

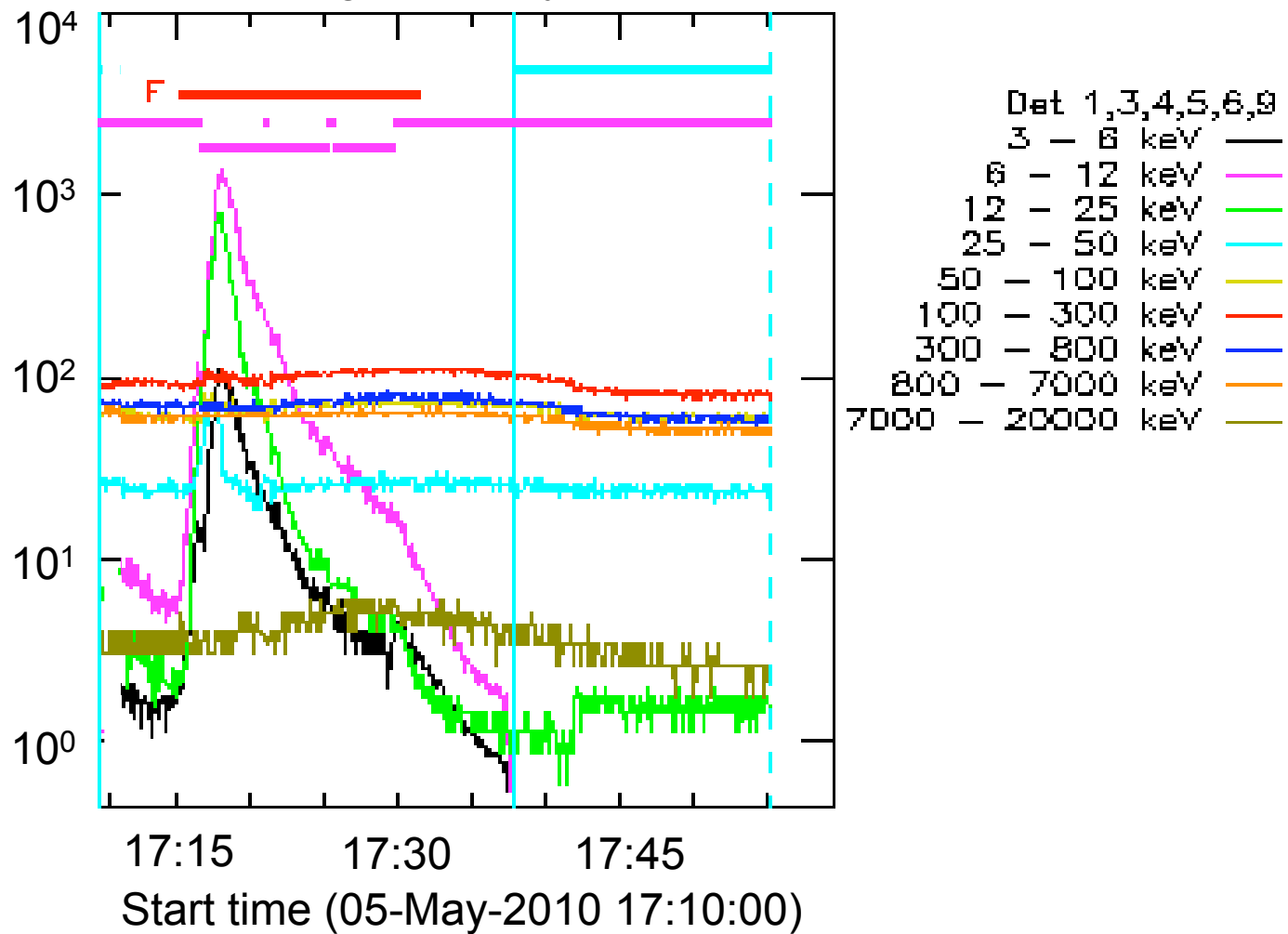


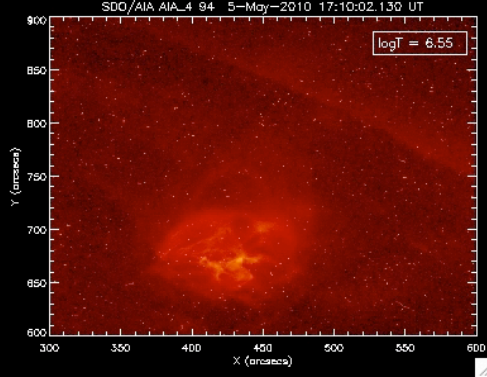
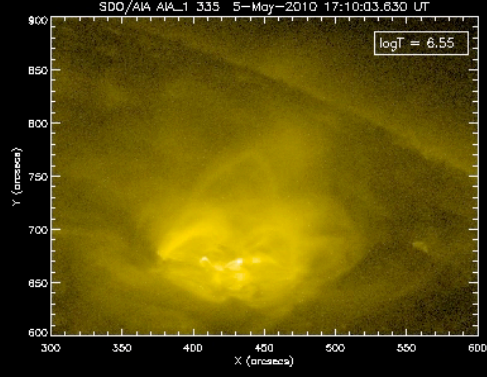
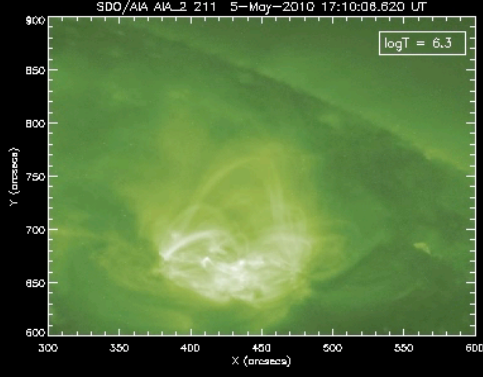
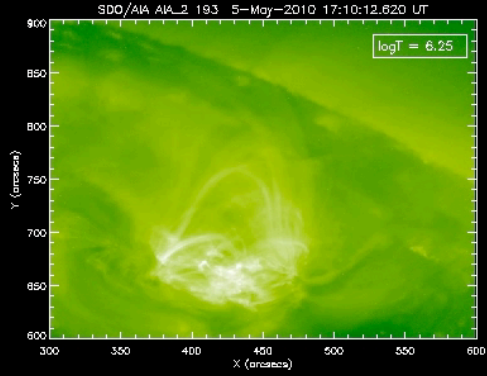
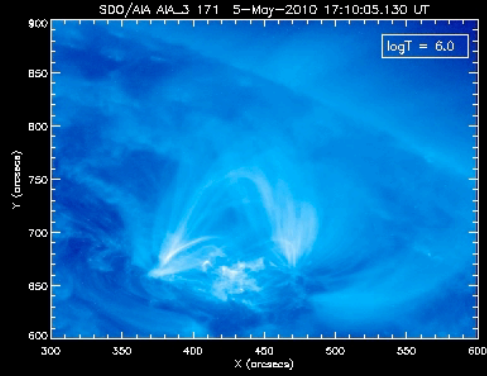
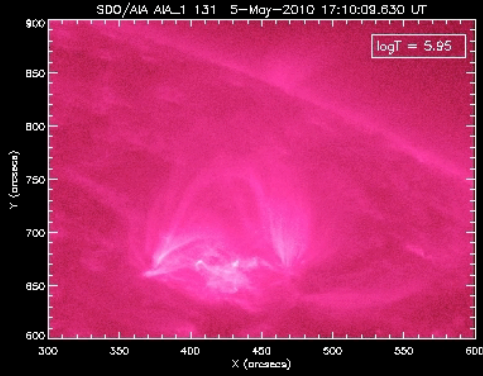
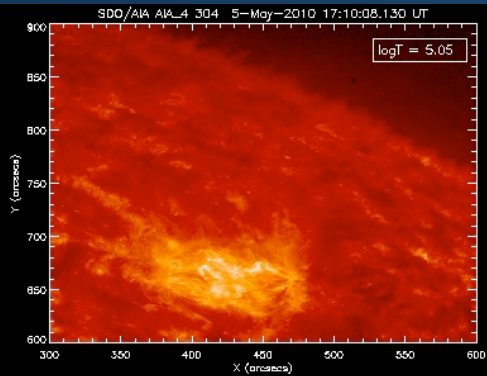
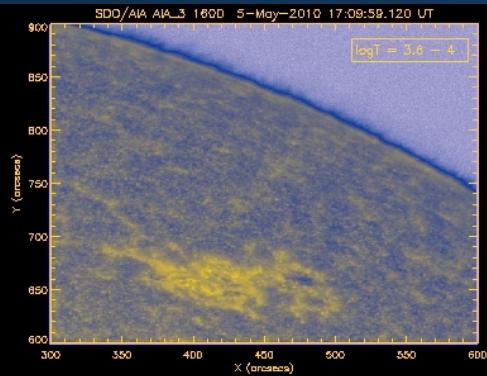
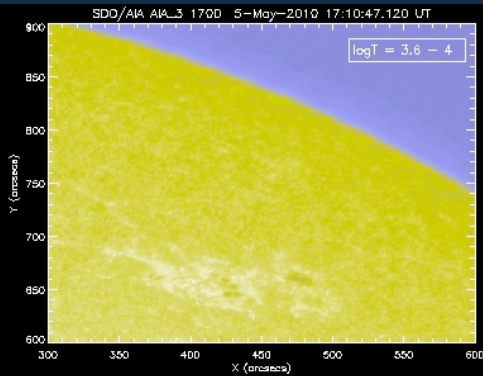
# Probing diffraction patterns: AIA vs RHESSI

Claire Raftery  
SSL, UC Berkeley

# 05 May 2010 - M1.2

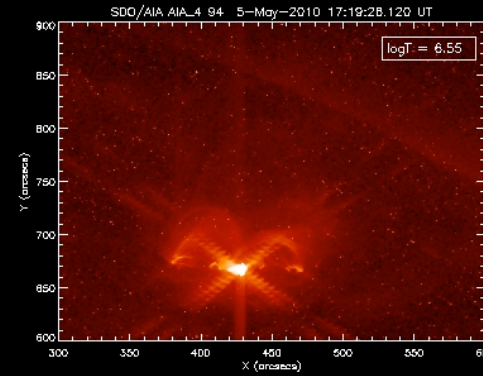
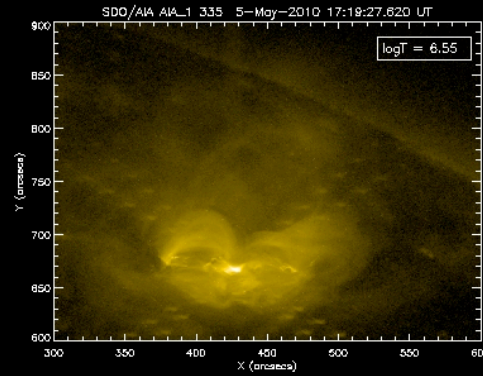
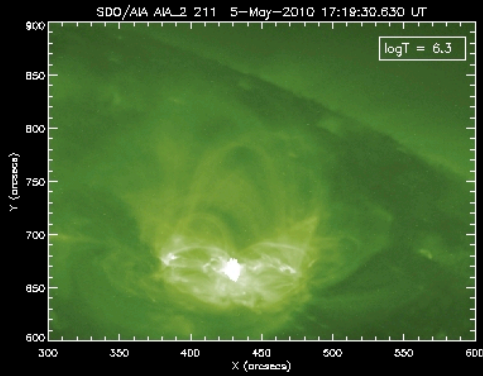
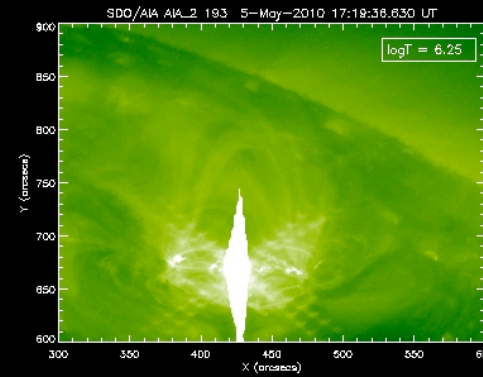
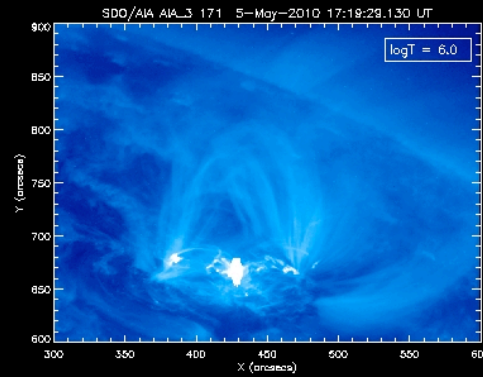
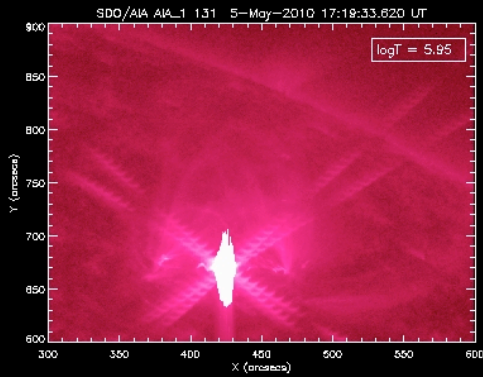
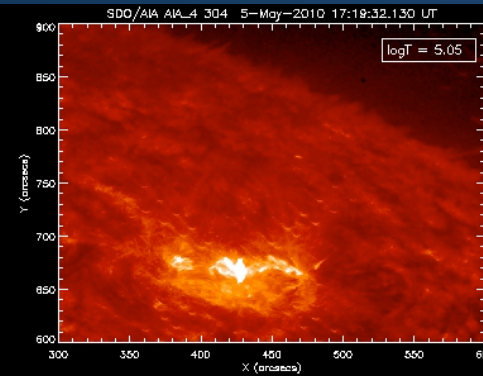
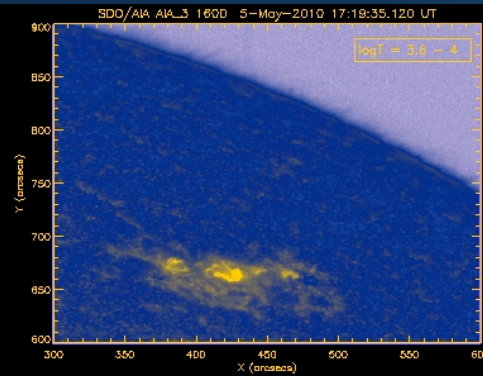
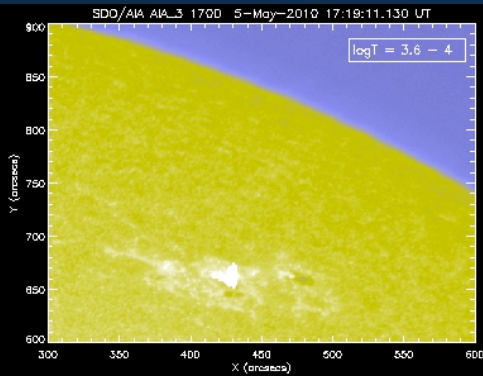
HESSI Observing Summary Count Rates, Corrected





Wave-length	LogT AR	LogT flare
1700 Å	4	4
1600 Å	4	4
304 Å	5.05	5.05
131 Å	5.95	7.10
171 Å	6.0	7.2
193 Å	6.25	7.2
211 Å	6.3	6.9
355 Å	6.55	6.8
94 Å	6.55	6.95

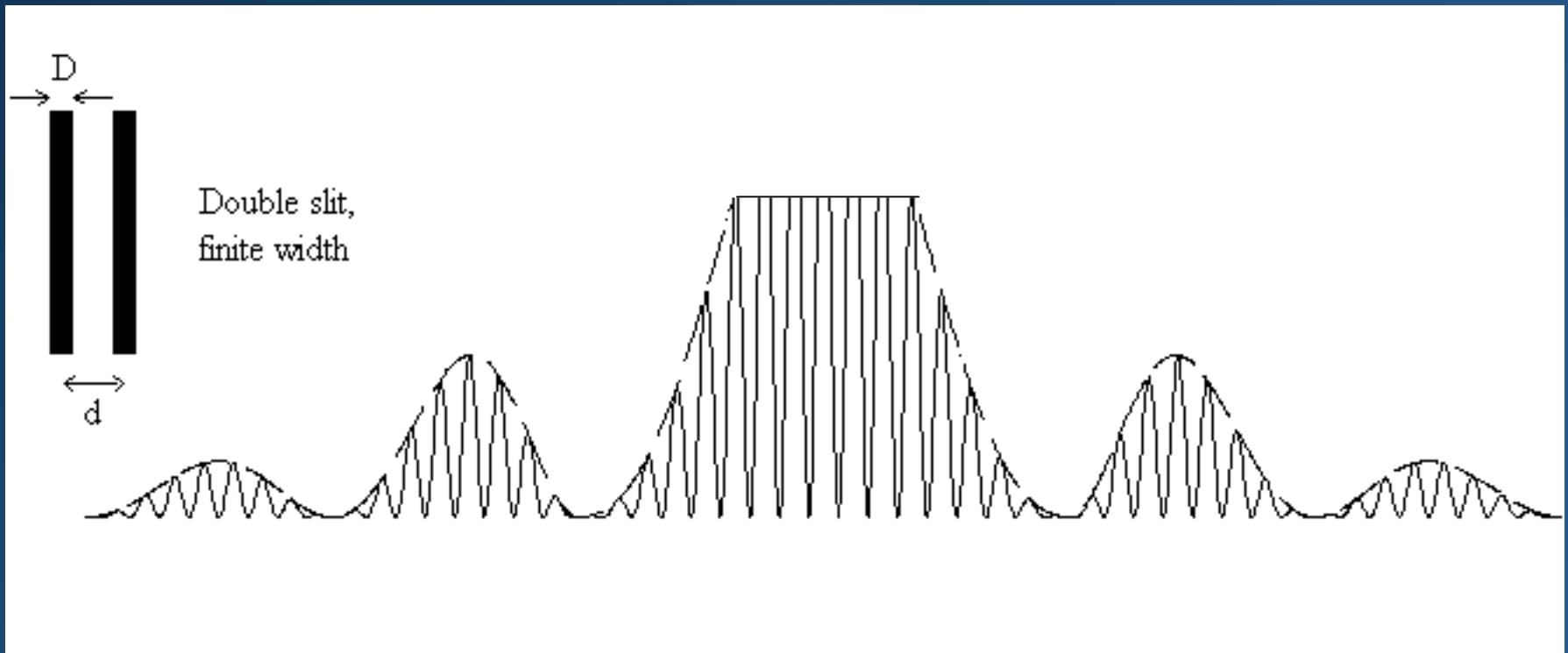
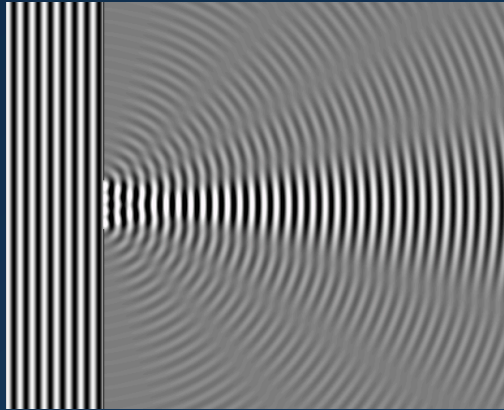
■ Raftery et al. 2010 (*in prep*)  
 O'Dwyer et al. 2010



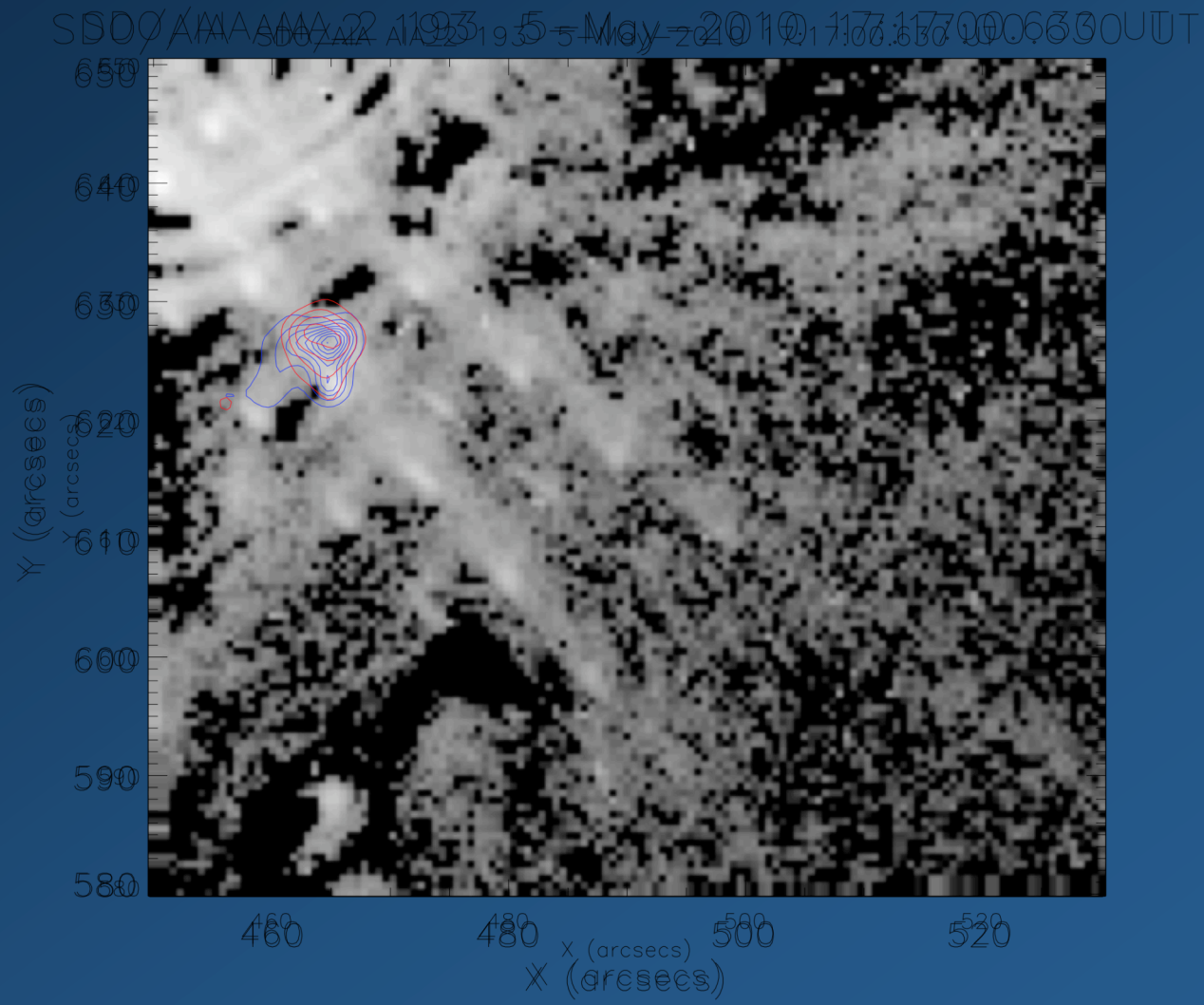
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■ Raftery et al. 2010 (in prep)  
 O'Dwyer et al. 2010

# Diffraction 101

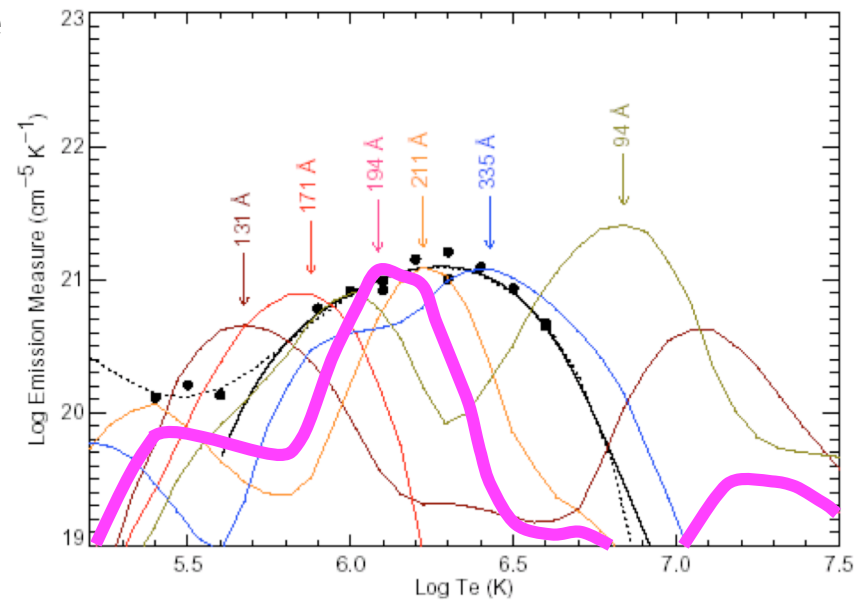
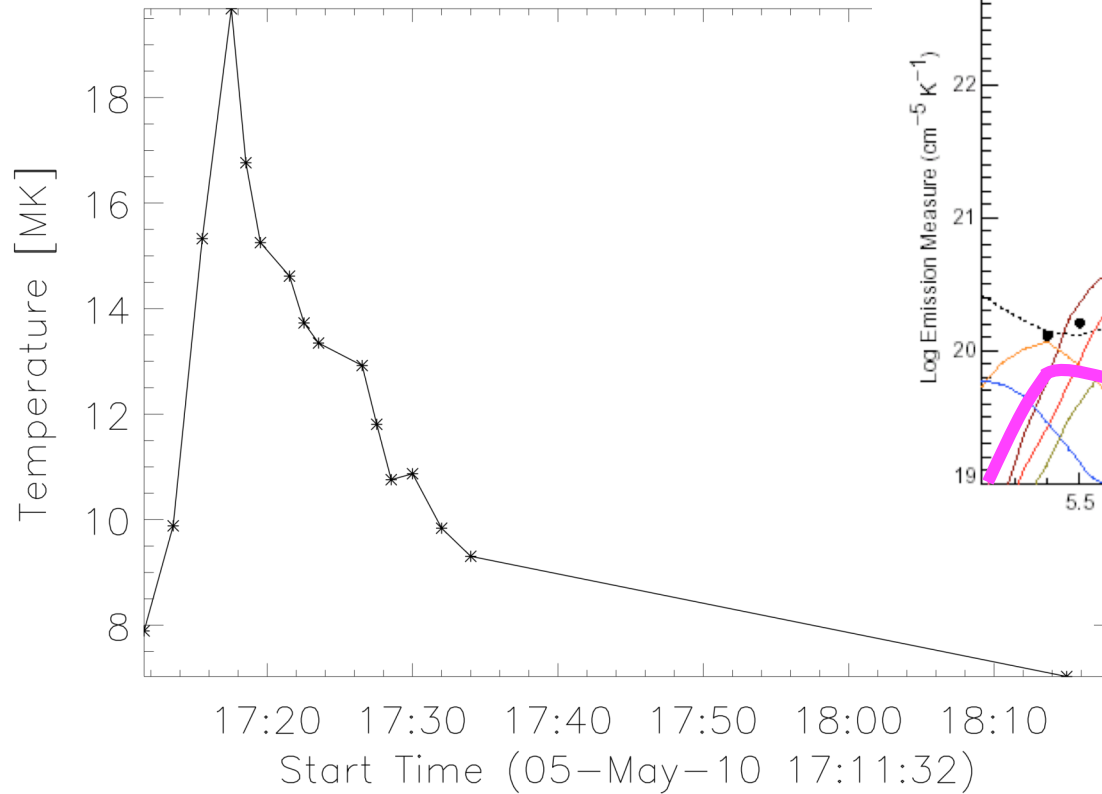


# RHESSI imaging

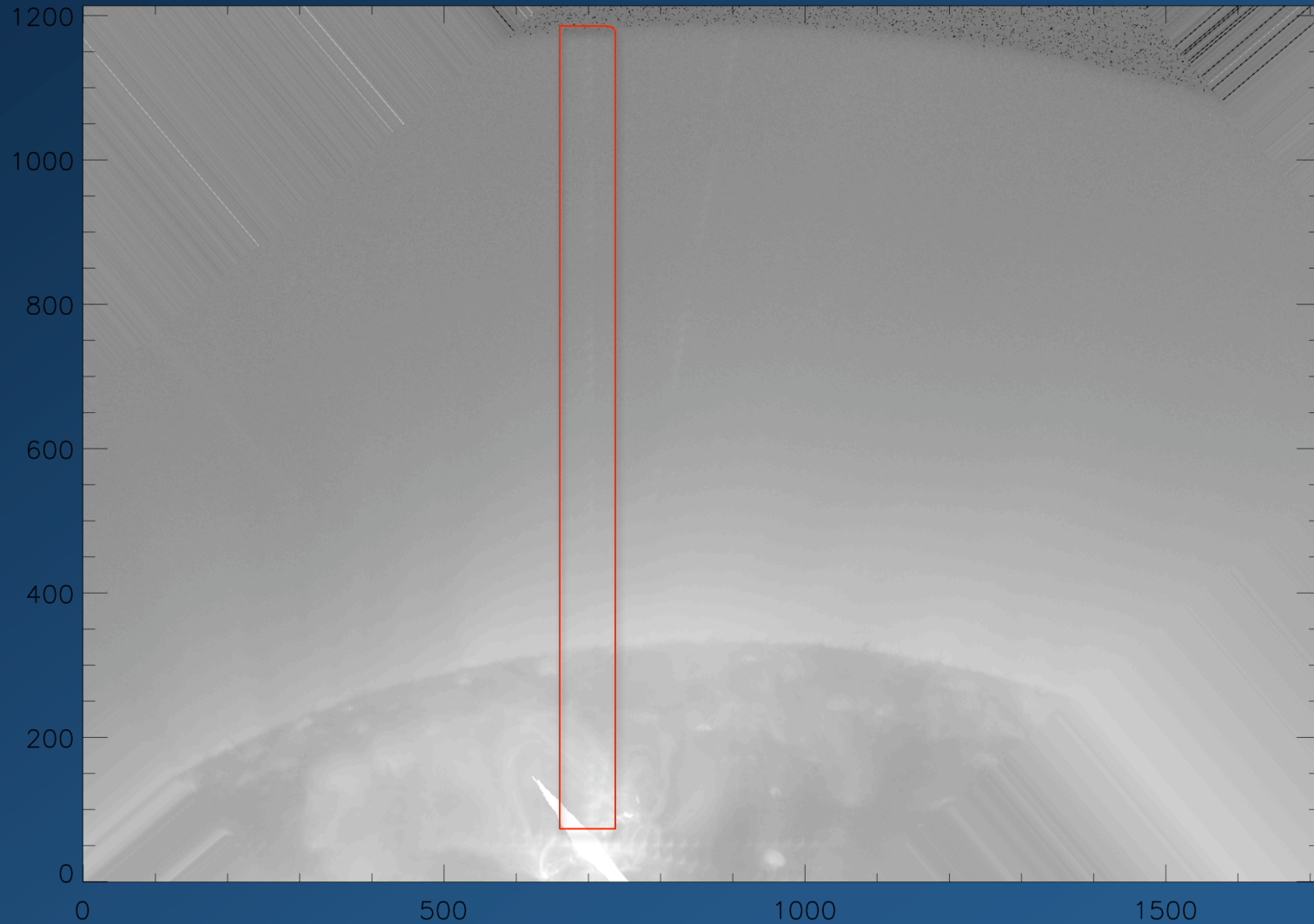


# Temperature profile

RHESSI temperature profile

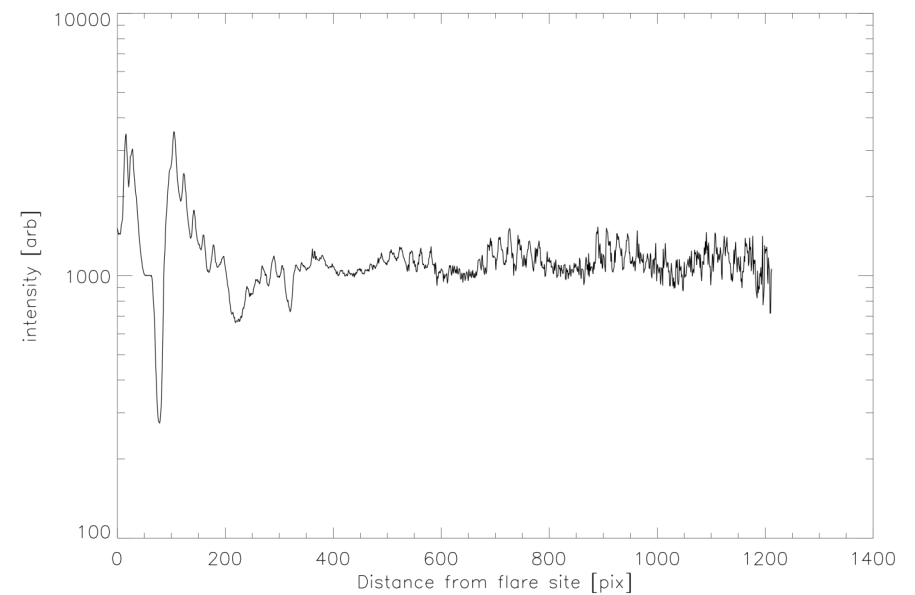
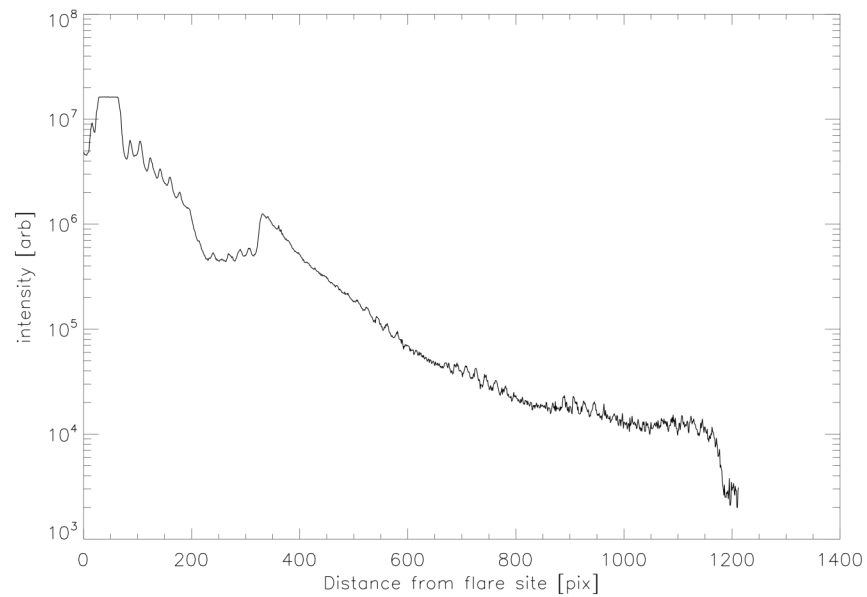


# AIA diffraction patterns - 194 Å





# AIA diffraction patterns - 194 Å



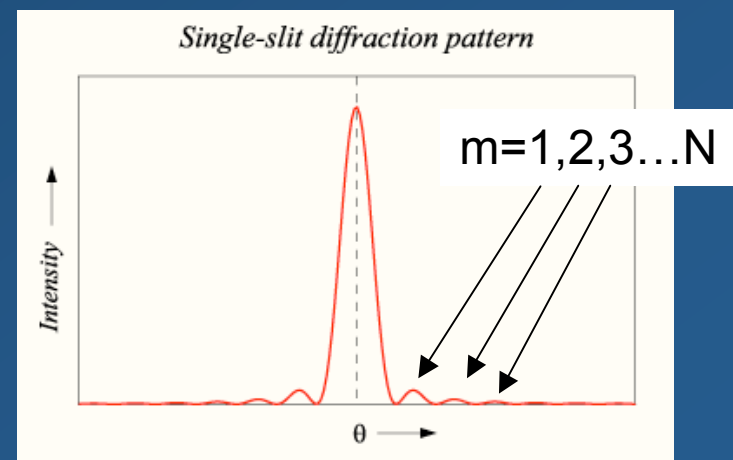
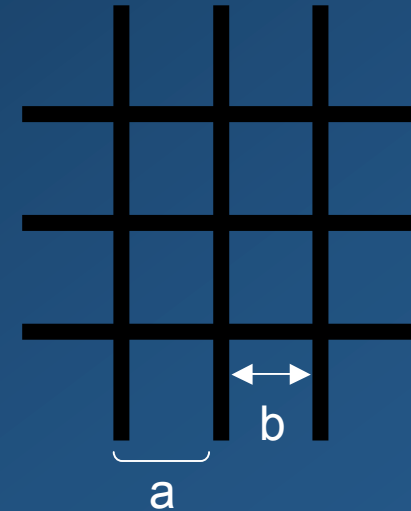
# Some maths

$$I(\vartheta) = I_0 \frac{\sin^2\left(\frac{\pi}{\lambda} b \sin \vartheta\right) \sin^2\left(\frac{N\pi}{\lambda} a \sin \vartheta\right)}{\frac{\pi}{\lambda} b \sin \vartheta \sin^2\left(\frac{\pi}{\lambda} a \sin \vartheta\right)}$$

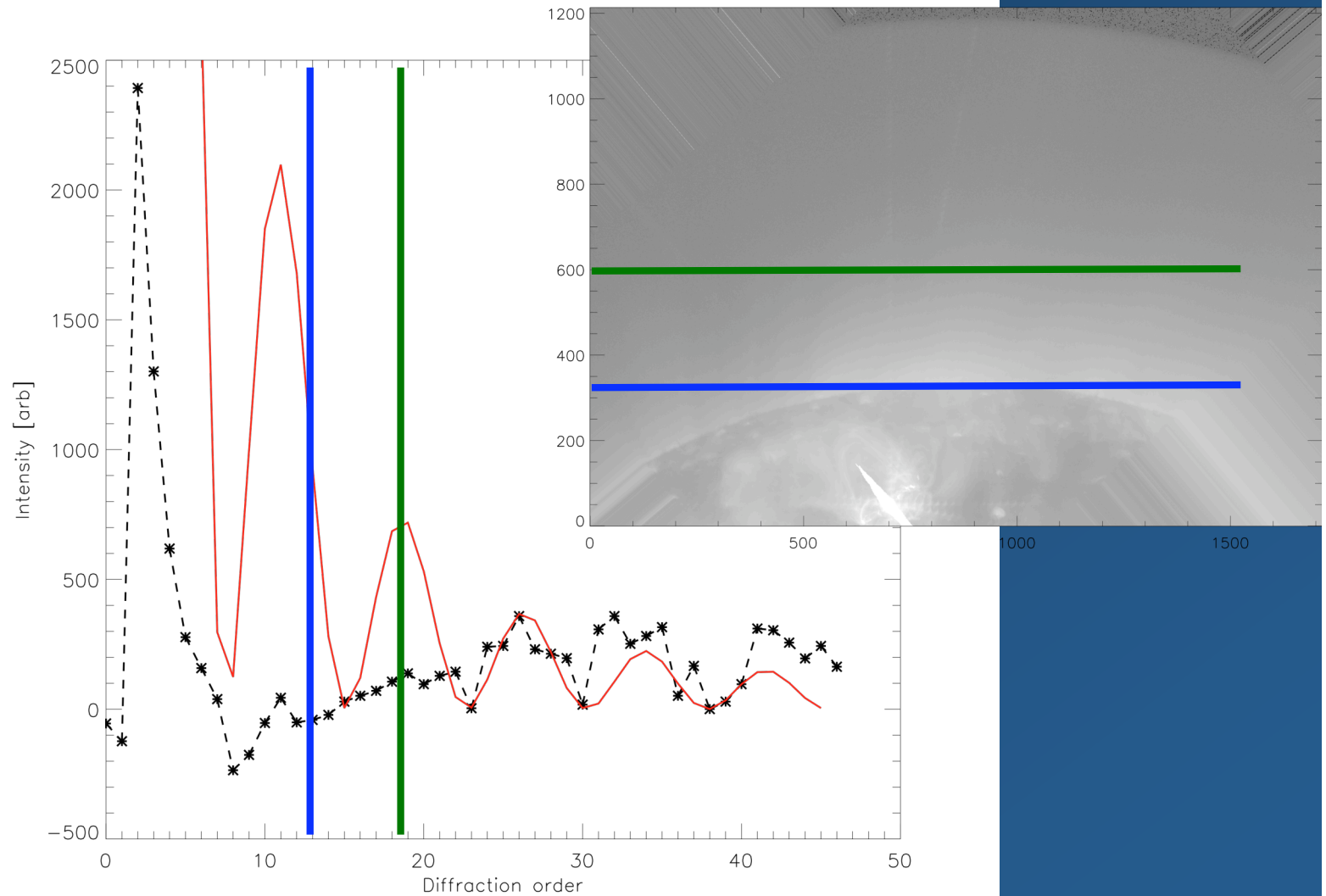
At each maximum:

$$\frac{\sin^2\left(\frac{N\pi}{\lambda} a \sin \vartheta\right)}{\sin^2\left(\frac{\pi}{\lambda} a \sin \vartheta\right)} = N^2$$

$$I(m) = I_0 \left(\frac{\sin(m\pi b/a)}{m\pi b/a}\right)^2 N^2$$

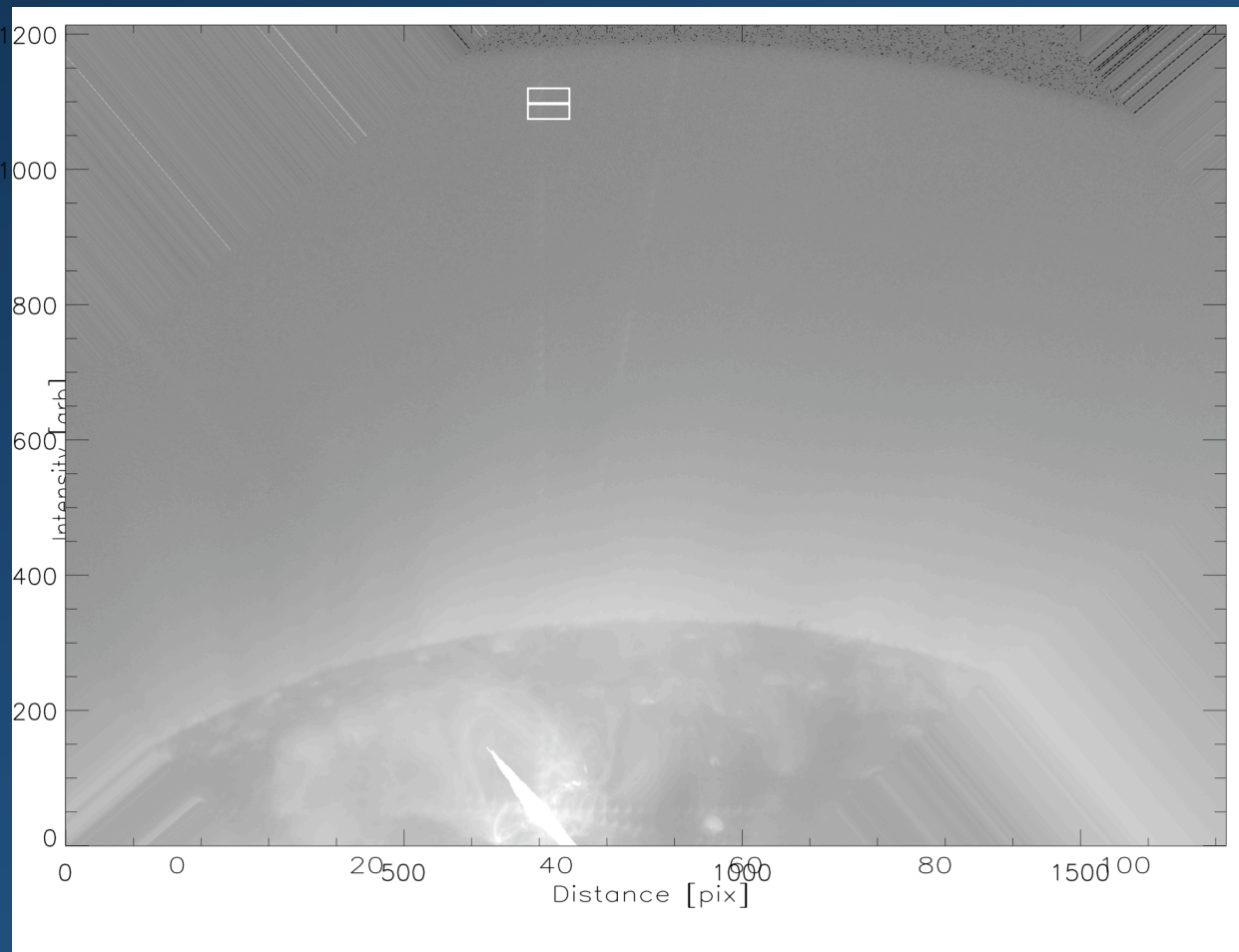
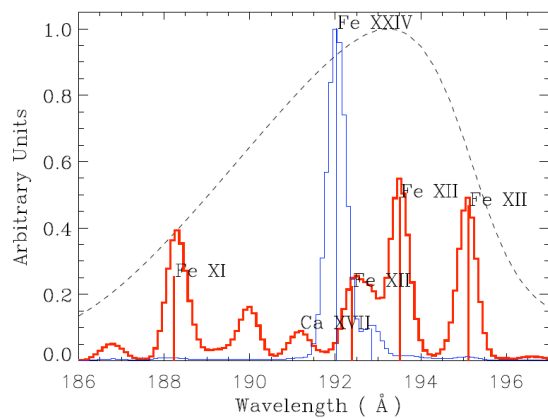


# Comparison to theory



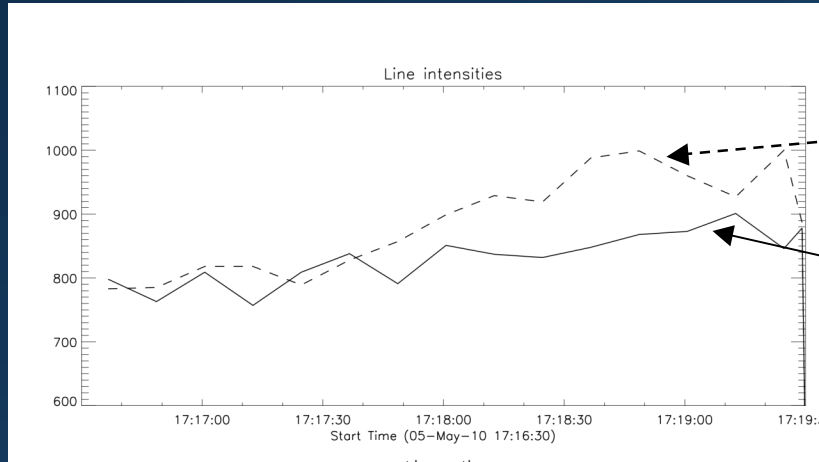
# Dispersion

$$\frac{\pi a}{\lambda} \sin \vartheta = m\pi \approx \frac{\pi a}{\lambda} \vartheta$$
$$\Rightarrow \vartheta \approx \frac{m\lambda}{a}$$

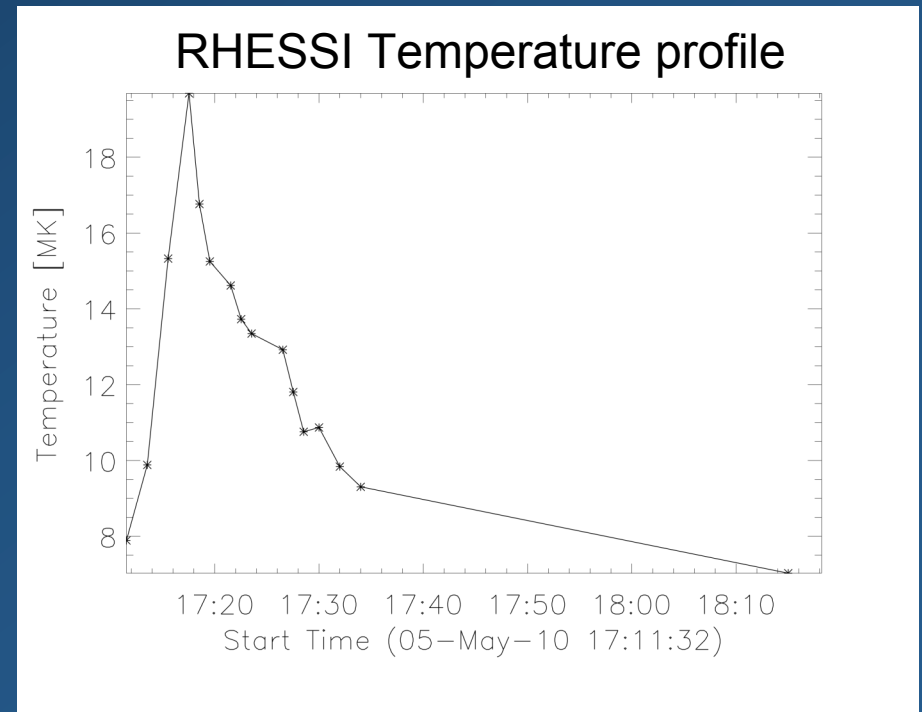
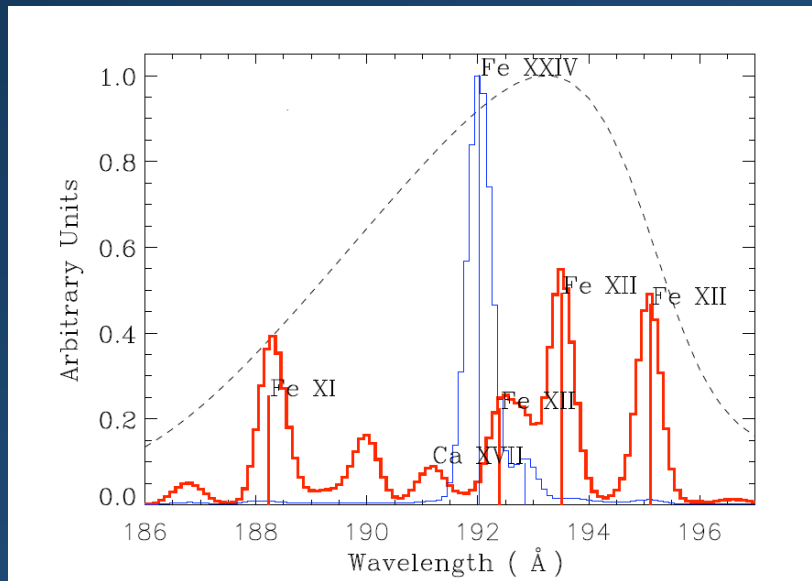


O'Dwyer et al. (2010)

# Investigating the separation of peaks



LogT	ion	$\lambda$
7.2	Fe XXIV	192.03
6.85 ??	Ca XVII	192.8



O'Dwyer et al. (2010)

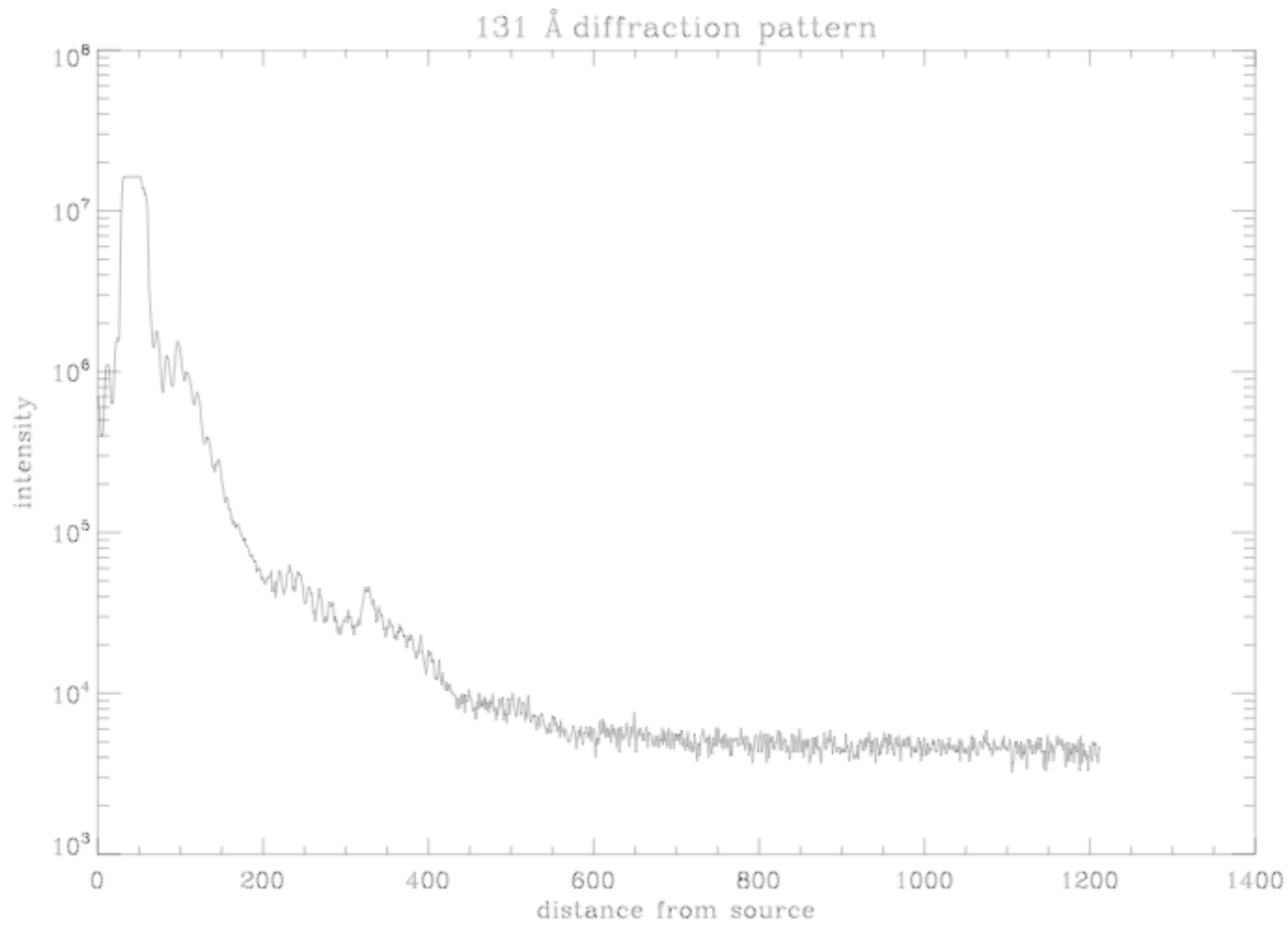
# Summary and preliminary conclusions

- Observe an M1.2 class flare using RHESSI and AIA.
- Investigate the dispersion pattern to recover over exposed flare site.
- 193 A passband dispersion pattern is well aligned with RHESSI thermal profile.
- High cadence allows comparison on  $<1$ sec timescale.

# Summary and preliminary conclusions

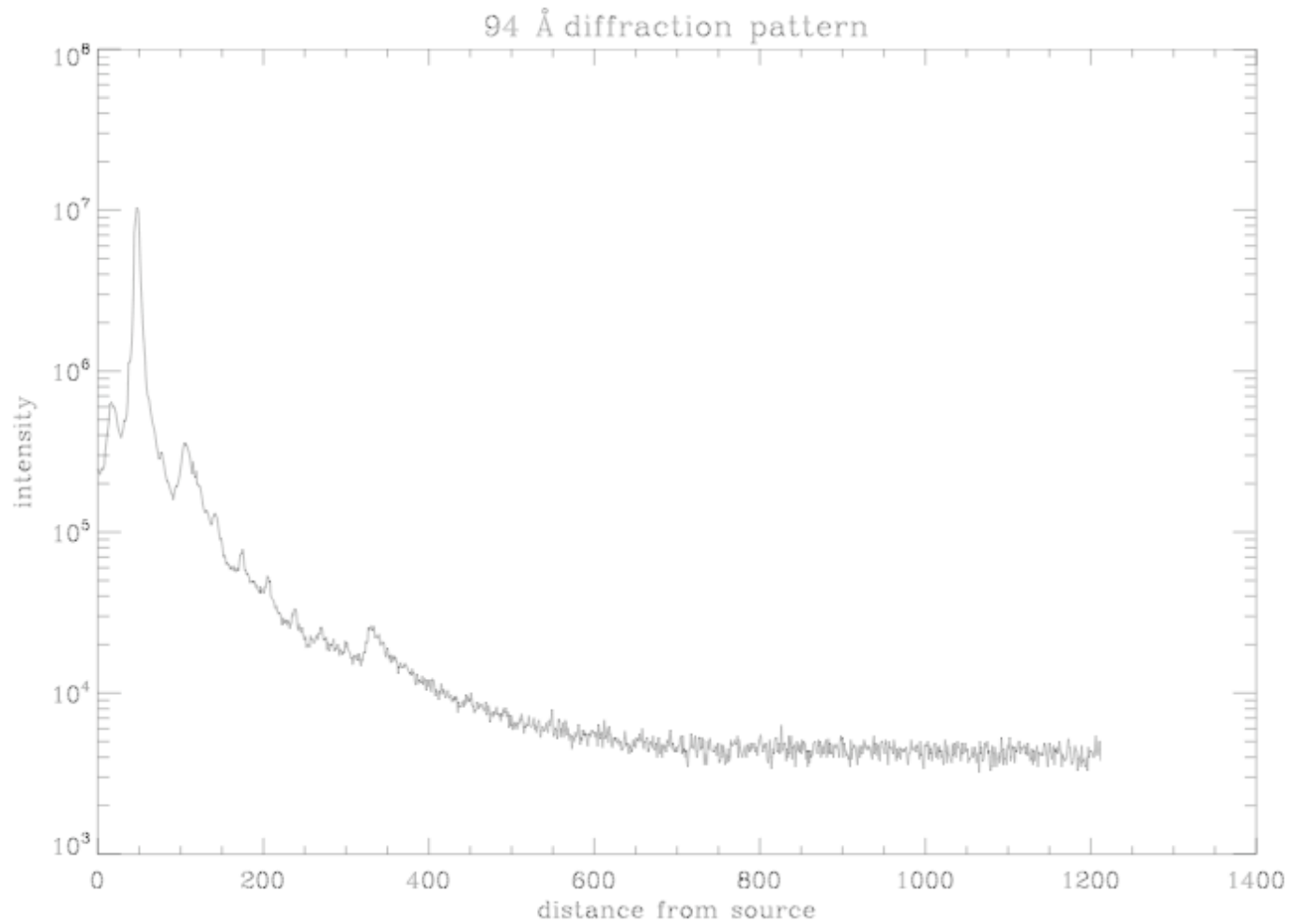
- Analyse dispersion level as a function of time for high orders.
- 2 prominent lines dispersed by a different amount.
- Can analyse the relative contribution of individual lines throughout the flare - can't get this from the raw data!!

# Next...

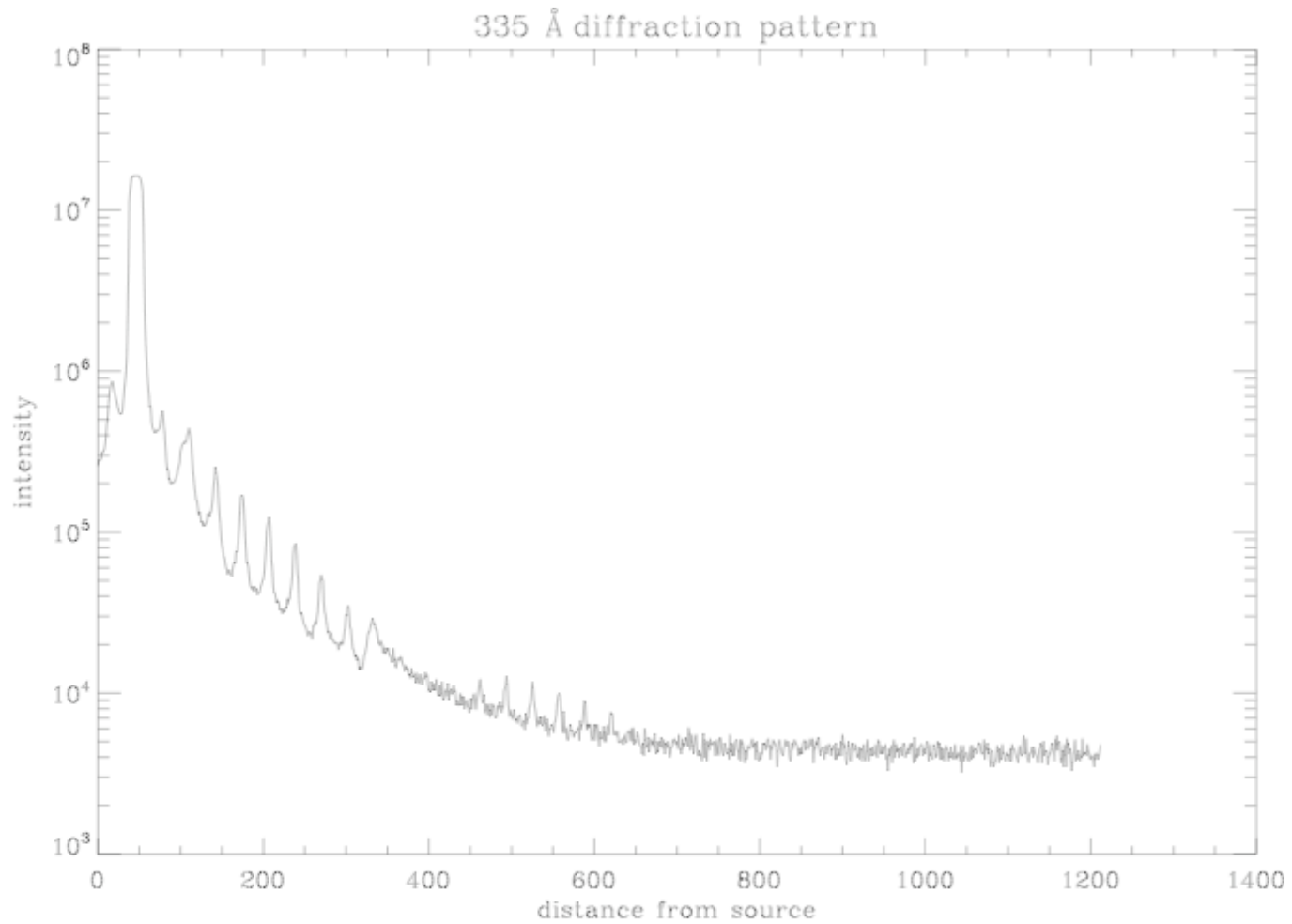




# Next...



# Next...



# Next...

