Observations of Supra-arcade plasma in flares

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AIA & XRT

AIA 131 - 2011/10/22 - 11:56:09Z
AIA 1600 - 2011/10/22 - 11:55:53Z
AIA 304 - 2011/10/22 - 11:55:56Z

Hinode/XRT: Be Thin
2012-01-27T19:26:23.433
New view

See Savage, McKenzie & Reeves, 2012

Difference images  Original 131 images  Histogram-equalized
• SADs are not cross-sections of empty loops, but wakes(?) behind much smaller, filled loops.
• Previous estimates of size & flux of reconnected flux tubes, shrinkage energies have been overestimates.
Eddies also visible

AIA 131 Å
6-Nov-2010

XRT Ti-poly
8-May-2007

Monday, February 13, 2012
K-H Instability

See Foullon et al., 2011
Mostly hot plasma

Reeves & Golub 2011

AIA 131 2010-11-04T23:00:09.620
AIA 94 2010-11-04T23:00:02.140
AIA 335 2010-11-04T23:00:03.620
AIA 211 2010-11-04T23:00:00.630
AIA 193 2010-11-04T23:00:07.840

Monday, February 13, 2012
DEM Temperature Reconstructions

- Calculate a DEM in each AIA pixel
- Integrate over temperature bins to get an estimated emission measure in each pixel
- Use the emission measure to make emission measure maps at each pixel.
Conclusions

• “Voids” in supra-arcade plasma are not cross-sections of empty flux tubes, but rather are areas of cleared-out density behind small shrinking loops (is “wake” a good word?)

• Supra-arcade plasma is hot, dynamic and finely structured
Open questions

• What is the magnetic field structure in the current sheet? Is the plasma frozen in?

• Why is the current sheet emitting?

• What is the plasma beta in the current sheet?

• Are plasma instabilities at play (i.e R-T, K-H)?