What Can We Learn About the Ejecta from Solar-B/EIS

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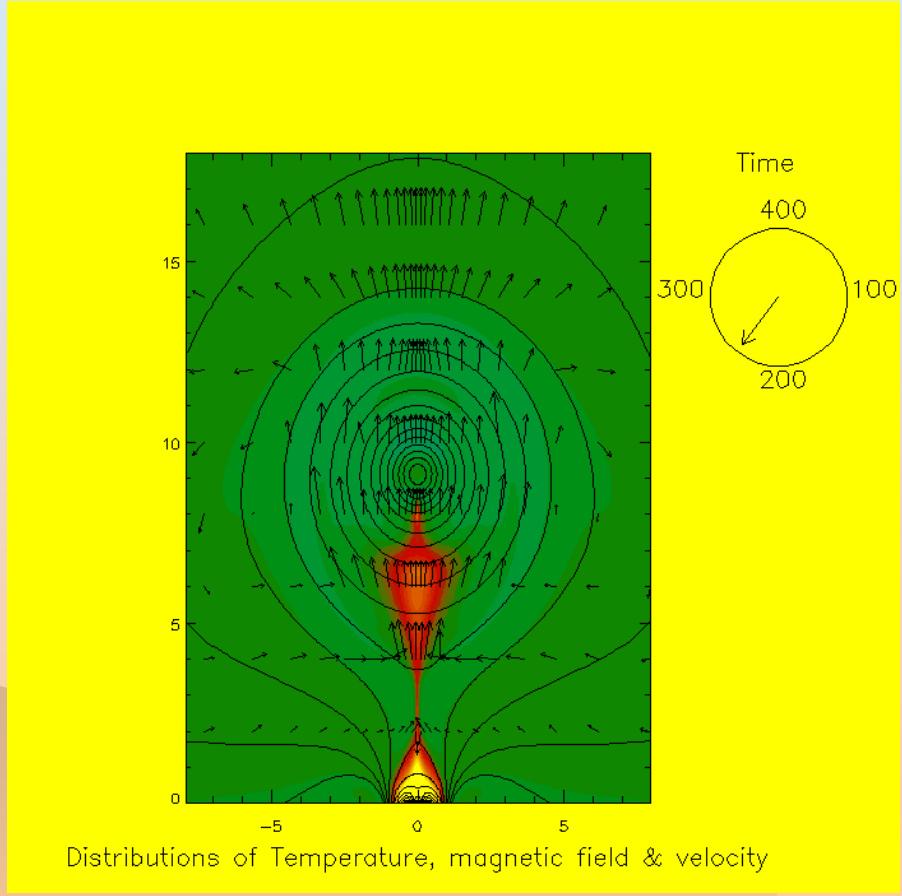
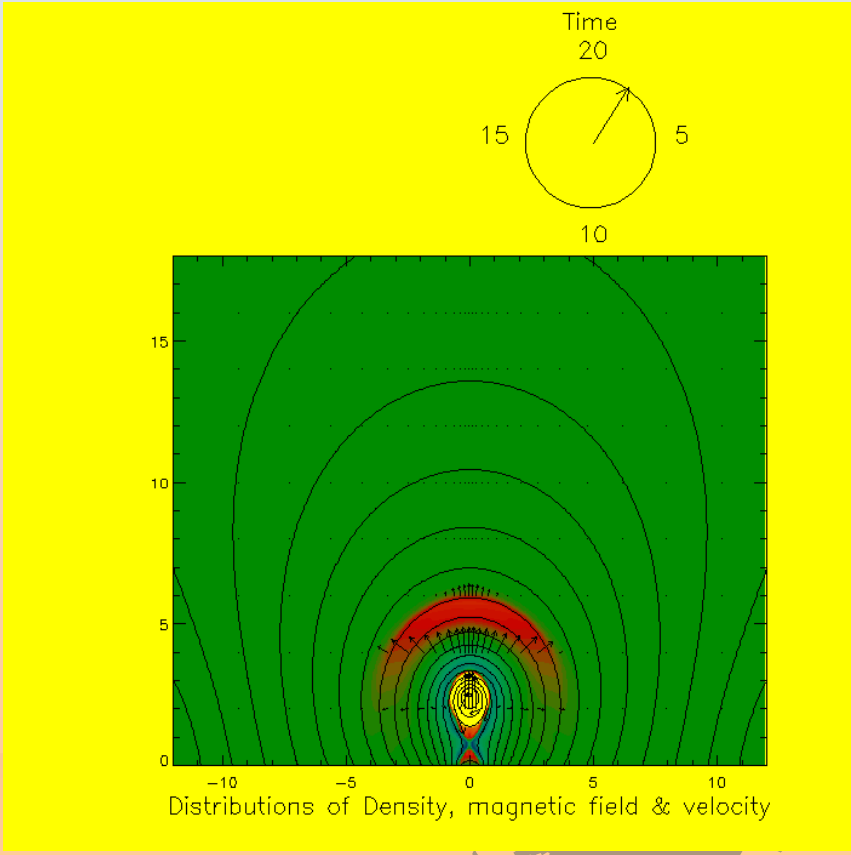
From Our Simulations

Chen & Shibata, 2000, ApJ, 545, 524

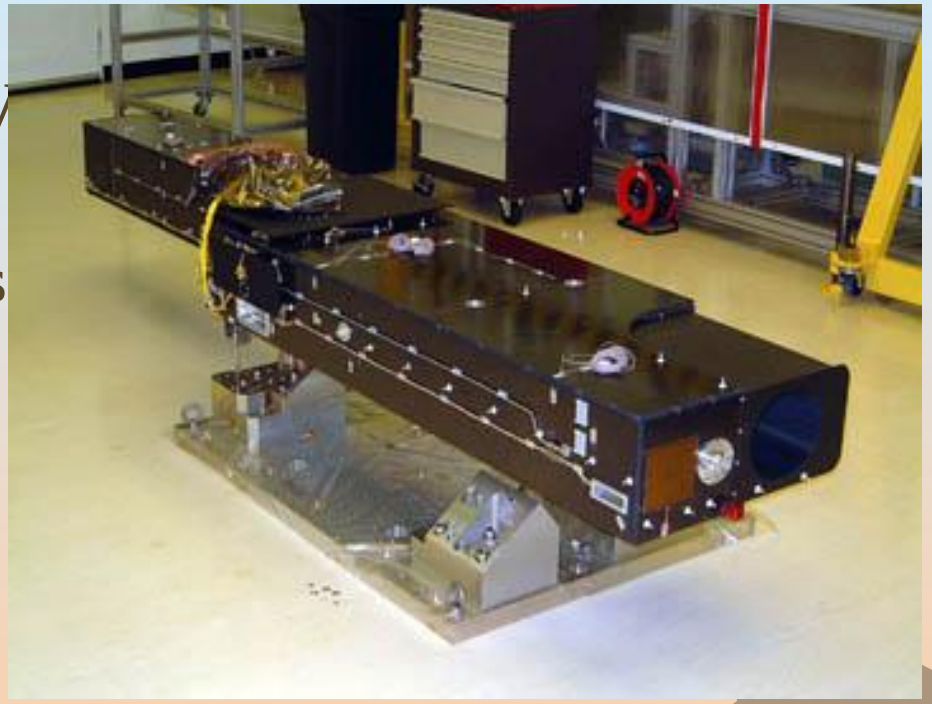


Chen, Wu, Shibata, & Fang

2002, ApJ, 572, L99



From the PIs



- Scientific Objectiv
  - ✓ Flare & CME onset proces
  - ✓ Reconnection evidence
  - ✓ ……
- Candidate Lines

Ca XVII, Fe X--XV, Fe XXIII, Fe XXIV, Si VII, Si X

VDEM & Forward Modeling

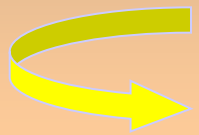
- VDEM (Velocity differential Emission Measure)

It is directly related to the flaring plasma properties

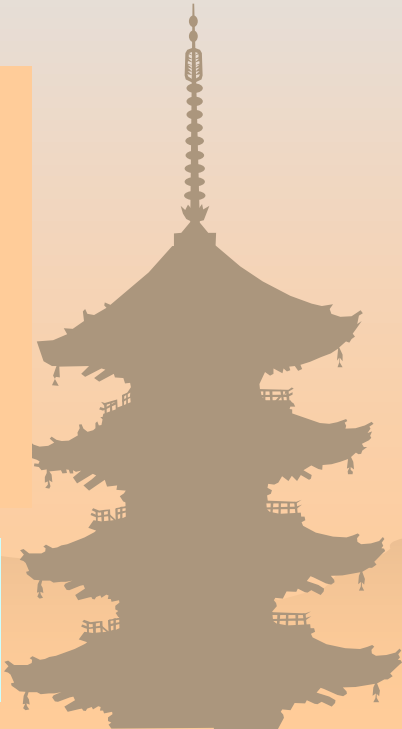
$$\mathrm{VDEM}(v) = n_e{}^2 G(T,\rho) A(s) \frac{\mathrm{d}s}{\mathrm{d}v}$$

- Why Forward Modeling

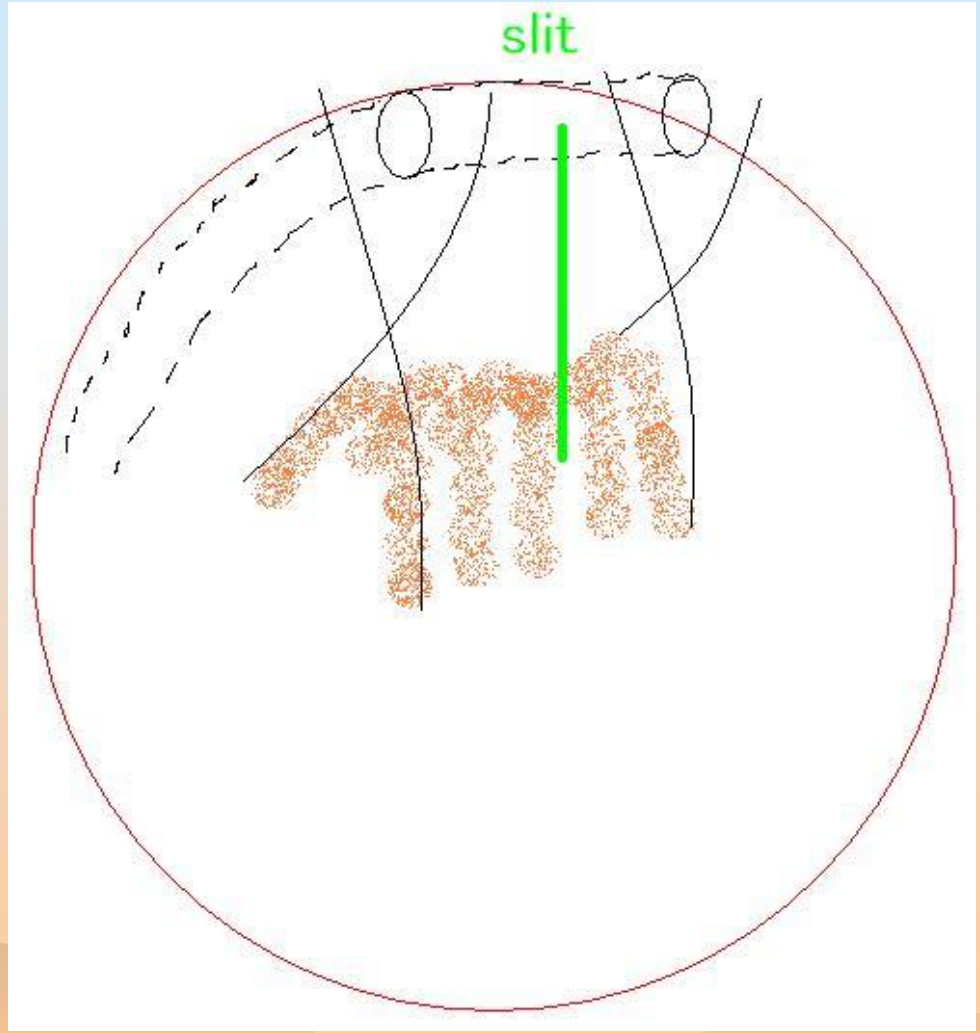
1. Inversion Modeling is an ill-posed problem, and should be combined with the Forward Modeling (λ resolution of SOHO/CDS is not high enough)
2. To suggest the most suitable lines for the corresponding phenomenon



Coronal Reconnection outflow & Moreton waves

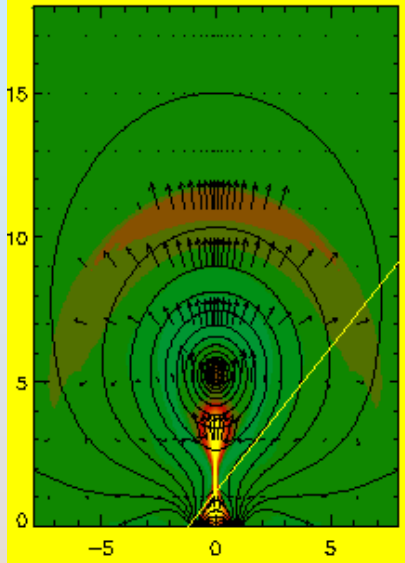


Scenario



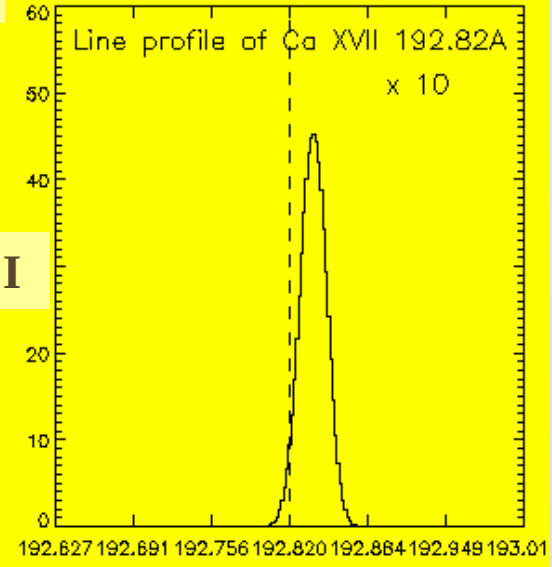
T_0=1.5 MK, n0=109 cm^{-3} T_{max} =30 MK for flare loop top, & 12 MK for the ejecta

Observer

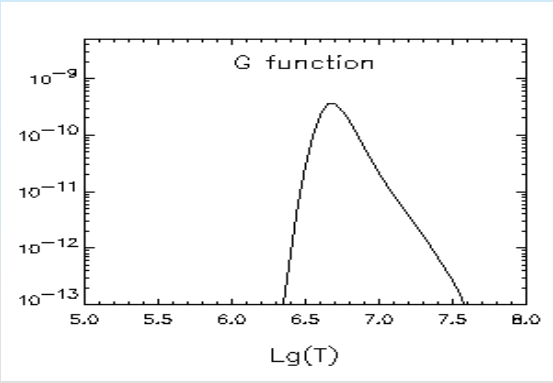


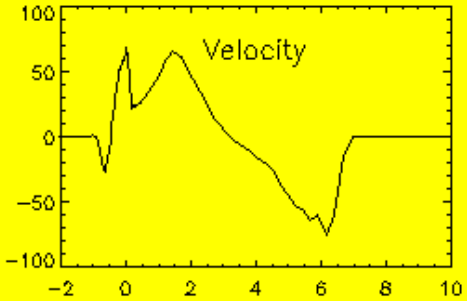
slit

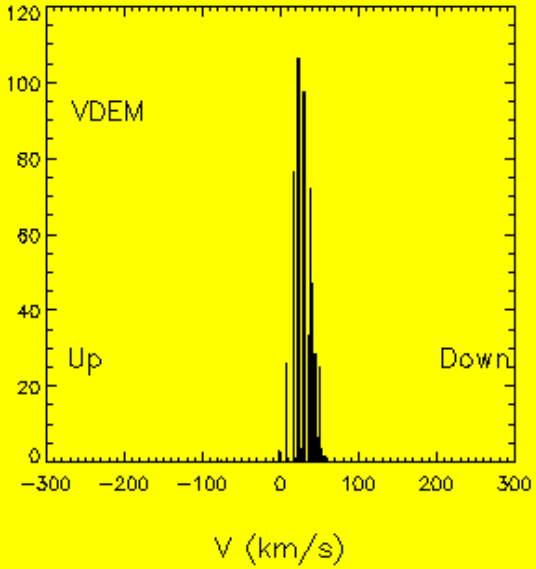
I



Ca XVII







Units

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35×10^{-11} photons s^{-1} $cm_{detector}^{-2}$ cm_{flare}^{-2} $Å^{-1}$

VDEM

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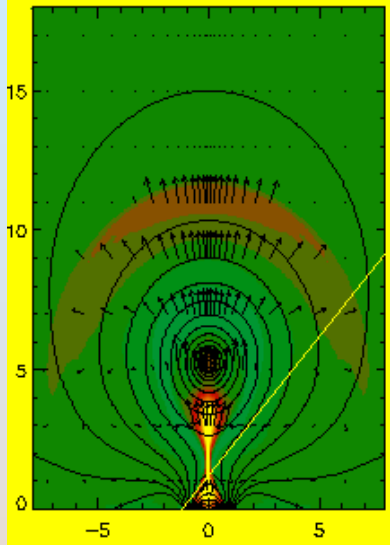

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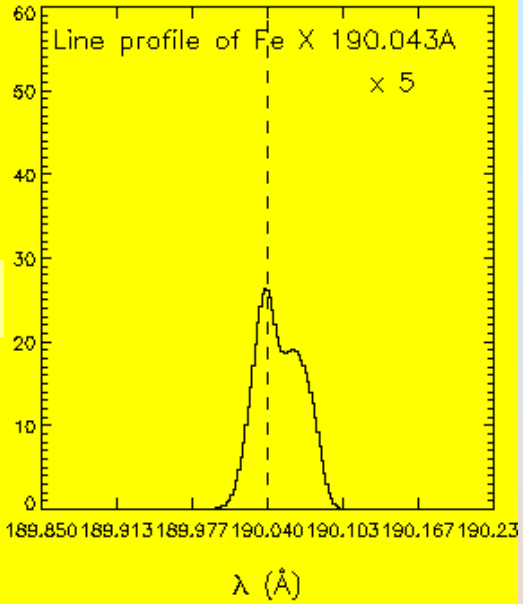
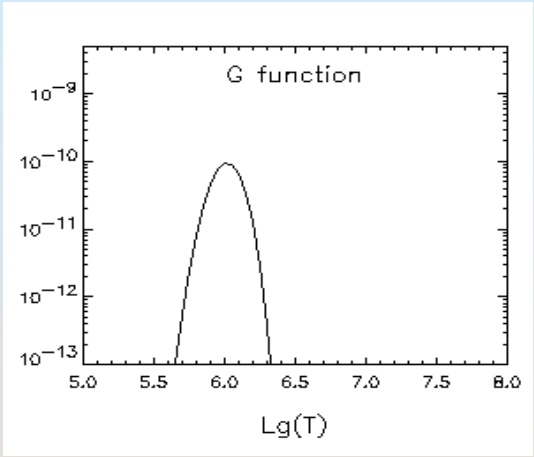
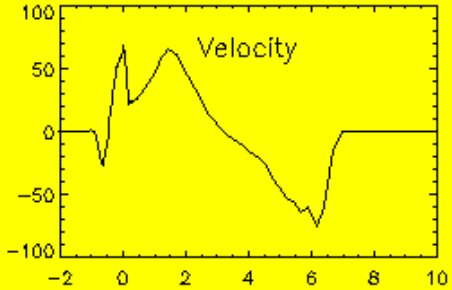
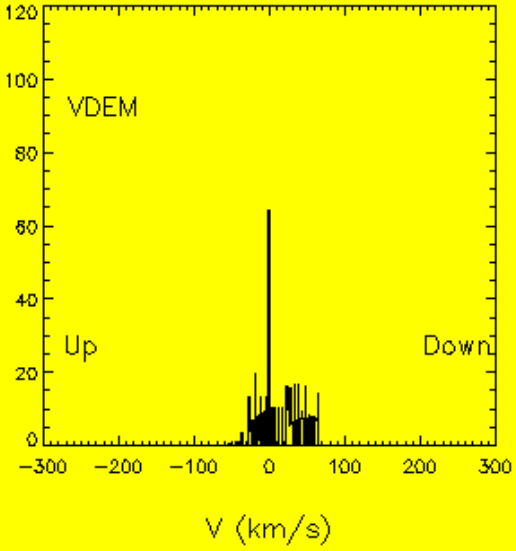


Fe X







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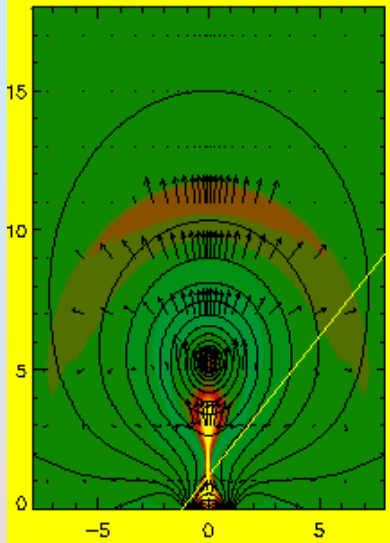

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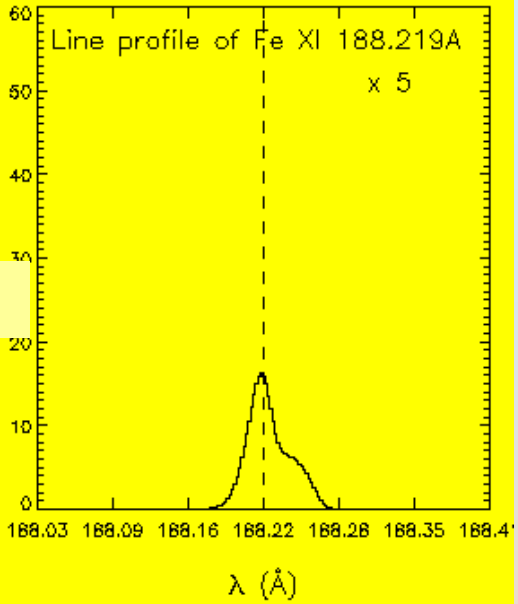

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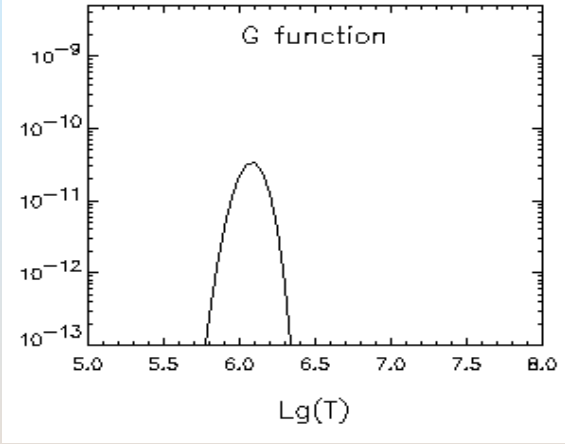

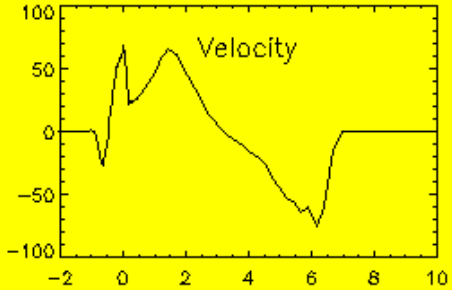

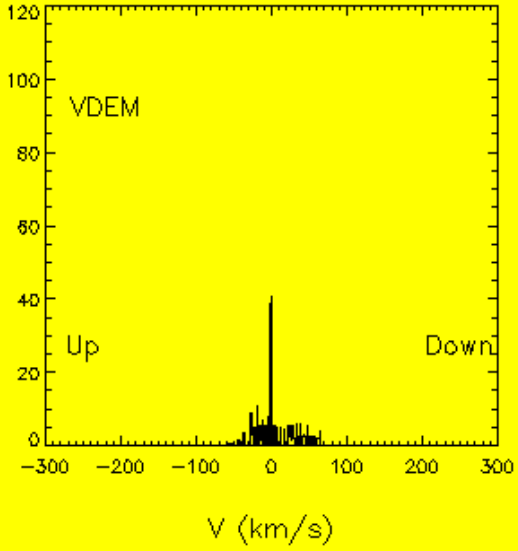

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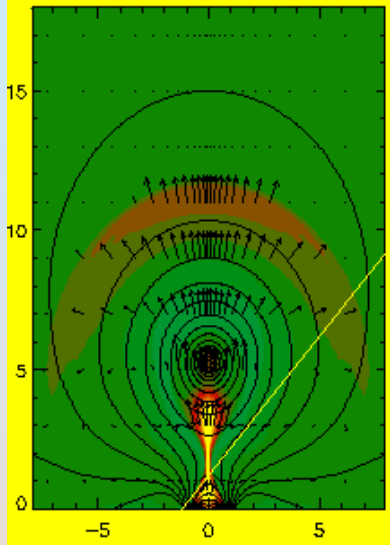

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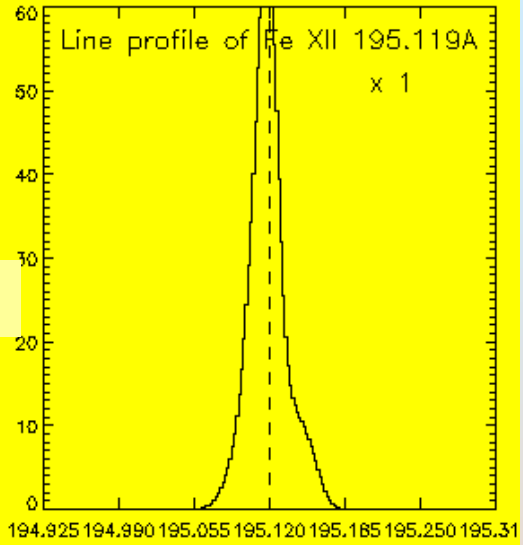
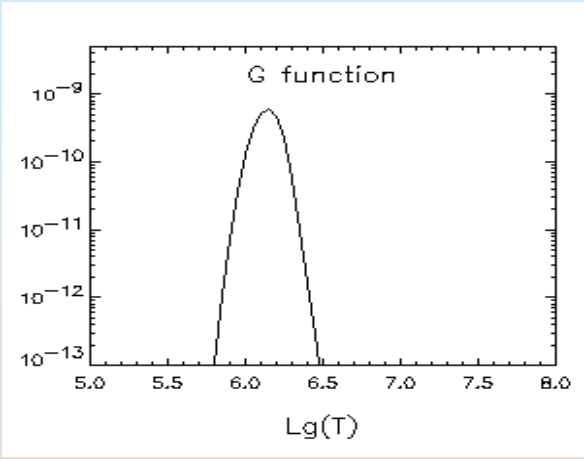
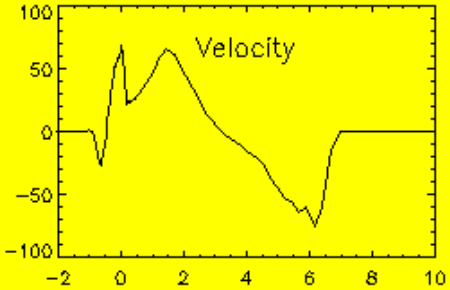
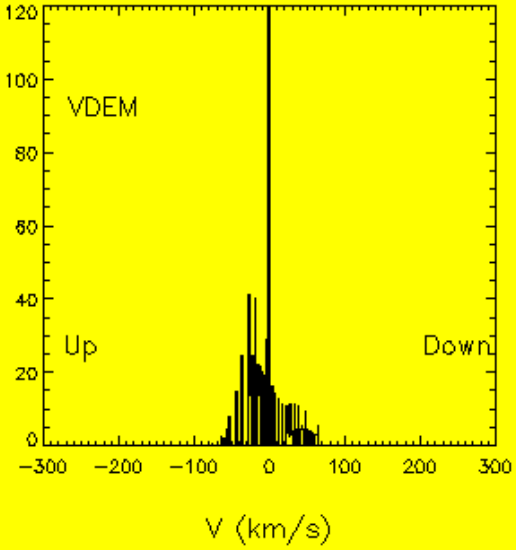


Fe XII







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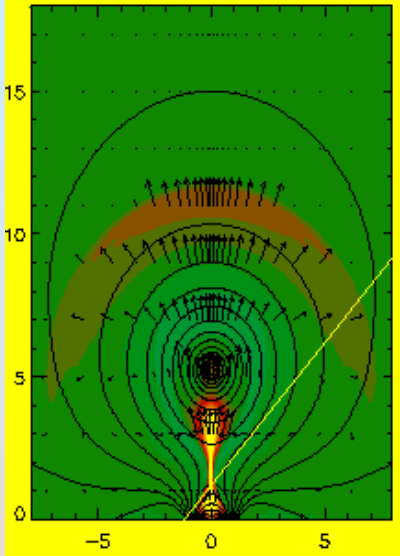

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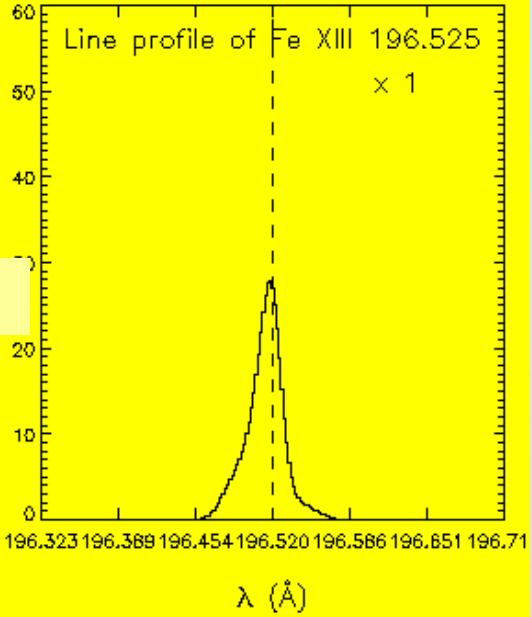
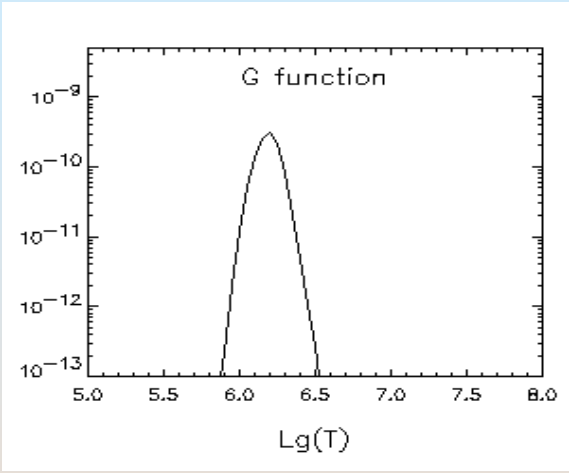
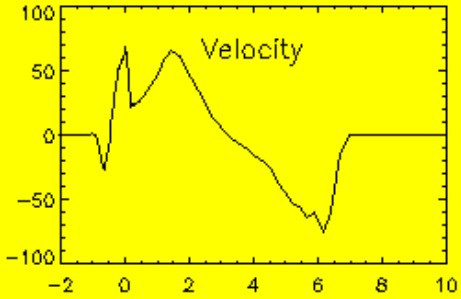
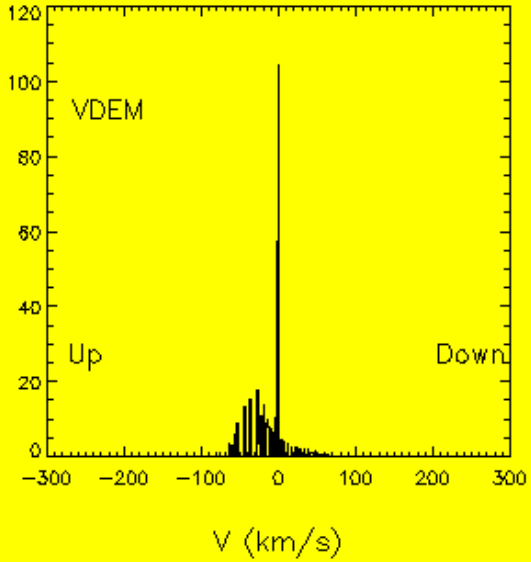


Fe XIII







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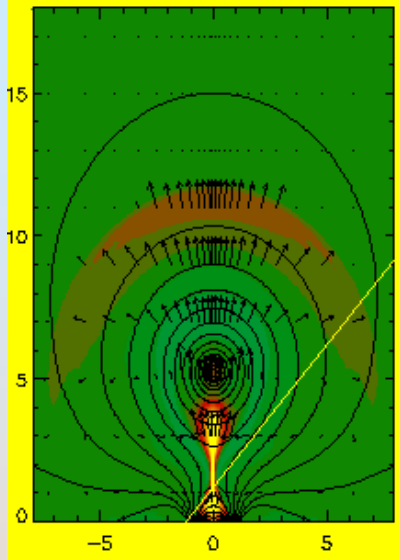

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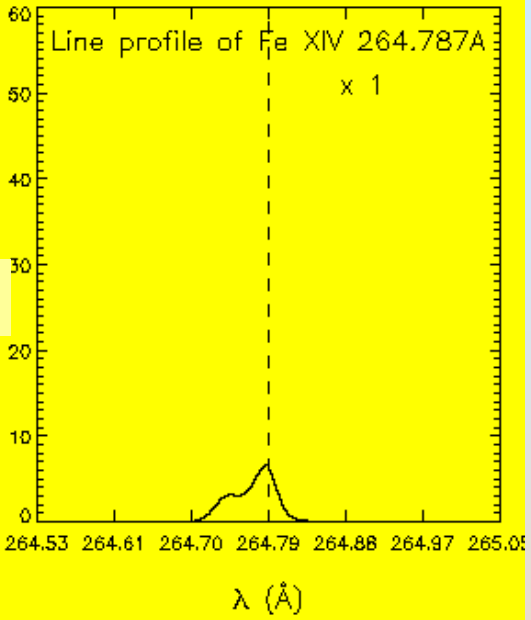
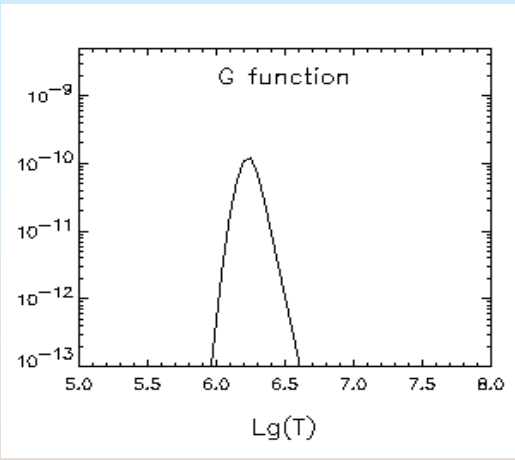
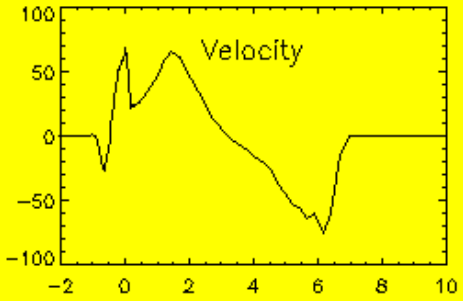
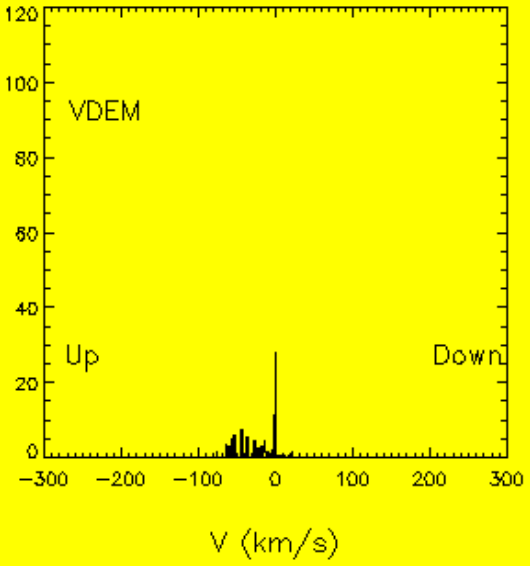


Fe XIV







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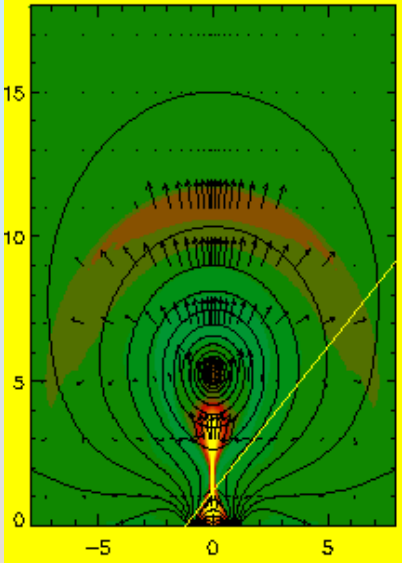

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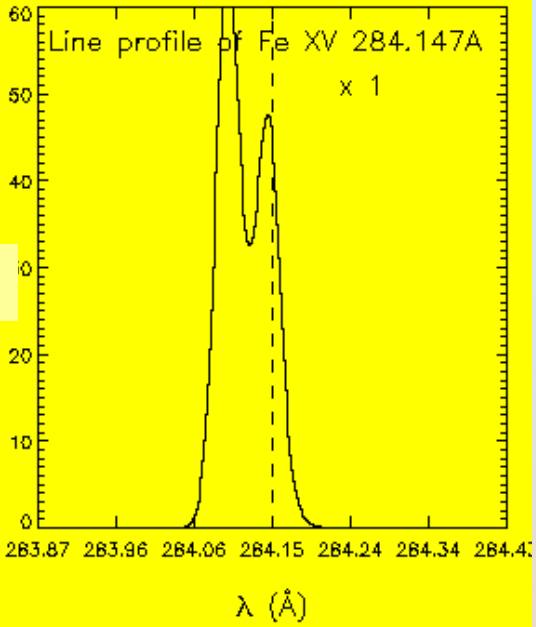
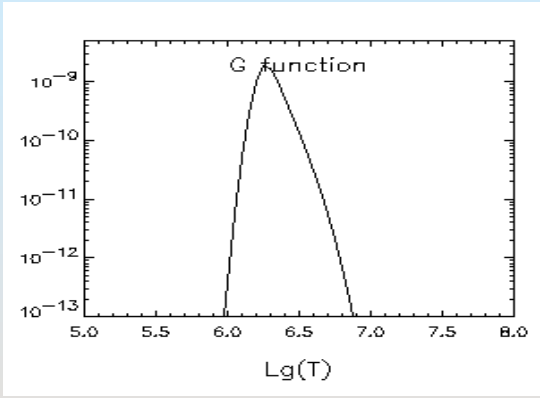
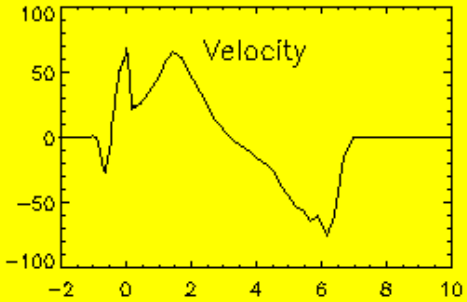
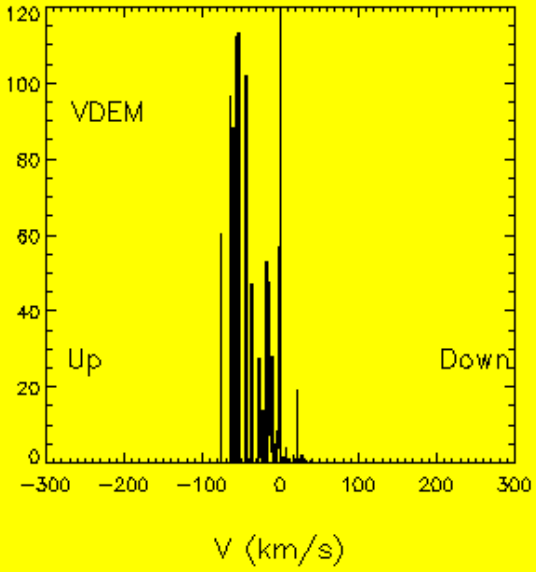


Fe XV







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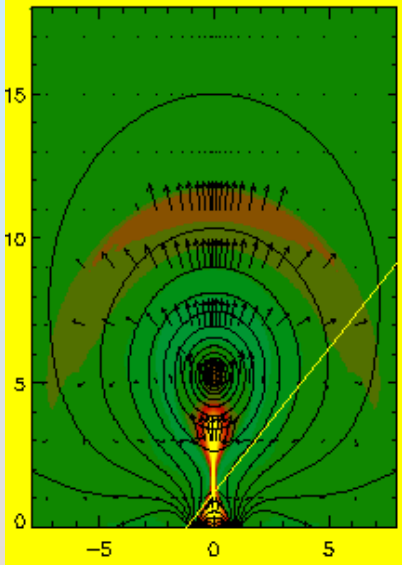

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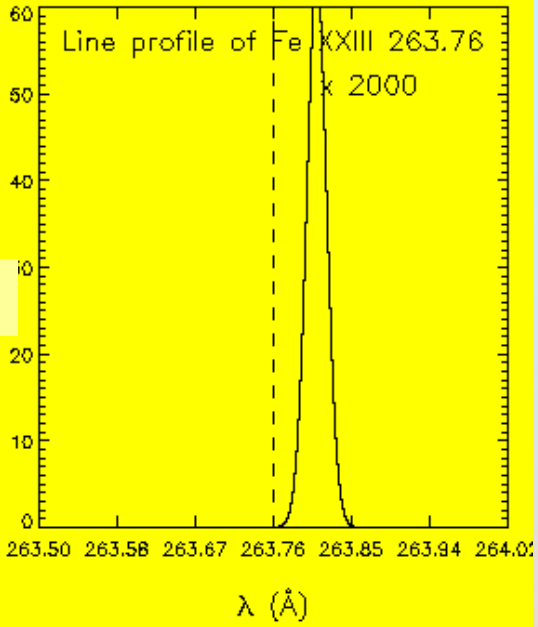
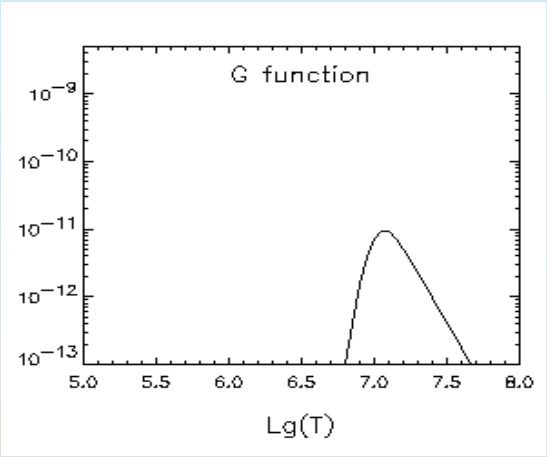
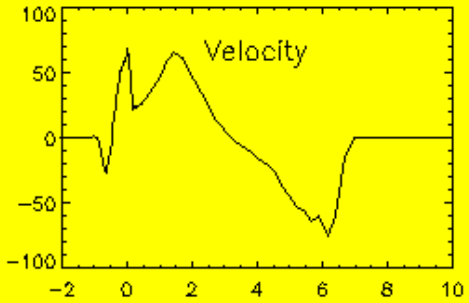
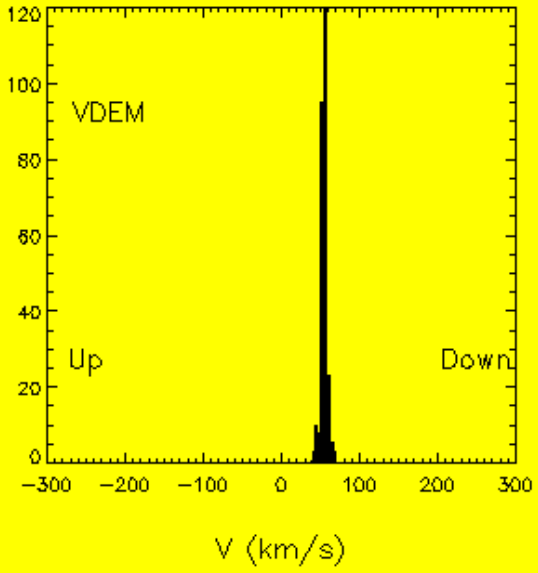


Fe XXIII







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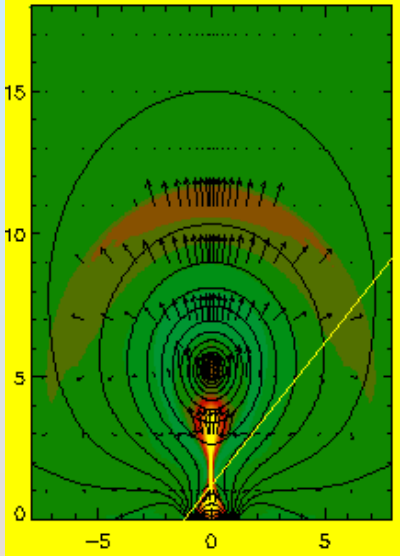

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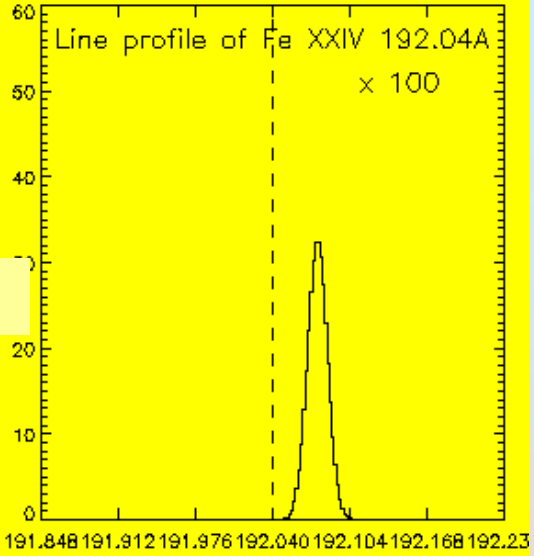
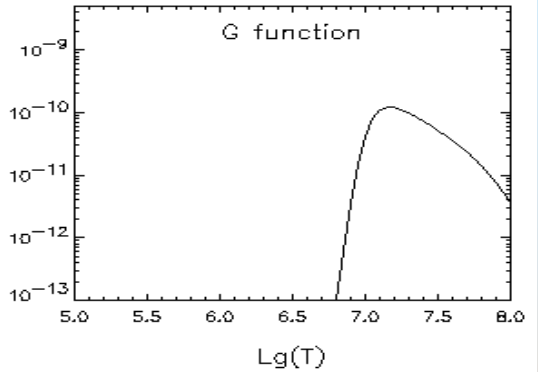
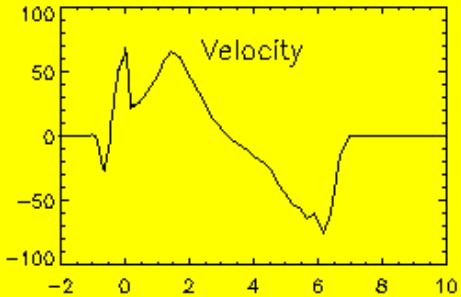
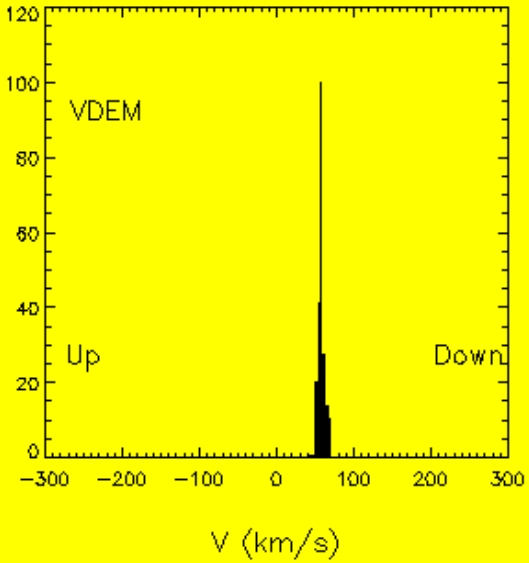


Fe XXIV







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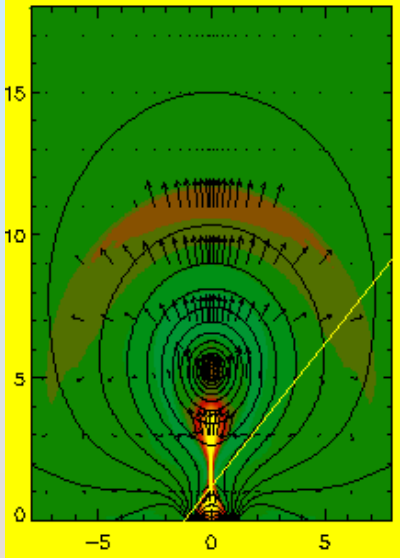
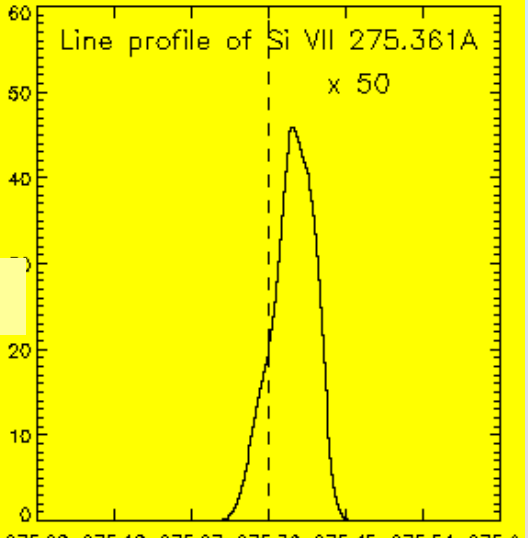


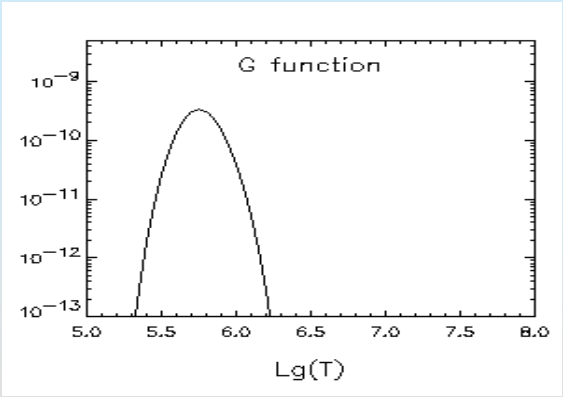
Observer

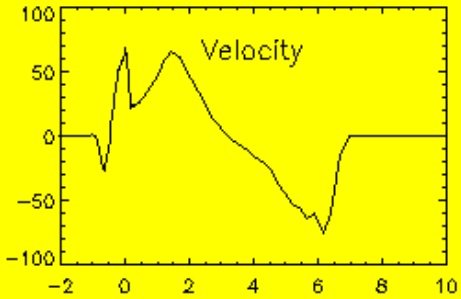
slit

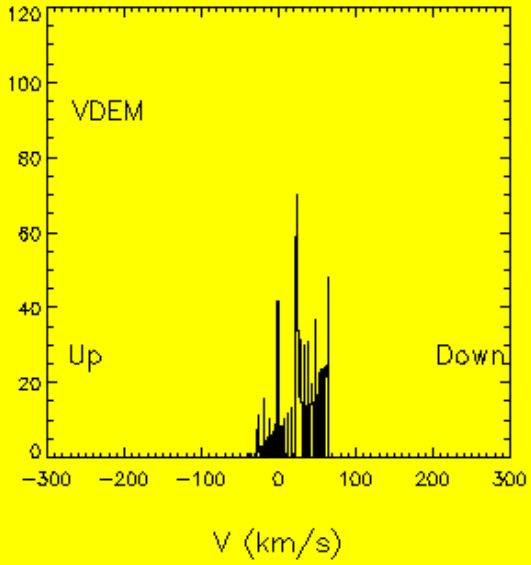
I



Si VII







Units

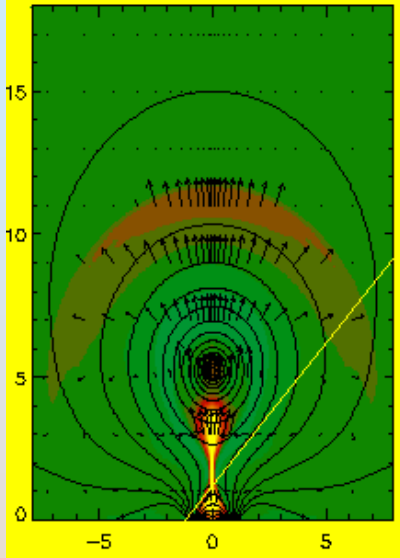
I

35×10^{-11} photons s^{-1} $cm_{detector}^{-2}$ cm_{flare}^{-2} $Å^{-1}$

VDEM

10^{15} photons s^{-1} $(km\ s^{-1})^{-1}$ cm_{flare}^{-2}

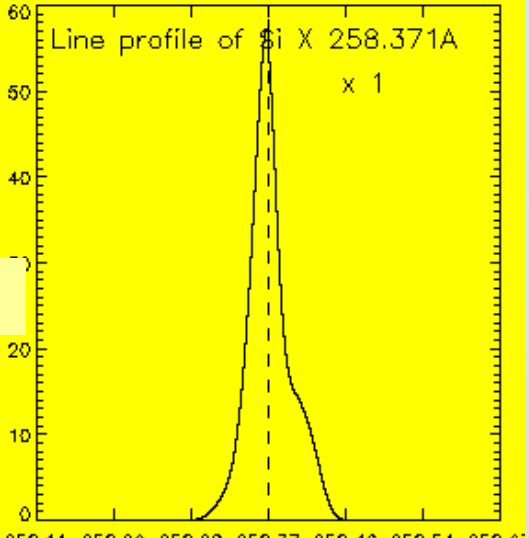
T_0=1.5 MK, n0=109 cm^{-3} T_{max} =30 MK for flare loop top, & 12 MK for the ejecta



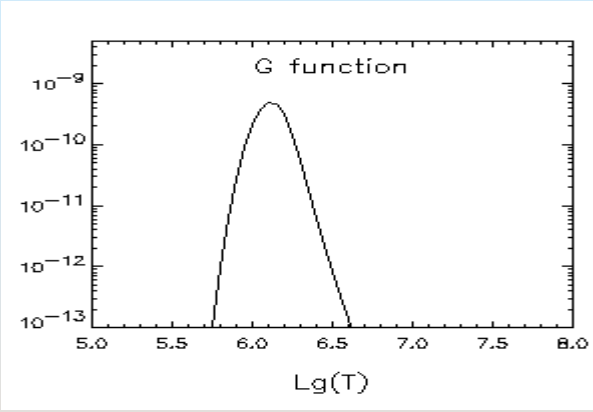
Observer

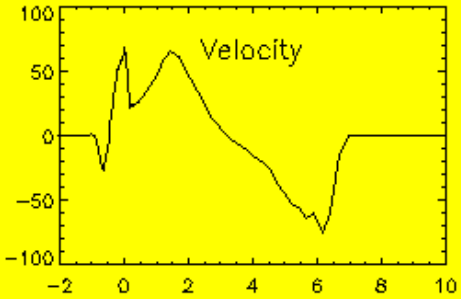
slit

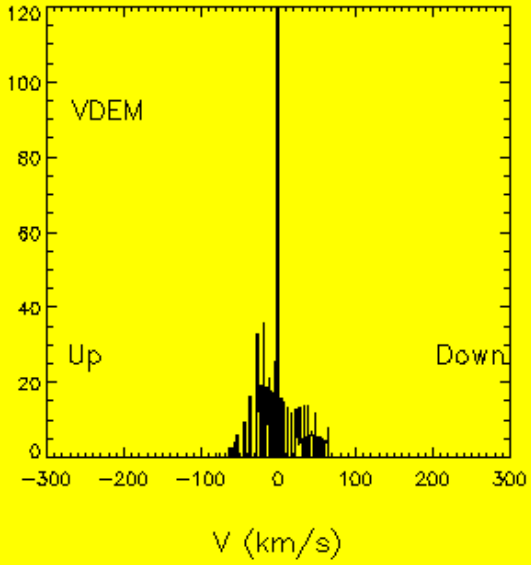
I



Si X







Units

I

35×10^{-11} photons s^{-1} $cm_{detector}^{-2}$ cm_{flare}^{-2} $Å^{-1}$

VDEM

10^{15} photons s^{-1} $(km\ s^{-1})^{-1}$ cm_{flare}^{-2}

Summary

Across the reconnection point upwardly

- Ca XVII 192.8 Red shift ⇨ blue shift with a possible 2 peaks at the blue wing corresponding to the slow shock pair
- Fe X 190.04 Besides a static component, one red peak turns to 1-2 blue peaks
- Fe XV 284.2 strong line, besides a static component, 1 ⇨ 2 ⇨ 1 blue peaks
- Si X 258.4 strong line, besides a static component, 1-2 peaks at the blue wing from the erupting flux rope and CME expansion

Future Research

- Contamination from other lines
- Jets at multiwavelengths
- To construct a G function which weakly depends on T, $a_1G_1+a_2G_2+a_3G_3+a_4G4+a_5G_5+\ldots\ldots$