Determining the Differential Emission Measure from EIS, XRT, and AIA

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Recent Results

(see also Reale et al., *ApJ*, 2009)
Important Questions

- Hot component could be an important key to constraining the coronal heating mechanism.
- What lines/filters are essential to better constrain the hot component?
Procedure

• Assume a DEM with and without a hot component.
• Calculate AIA + Hinode intensities.
• Calculate a DEM using xrt_dem_iterative2 from AIA intensities alone, then adding filters/lines from Hinode.
• Determine the goodness of each calculated DEM at the hot component temperature.
Model DEM

Cool component @ 6.1 + Hot component @ 7.1
AIA Only

7 AIA channels
AIA + XRT

7 AIA channels, 15 XRT filters
Common Observations

EIS Lines:

- Fe X 184.536
- Fe XI 188.216
- Fe XII 195.119
- Fe XIII 203.826
- Fe XIV 264.787
- Fe XV 284.160
- Fe XVI 262.984
- Si VII 275.368
- Ca XVII 192.858

XRT Filter Wheel 2:

- Al-mesh
- Ti-poly
- Al-thick
- Be-thick

Ca XIV 193.874
Ca XV 200.972
Ca XVI 208.604
Common Observation

AIA + Filter Wheel 2 + common EIS lines
Common Observation

AIA + Filter Wheel 2 + common EIS lines + Ca lines

Ca lines greatly improve the DEM by constraining the DEM at lower temperatures.
Why?

$$EM_{195} = I_{195} / G_{195}(T)$$

DEM cannot be in this region.
Why?

Ca lines constrain the DEM in this region.

DEM remains unconstrained at high and low temperatures.
Fe XXIII and Fe XXIV could constrain high temperature component, but difficult to calculate.
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6 AIA channels, 2 XRT filters, and 21 EIS lines including Ca lines
Emission Measure poorly constrained at high temperatures. Predicted Fe XXIV emission is \( \sim 60 \text{ ergs/cm}^2/\text{s/st.} \).
Conclusions

• EIS Ca lines greatly constrain some DEMs - PLEASE observe them!

• “Hot” iron lines can also constrain the DEMs even though intensities are difficult to measure.

• Currently, high temperature component of AR emission is ambiguous.