Fe K line from the Quiet Sun

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Hypothesis

- Coronal heating is the result of nanoflares
- These events derive their energy from non-thermal electrons, just like flares
- The electrons stop in a chromospheric thick target and all have energies of 7.12 keV

The calculation

$$F_{6.4} = PRAY\sigma/\varepsilon \ ;$$

R the range, 1.47×10^{-5} g cm^{-2}

A the relative Fe abundance, 3.2×10^{-5}

Y the flourescence yield $= 0.31$

σ the K-shell ionization cross-section, 5×10^{-22} cm^2

P the power available, erg/s

$\varepsilon = 7.12$ keV $= 1.15 \times 10^{-8}$ erg

The result

For the solar coronal power, $F \sim 6 \times 10^{-8}$ ph/cm^{2}s

For the chromospheric power, $F \sim 6 \times 10^{-6}$ ph/cm^{2}s

Slides and IDL script on
http://www.ssl.berkeley.edu/~hhudson/presentations/

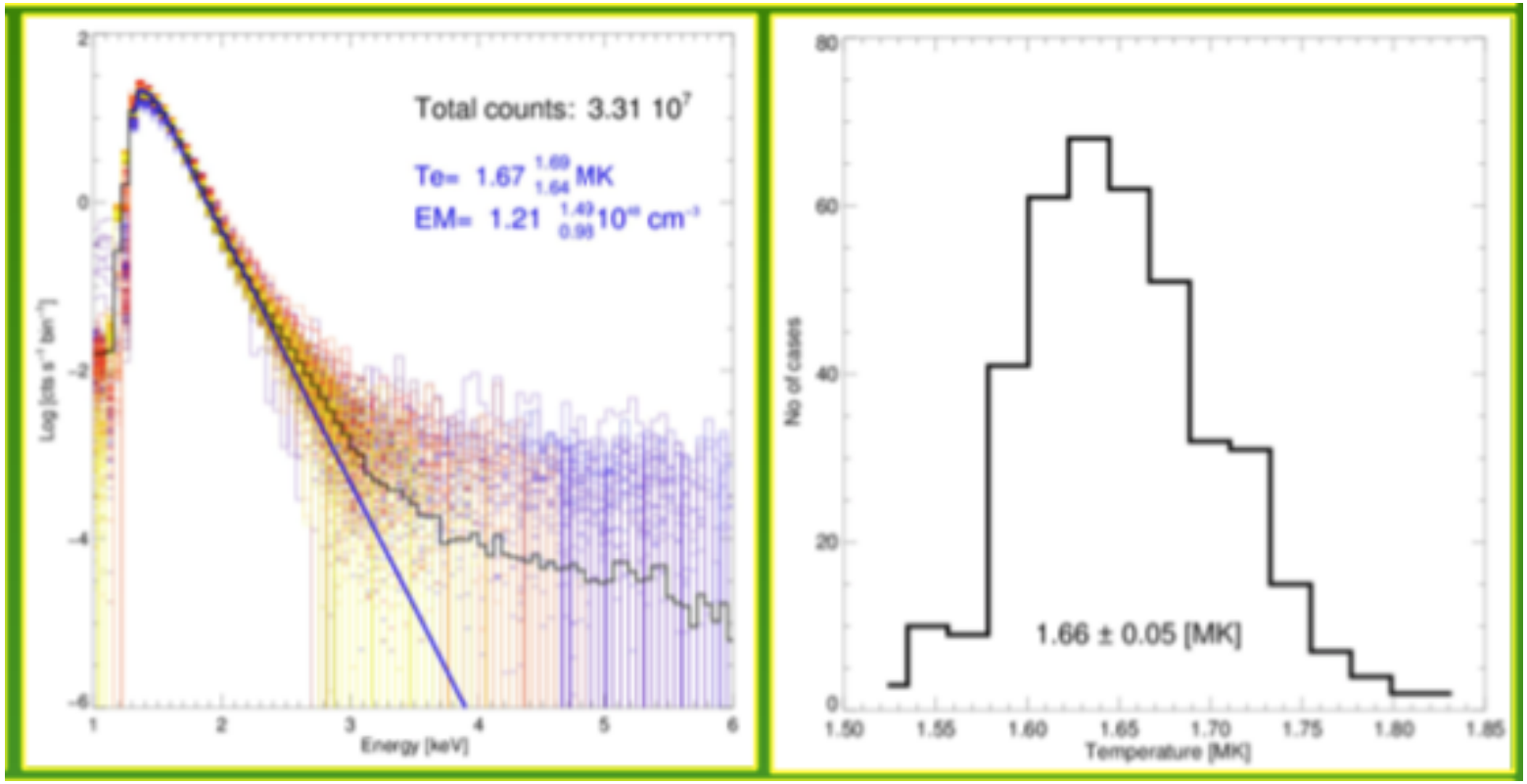
The observation

- This must be a ”meta-analysis” of all solar data, differenced against a lot of non-solar background data
- The line fluxes are very small but the search should be made
- Even those of us who do not believe in nanoflares want to see this simple result
- My estimation code needs to be checked

SphinX results*

* There is a new paper covering this but I have not digested it yet; also there are to be Chandrayaan-2 and of course MinXss data as well.

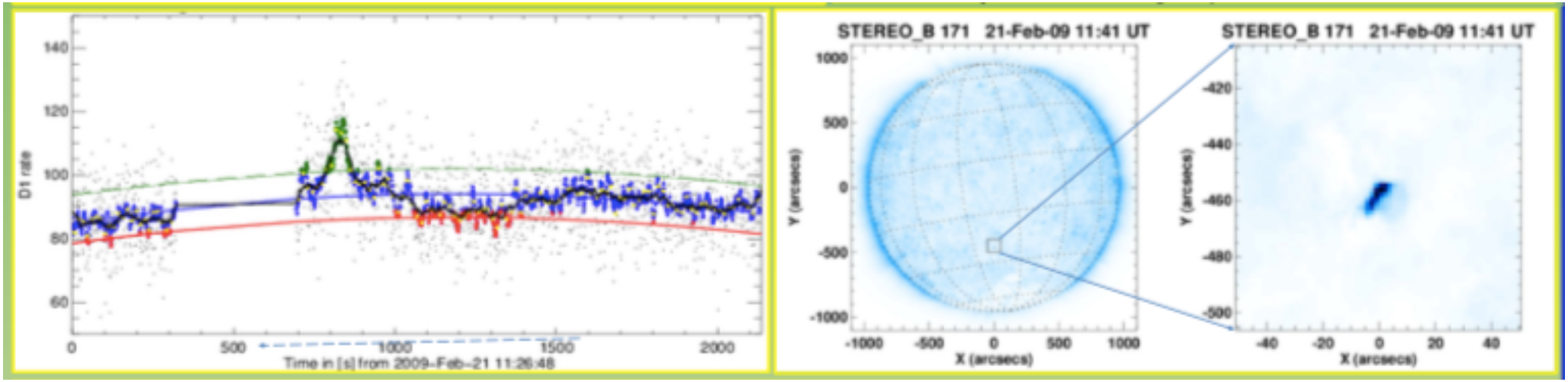
SphinX results, 2008 minimum

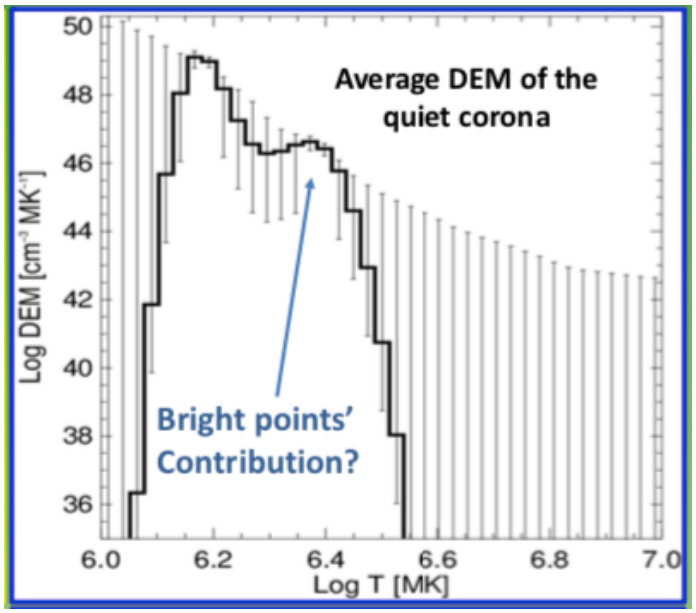


Sylwester poster (Hvar, 2019)

• Miceli et al. (1997) found a hot component (7 MK) in the same dataset by “excluding resolved microflares”. Neither paper mentions “background” but the rate above 3 keV is < 1 cps.

SphinX results, 2008 minimum





- Sylwester et al. conclude that yes, there is a hot component, but at 3.6 MK rather than 7. They also note that about half of the really faint events have symmetrical light curves (upper left).

- I conclude that there's no evidence for a diffuse coronal hot signature.