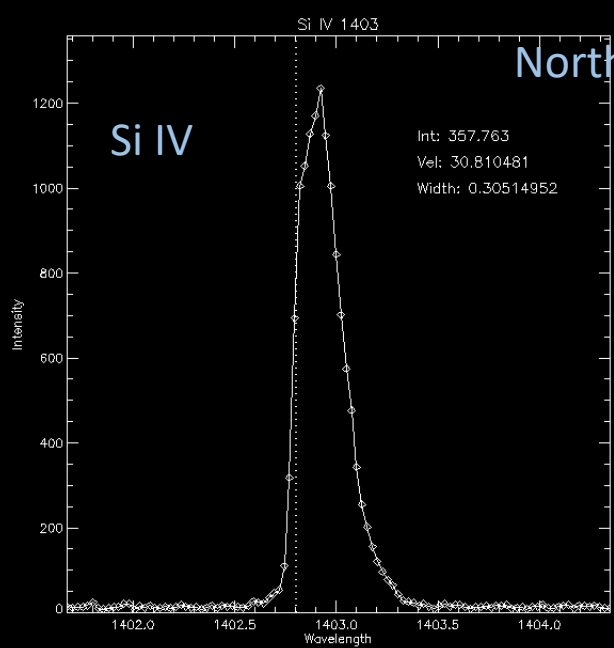
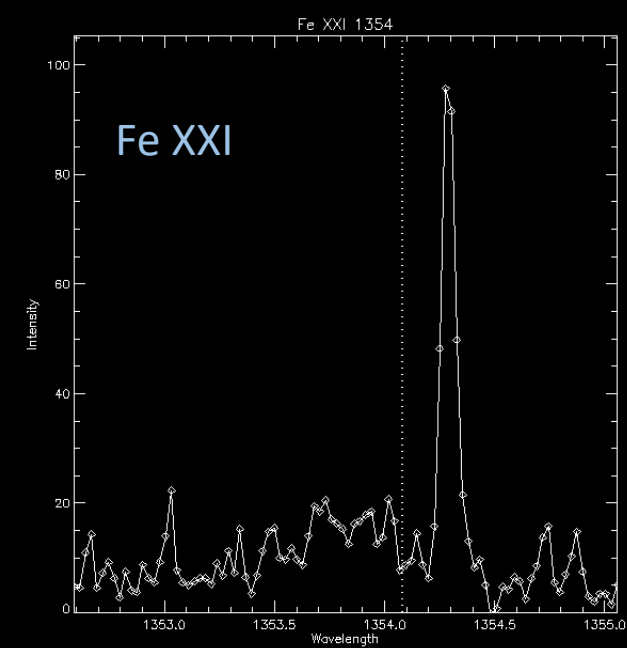


## Doppler Velocity

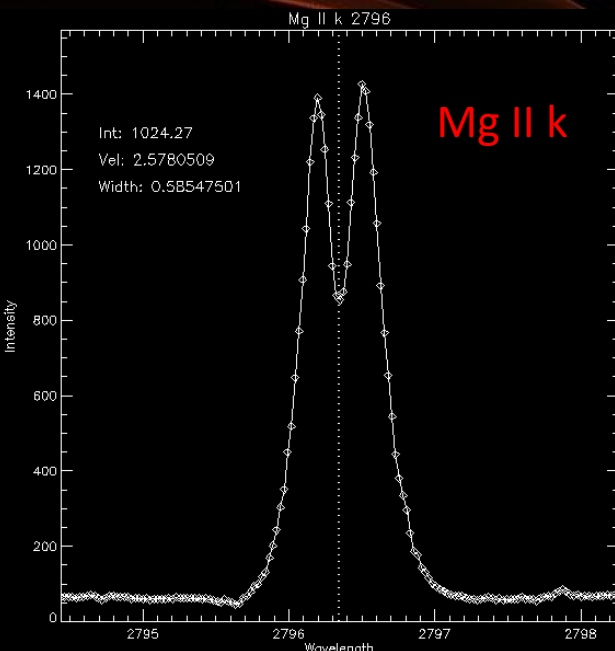
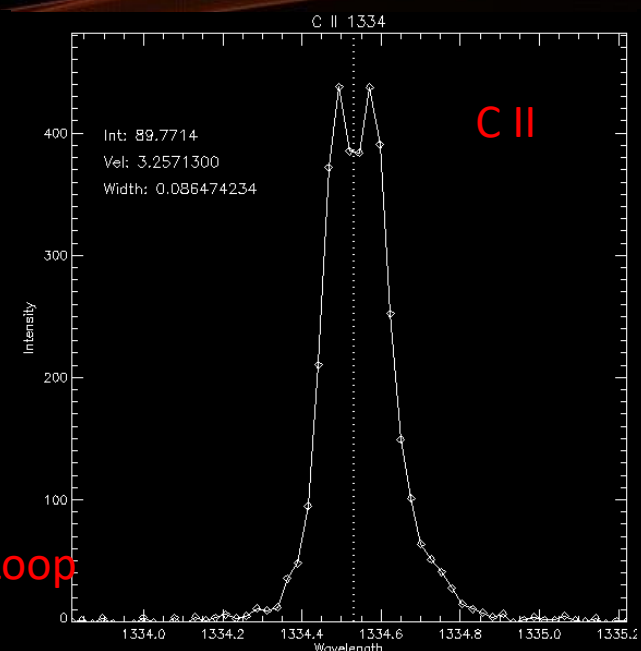
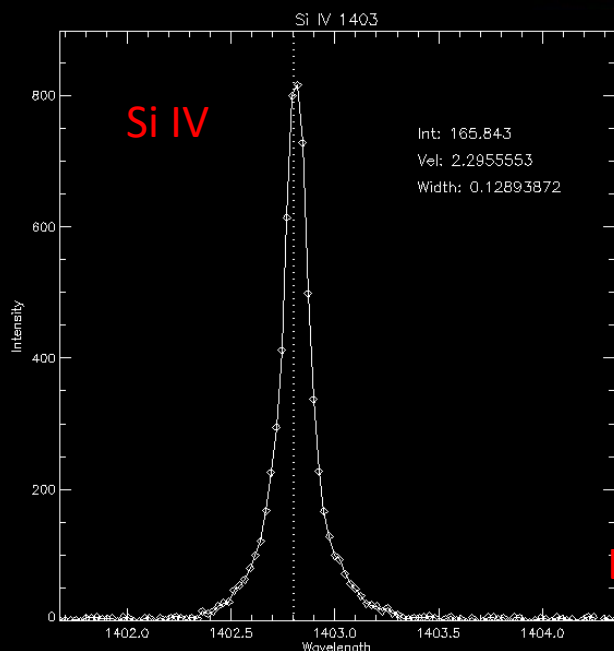
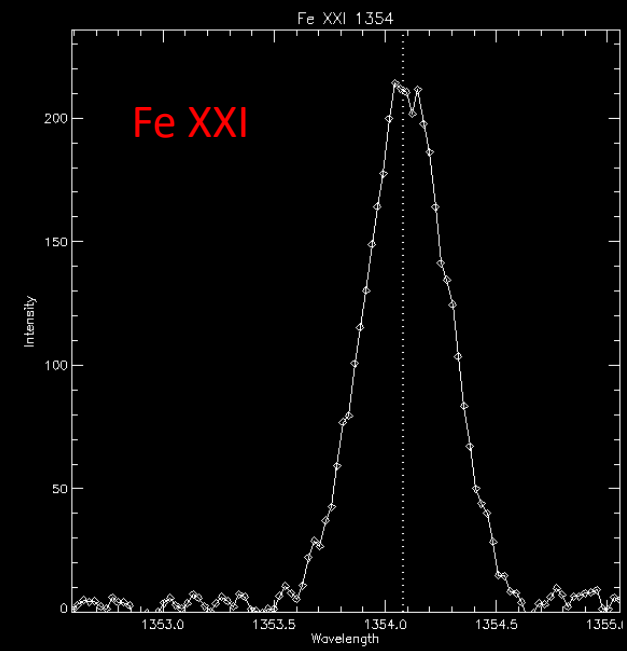


## Line Width



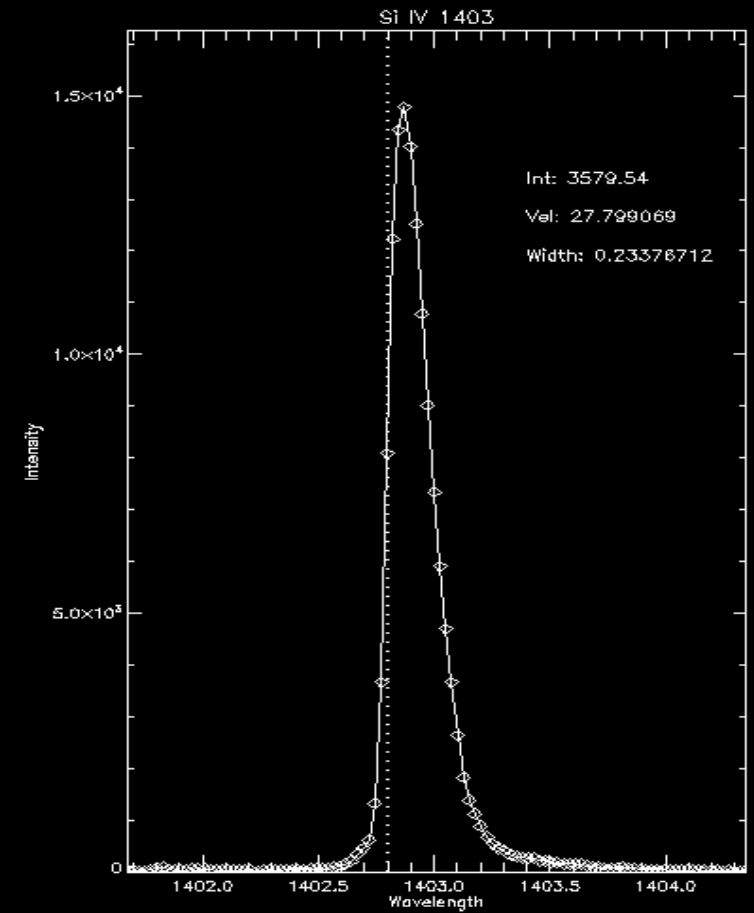
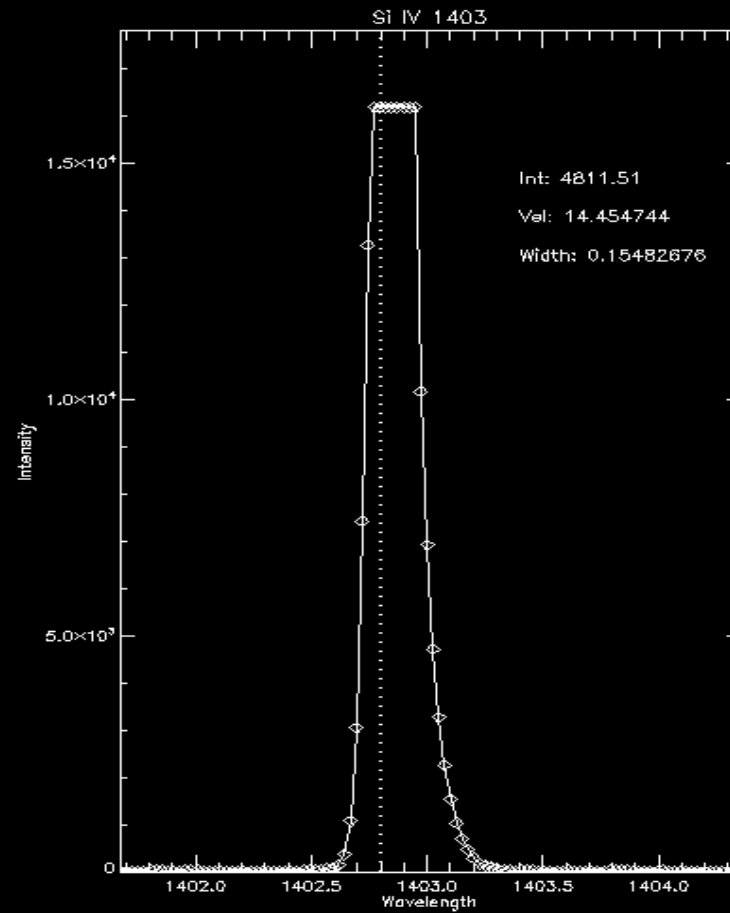
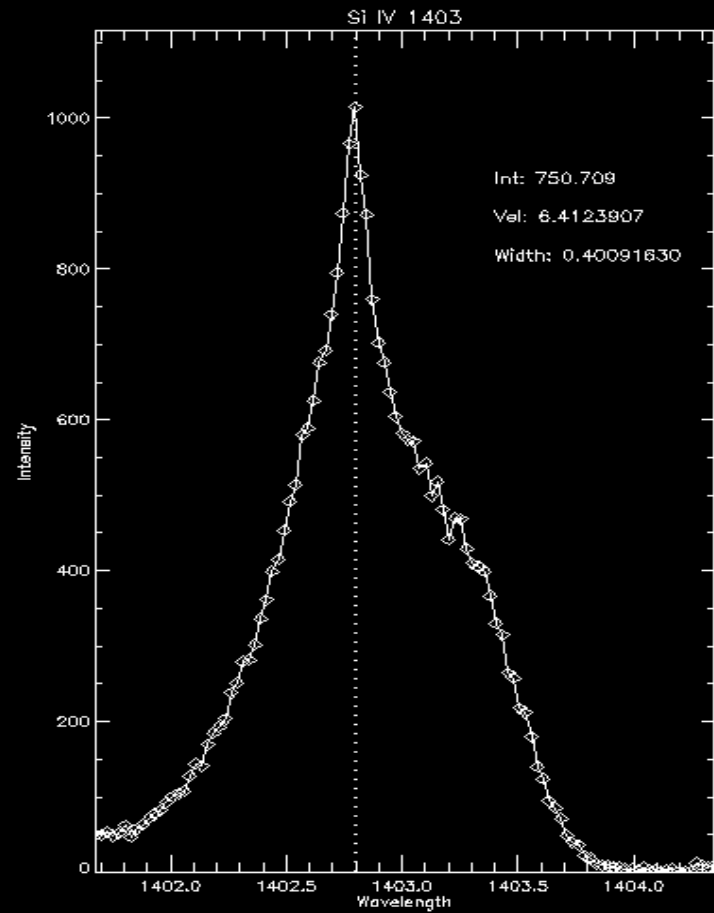


# Ribbon vs Loop Line Profiles



Loop

# Other Pixels



# Summary

- The TR and chromospheric lines (Si IV, C II, Mg II k) peak in intensity and width around the peak time of the flare. Their greatest intensities and widths occur on the ribbon, while the coronal Fe XXI line has its greatest intensity on the loop.
- The TR and chromospheric lines are all redshifted at the ribbons, particularly around the peak time, indicative of chromospheric condensation, while the Fe XXI line, particularly at the north ribbon, is blueshifted, displaying chromospheric evaporation.
- The north ribbon and south ribbon show a significant difference in the Doppler velocities of Fe XXI, indicating asymmetric dynamics between the ribbons.
- The Doppler velocity on the loop, is most nearly zero for all the lines after the peak time.
- Across the board, peaks in intensity, Doppler velocity, and line width occur around the flare peak time, followed by a gradual fall off after the flare peak, suggesting that the largest energy release or energy flux occurs around the flare peak time.
- The line profiles for Si IV follow a Gaussian shape on the ribbon, but become rather narrow and broadly winged at the loop.
- On the loop, Mg II k and C II show double peaks (central reversal), while on the ribbon there is just a single peak.