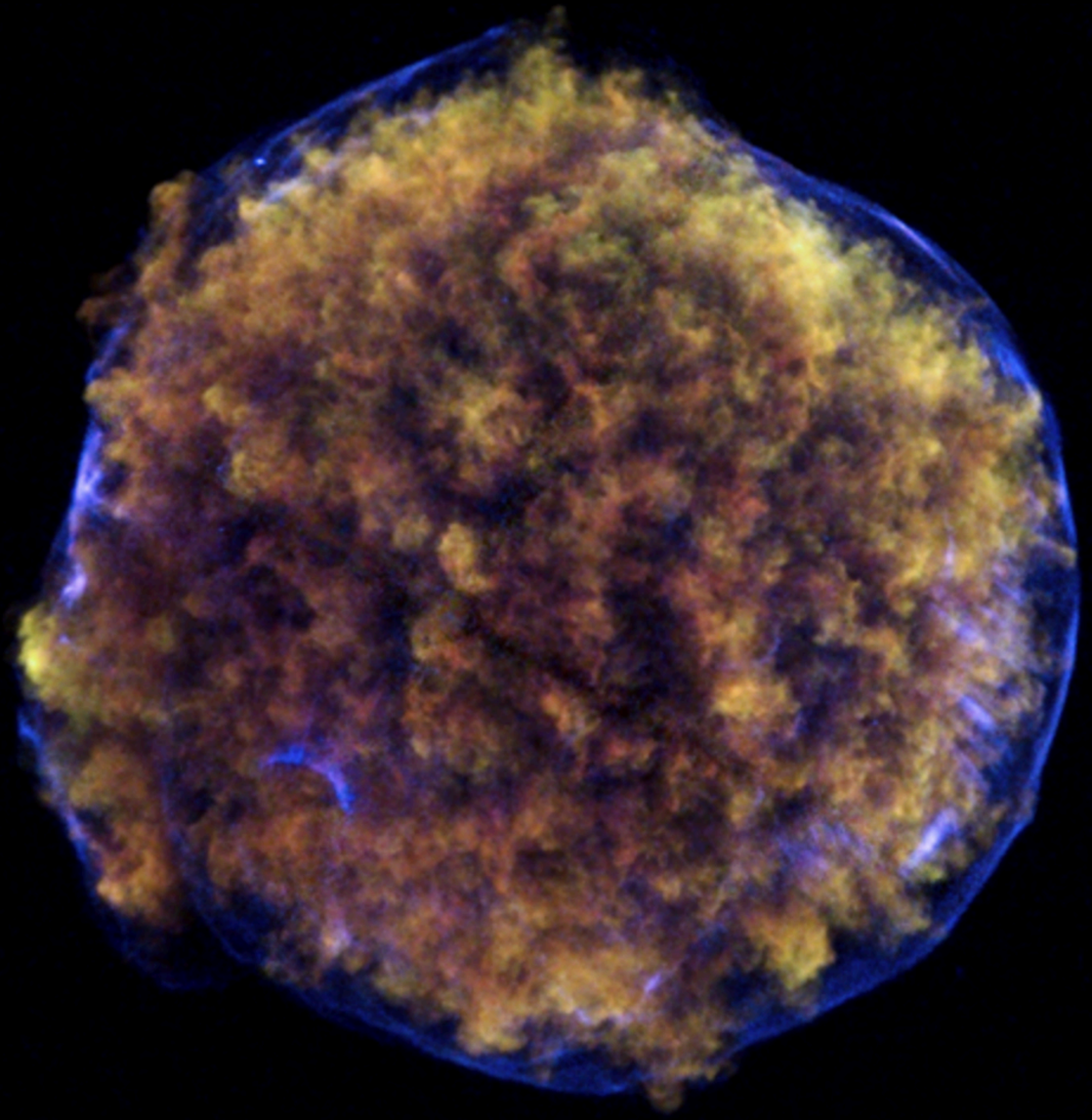


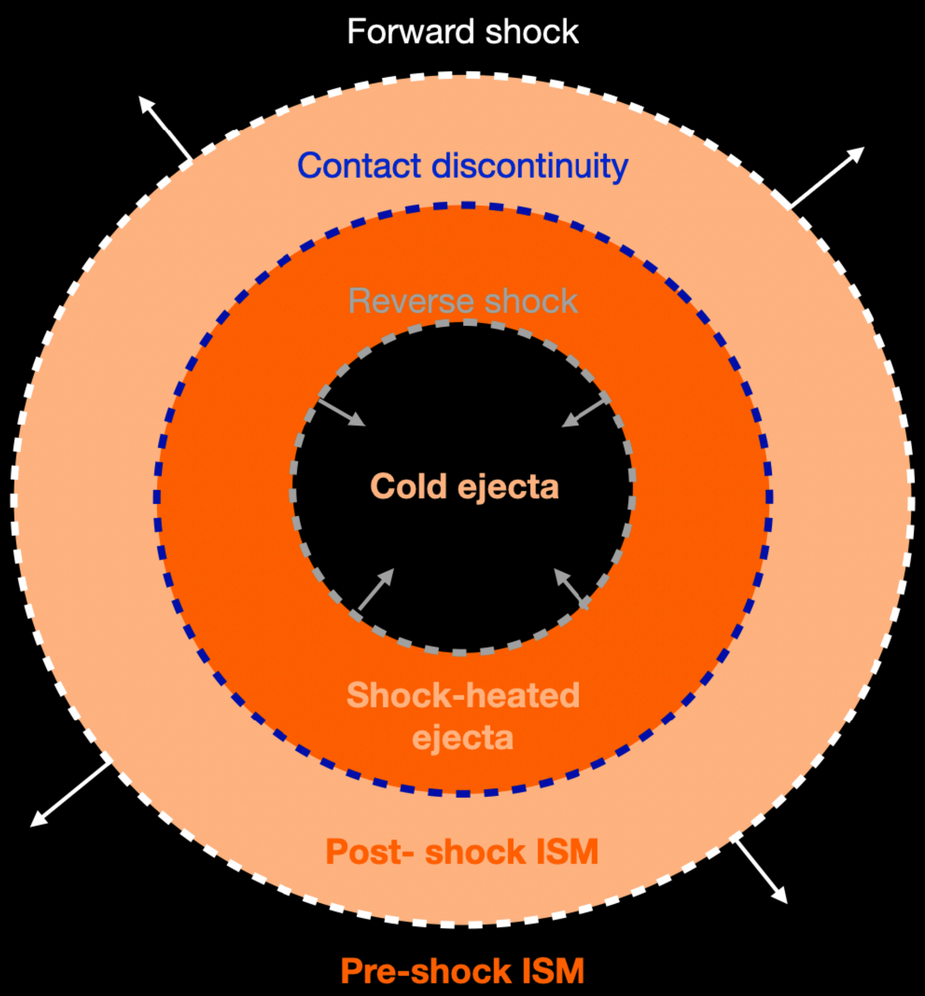
Spatially resolved spectral analysis with XRISM

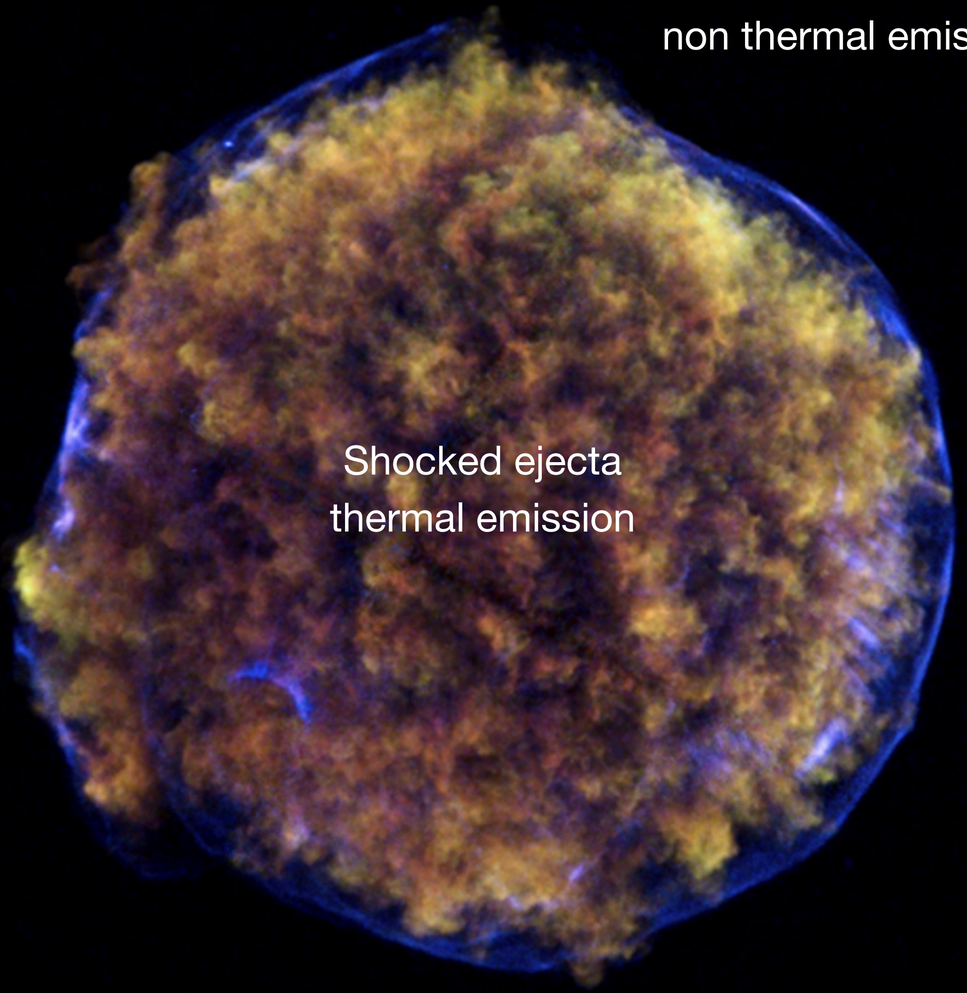
Roberta Giuffrida
Post-Doc at CEA - Paris Saclay

LUMIéRE

Insitute Pascal, Orsay, January 2026

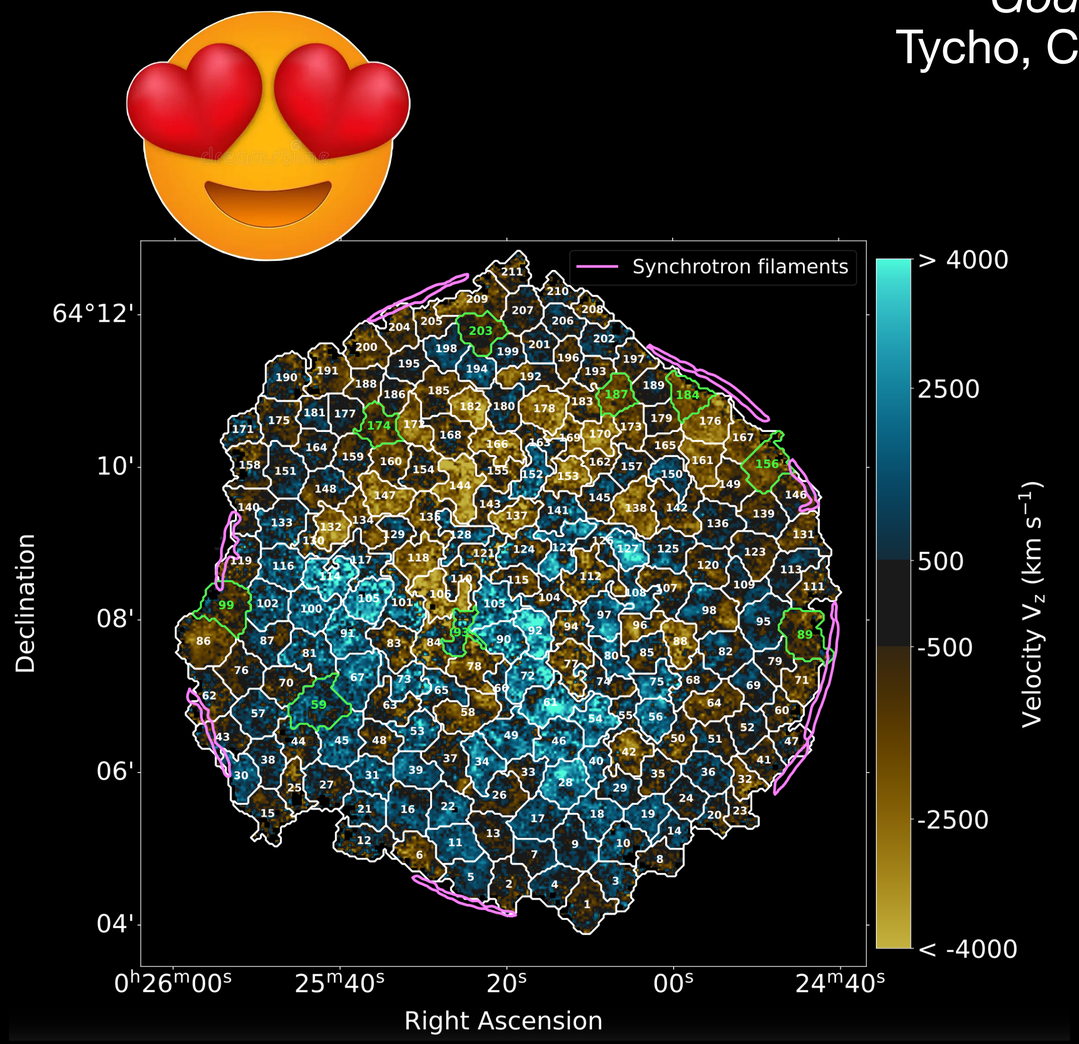
Introduction

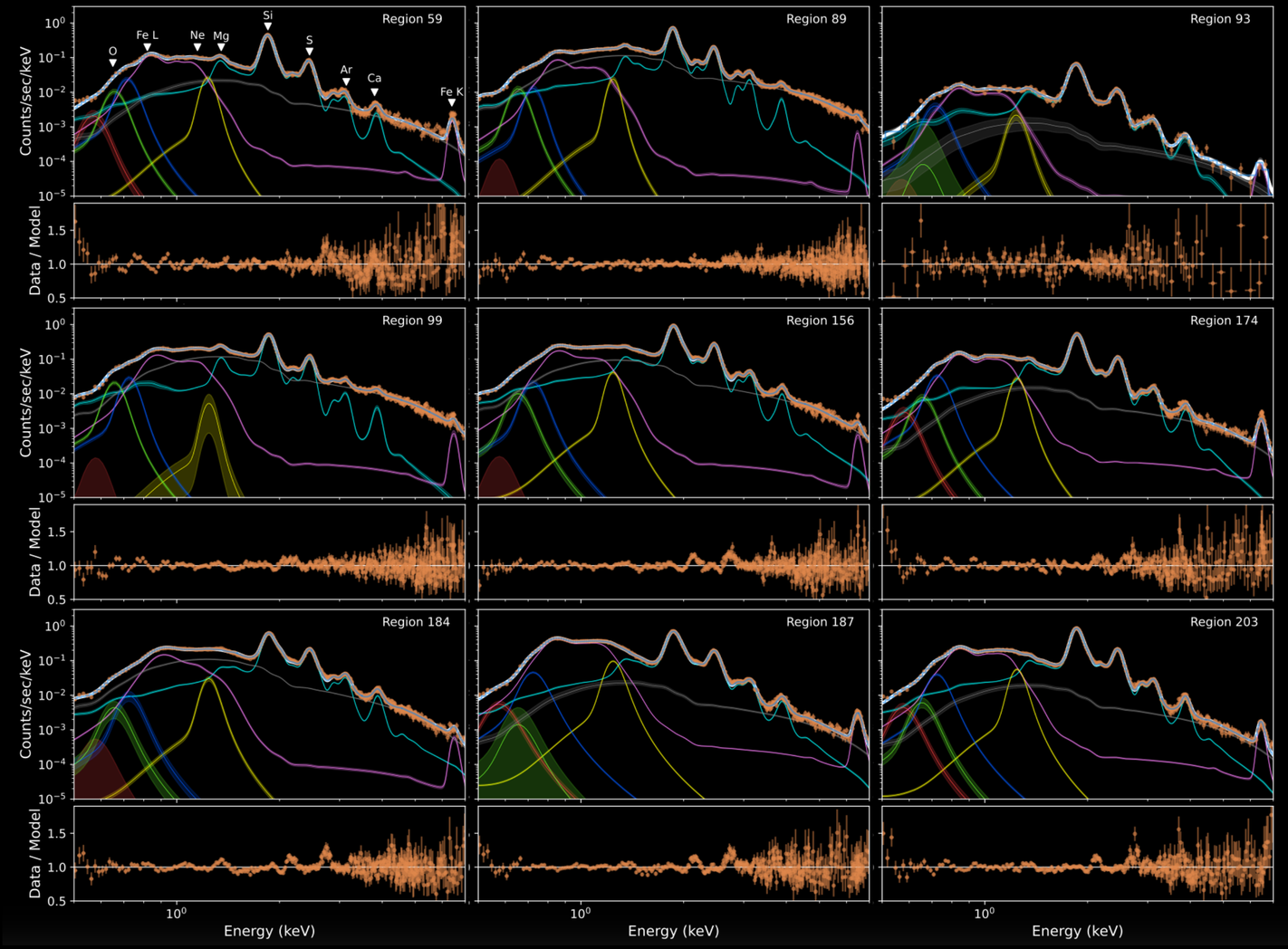




Introduction

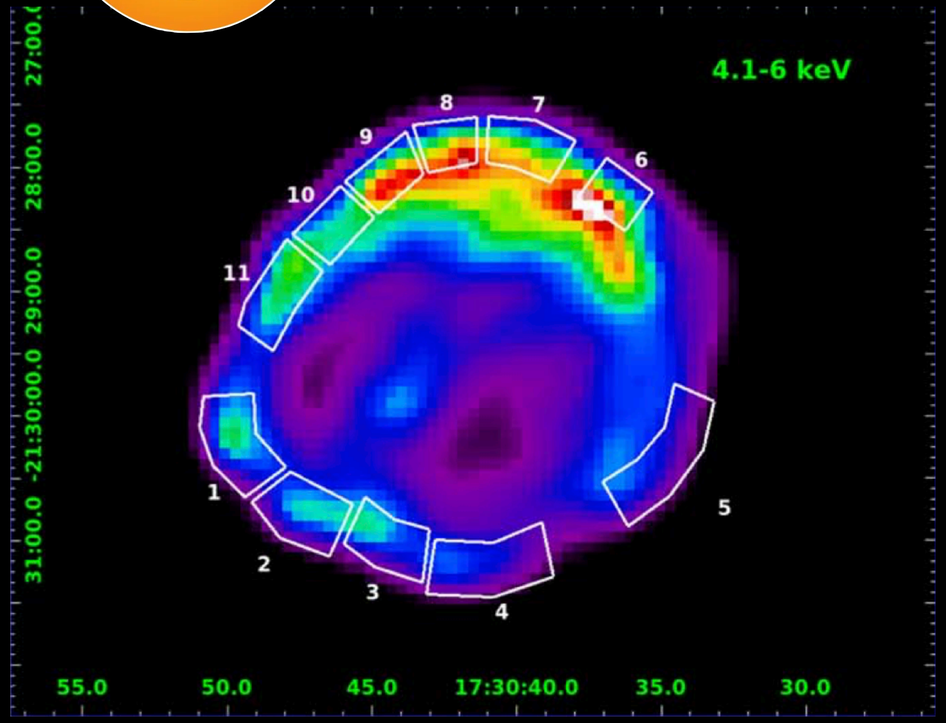
Godinaud et al 2025
Tycho, Chandra observations

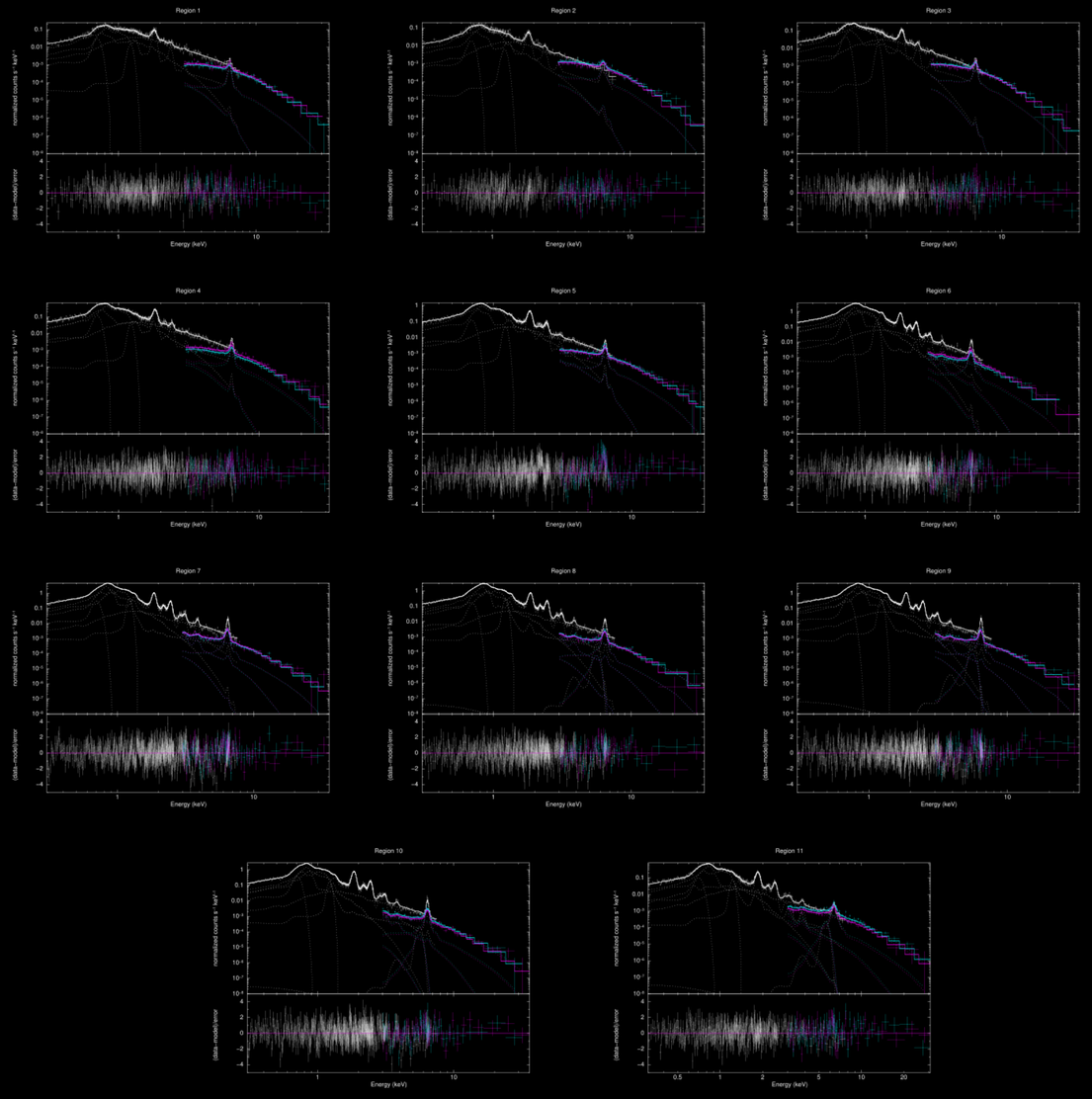




Introduction

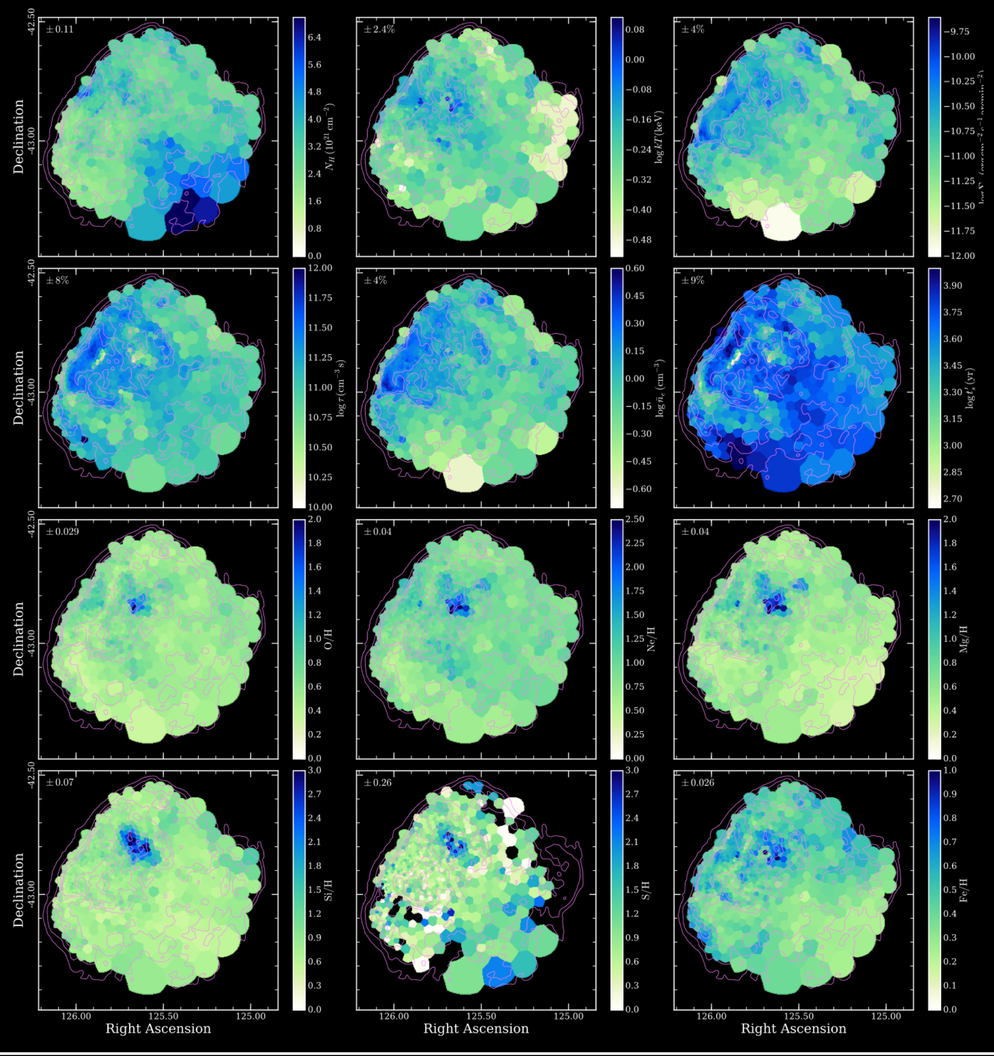
Sapienza et al 2022
Kepler, XMM-Newton observations





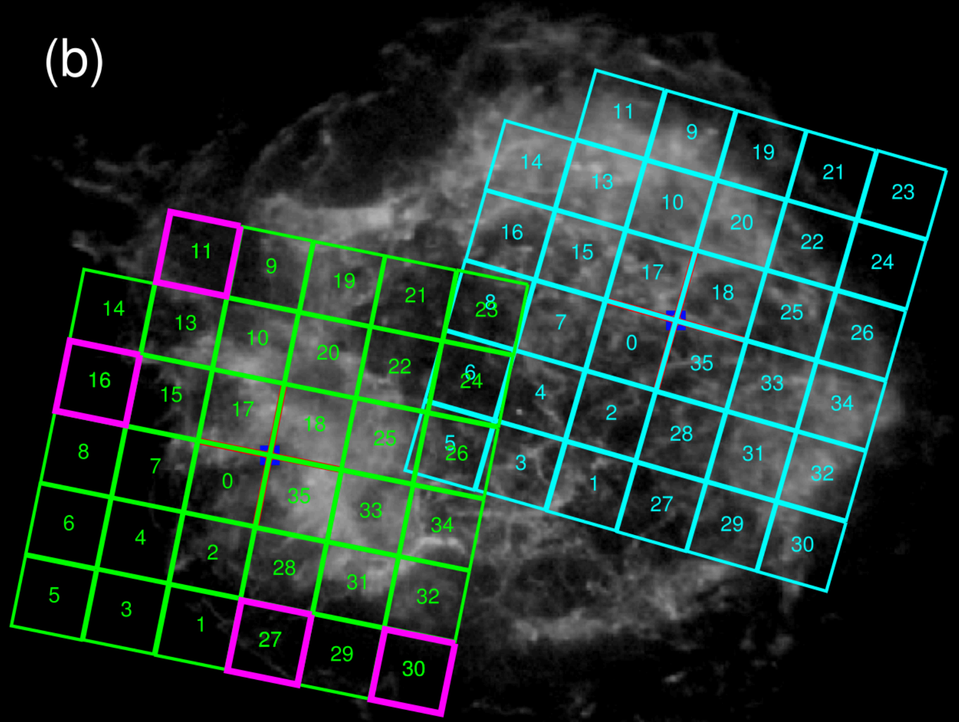
Introduction

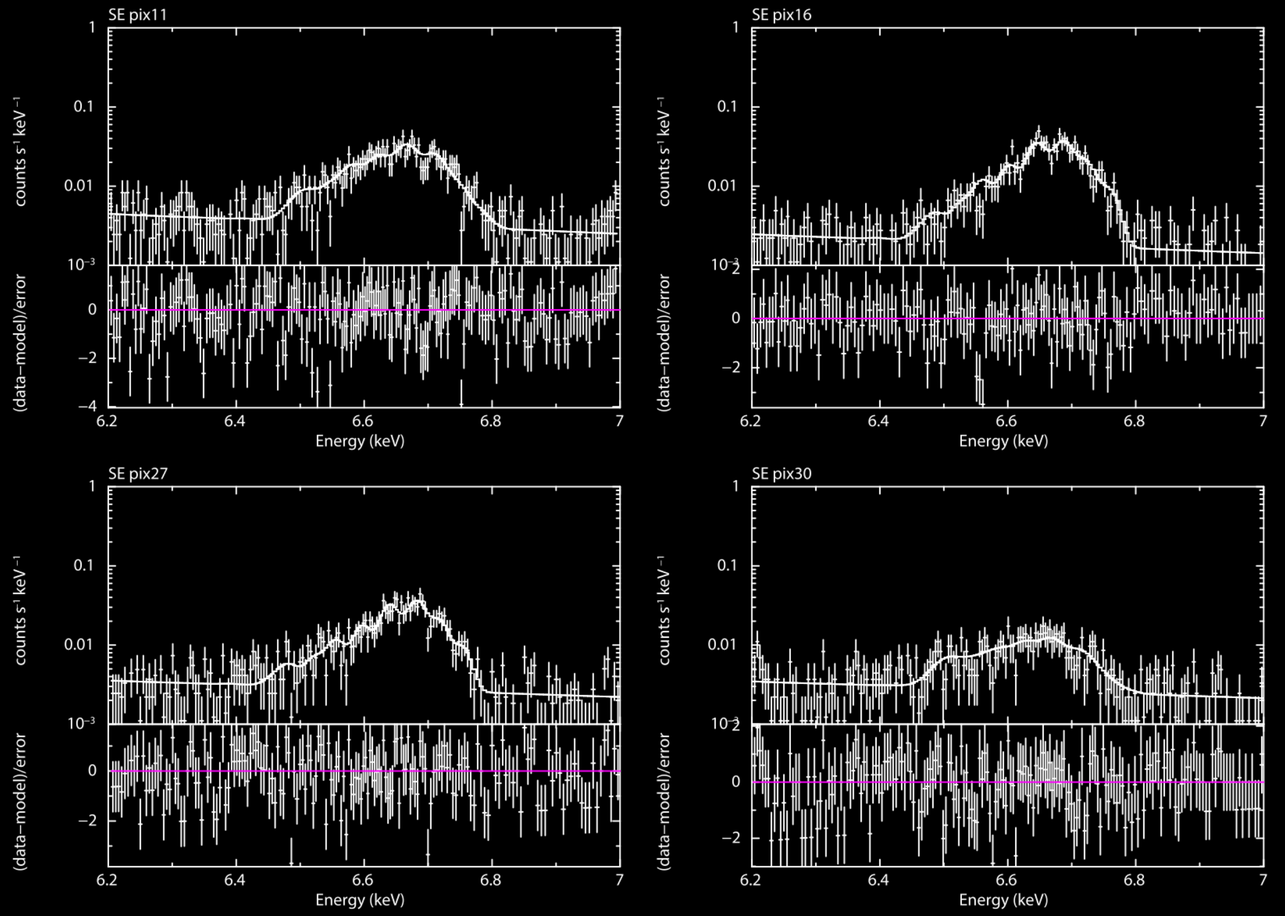
Mayer et al 2022
Puppis A, eRosita observations



Introduction

Bamba et al 2025
Cas A, Resolve observations





ARF?????
Point? Flat? Image?
Which image?

SSM?
Estimation of the contamination in single pixels?

Multiresponse analysis?
Associate different spatial components (ARFs) to different spectral components!

Multi-response data analysis

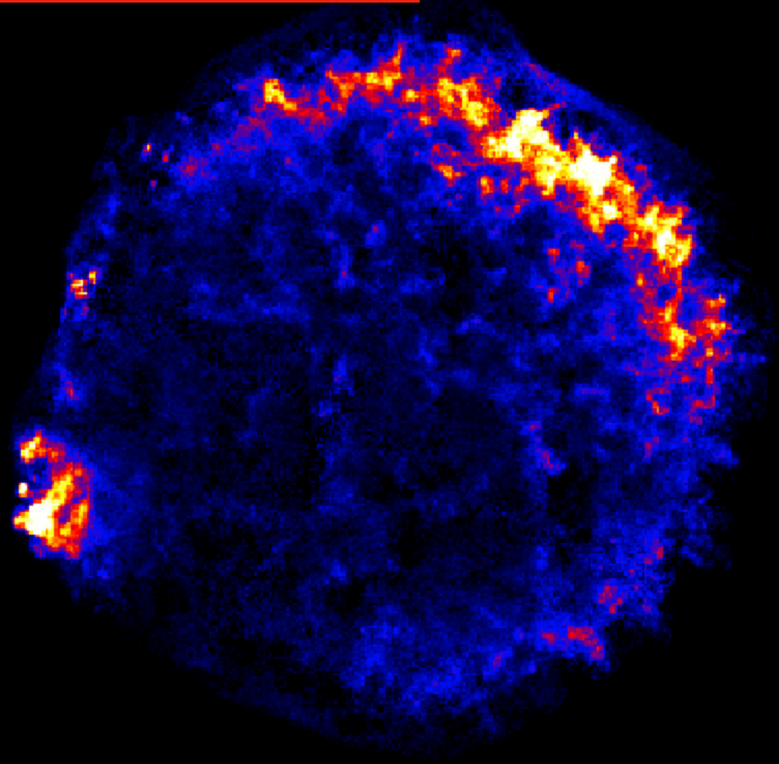
Spectral analysis above 4 keV

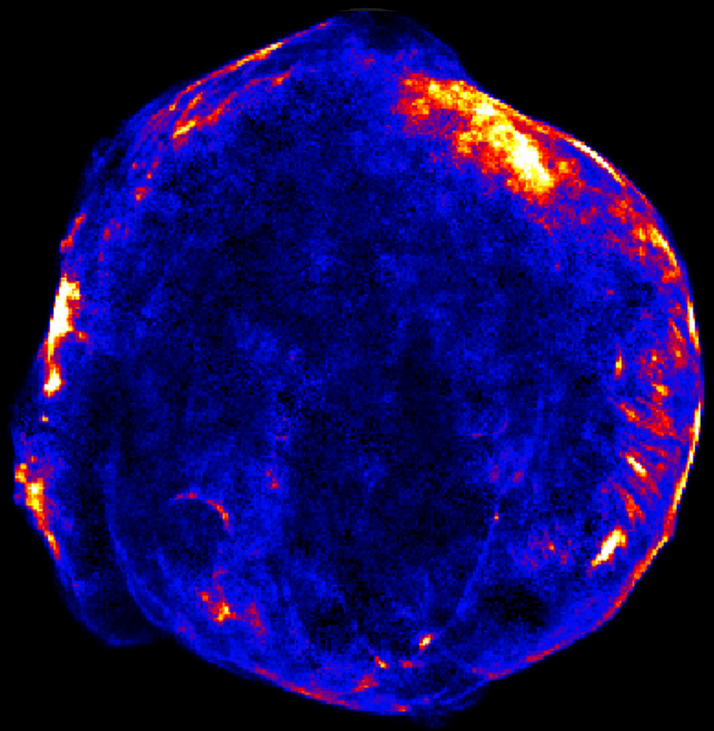
Model = NEI thermal + non-thermal

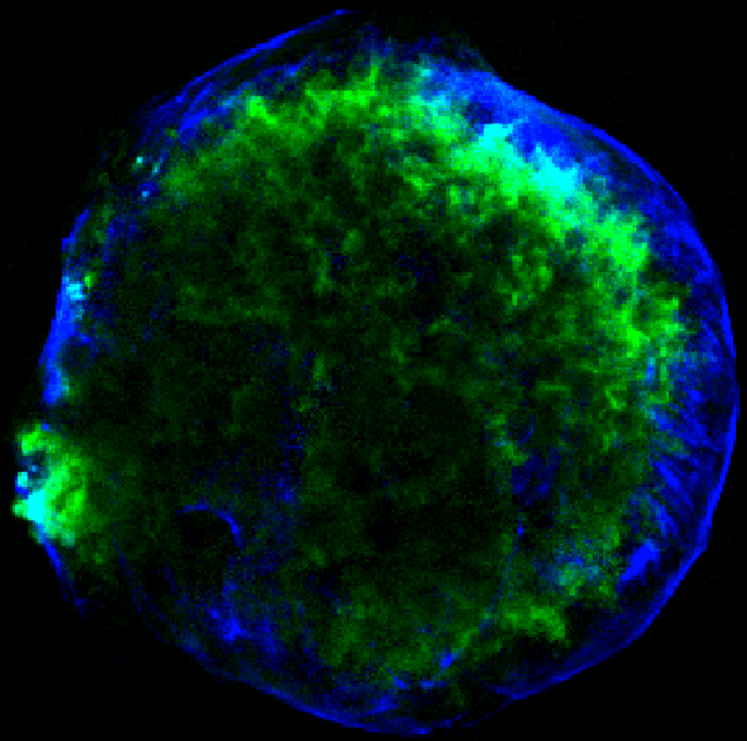
GMCA images
See talk by Leila on Friday!

Fe

Synchrotron





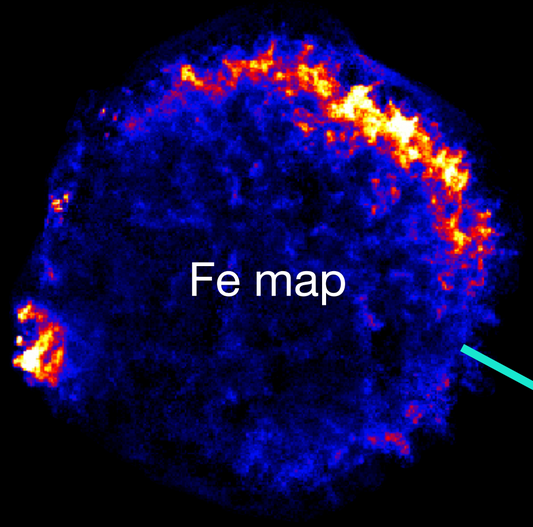


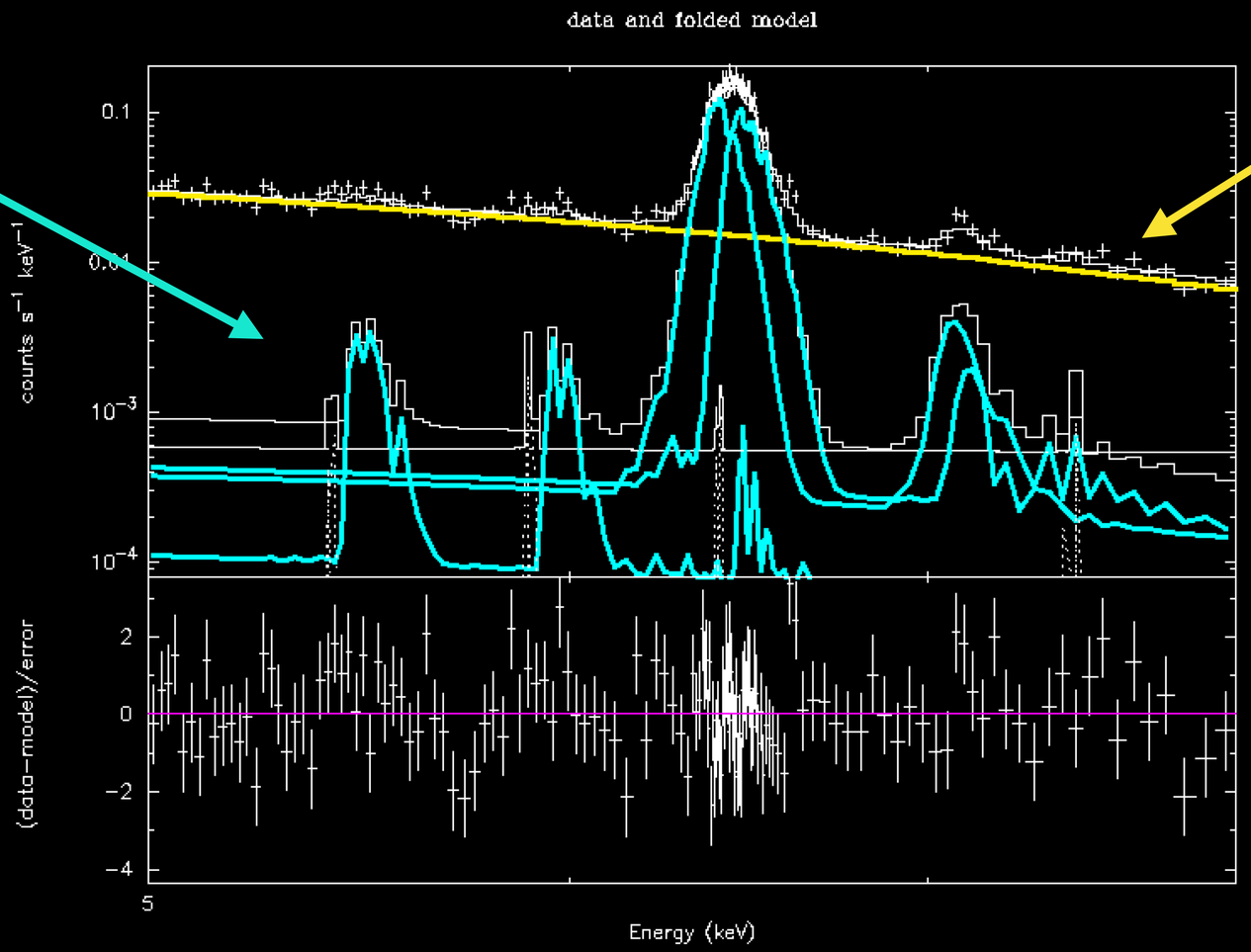
Fe map

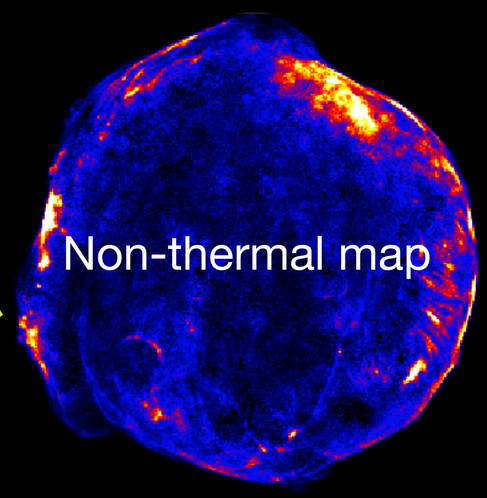
Non-thermal map

Green: Fe, Blue: Synchrotron

Multi-response data analysis

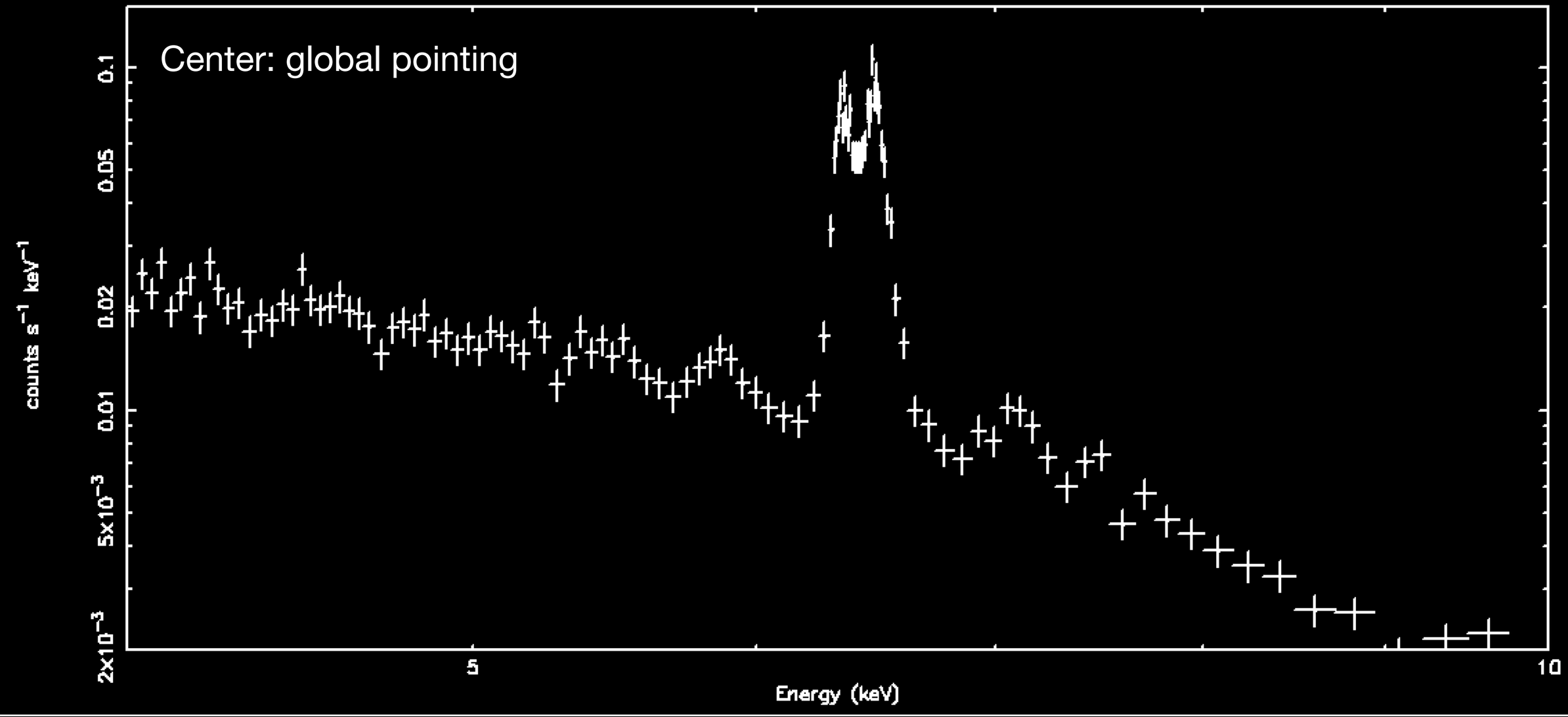




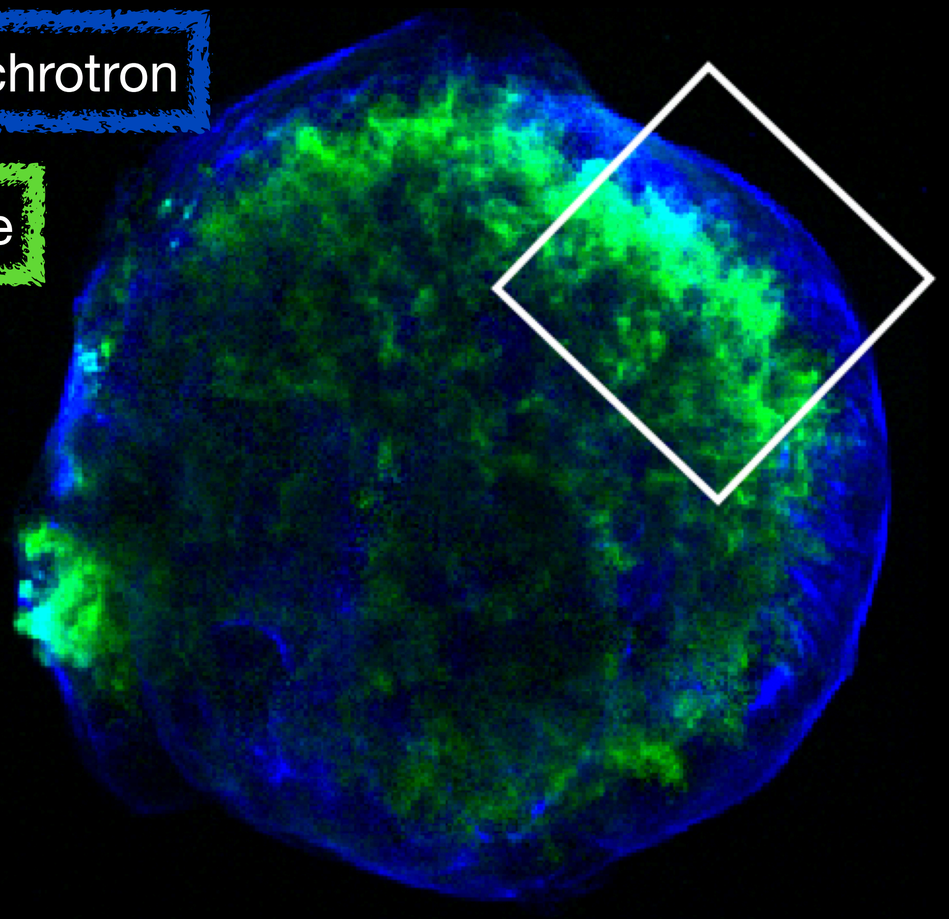


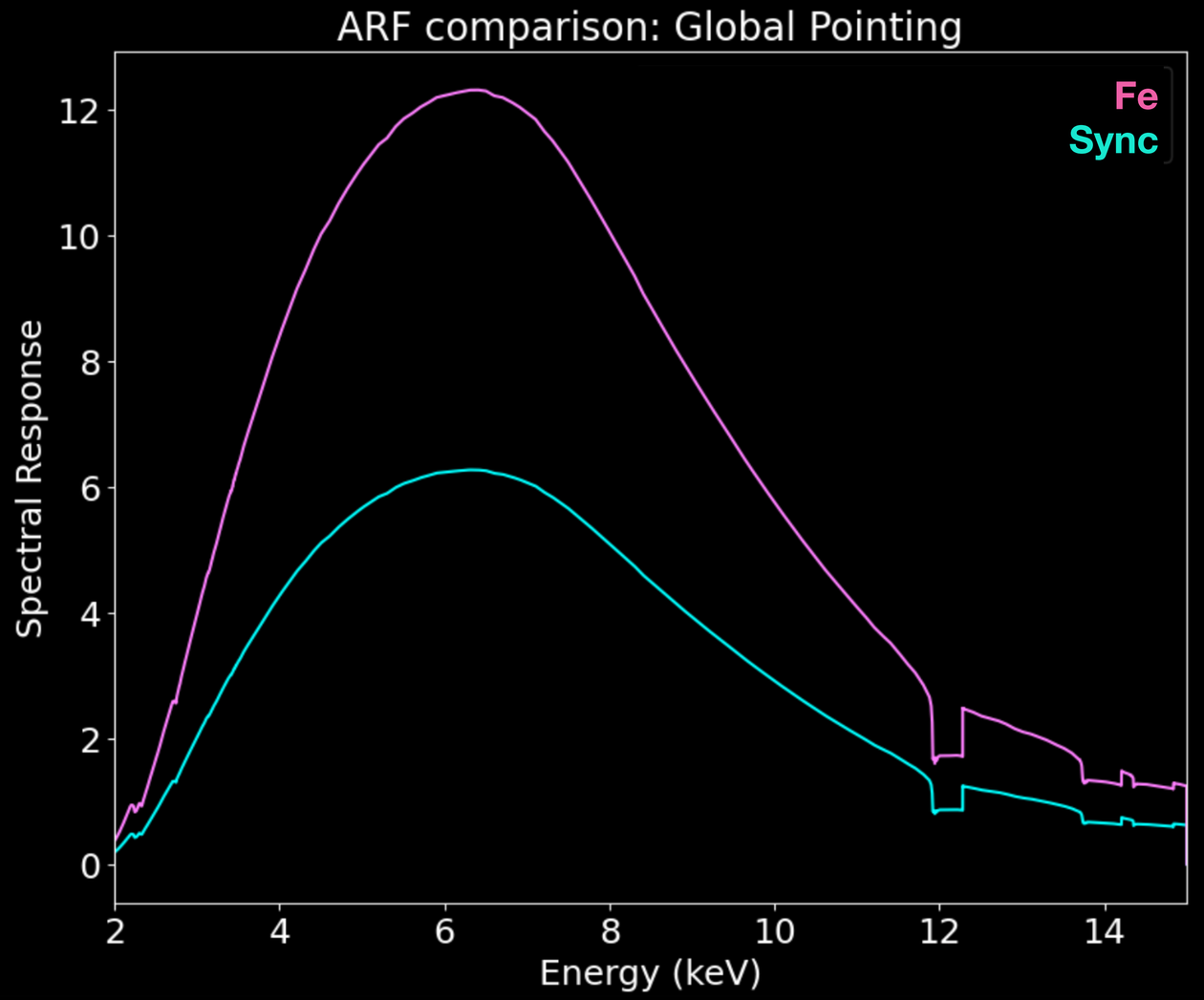
Multi-response data analysis

Just a little off topic to show very beautiful data

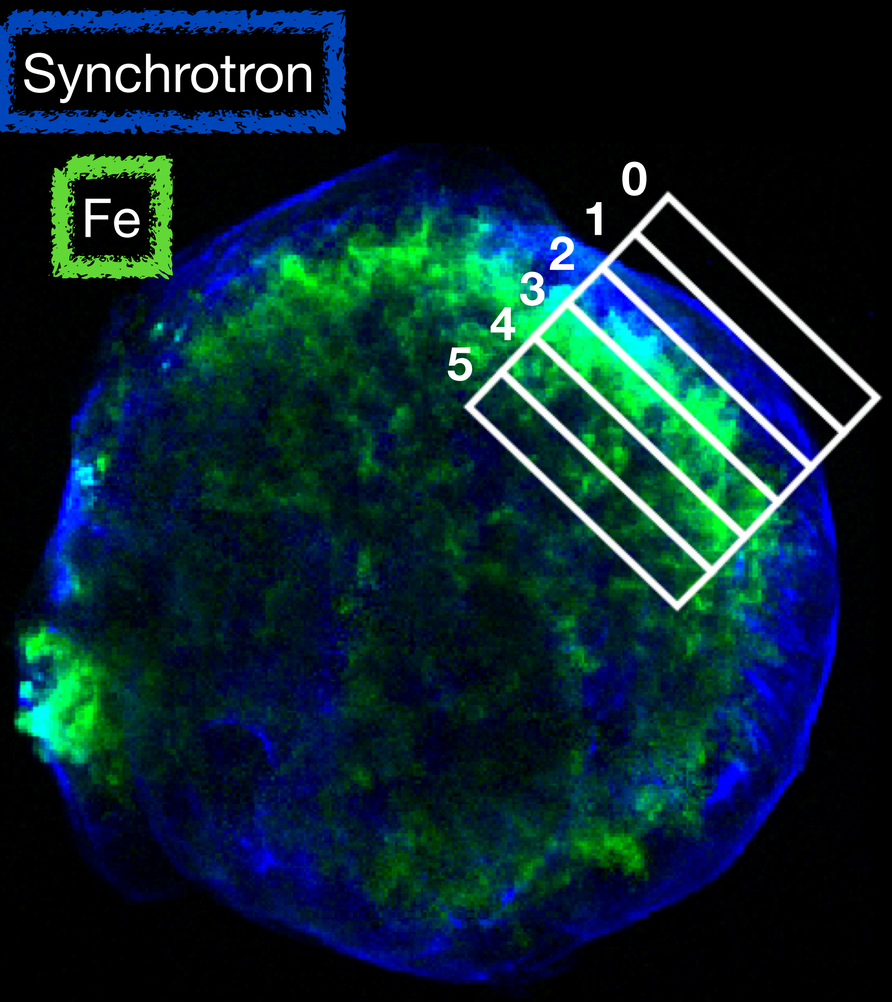


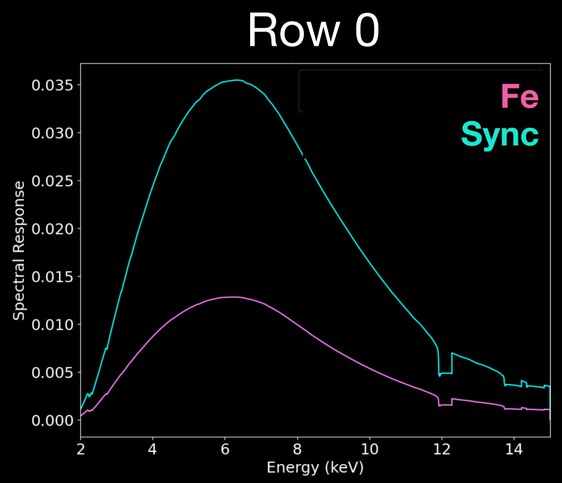
Multi-response data analysis

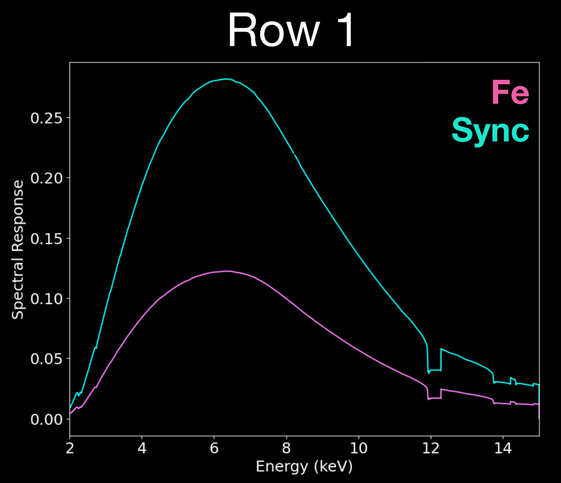


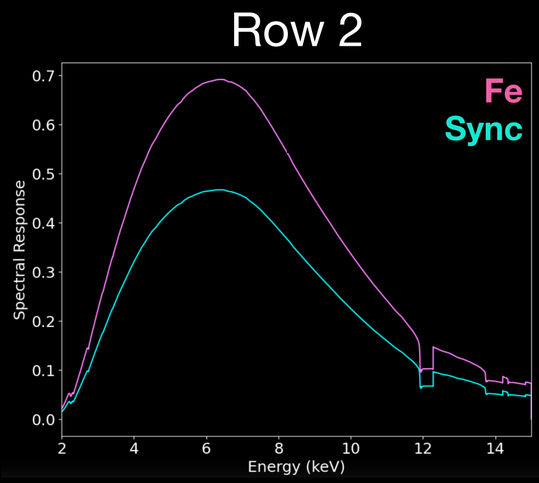


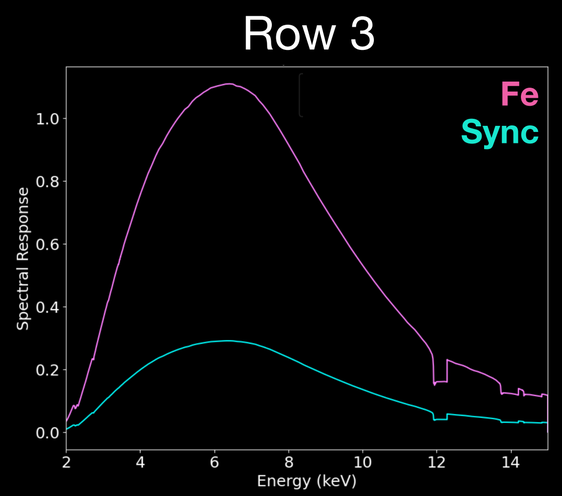
Multi-response data analysis

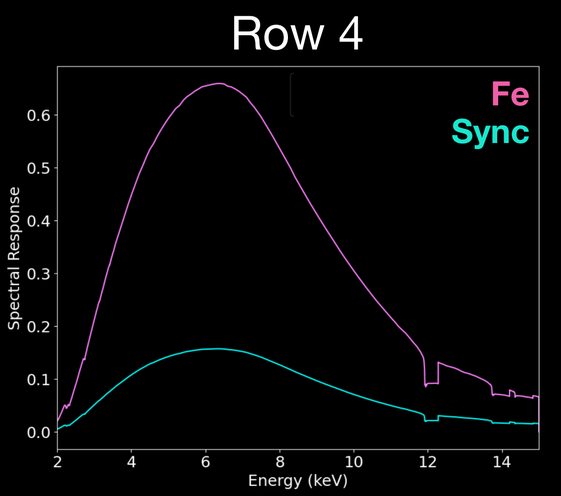


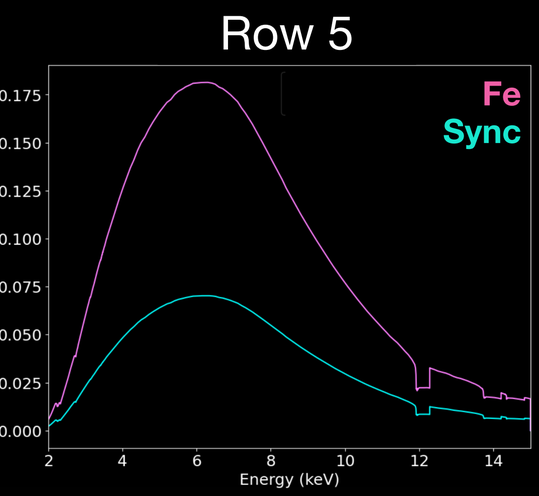








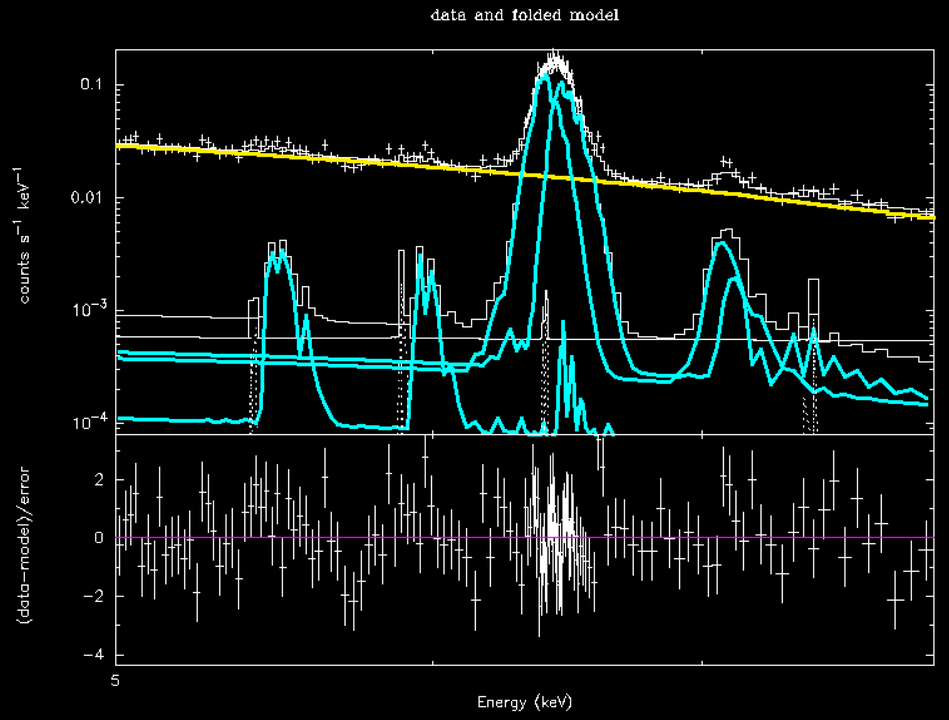




Multi-response data analysis

How to do that with Xspec

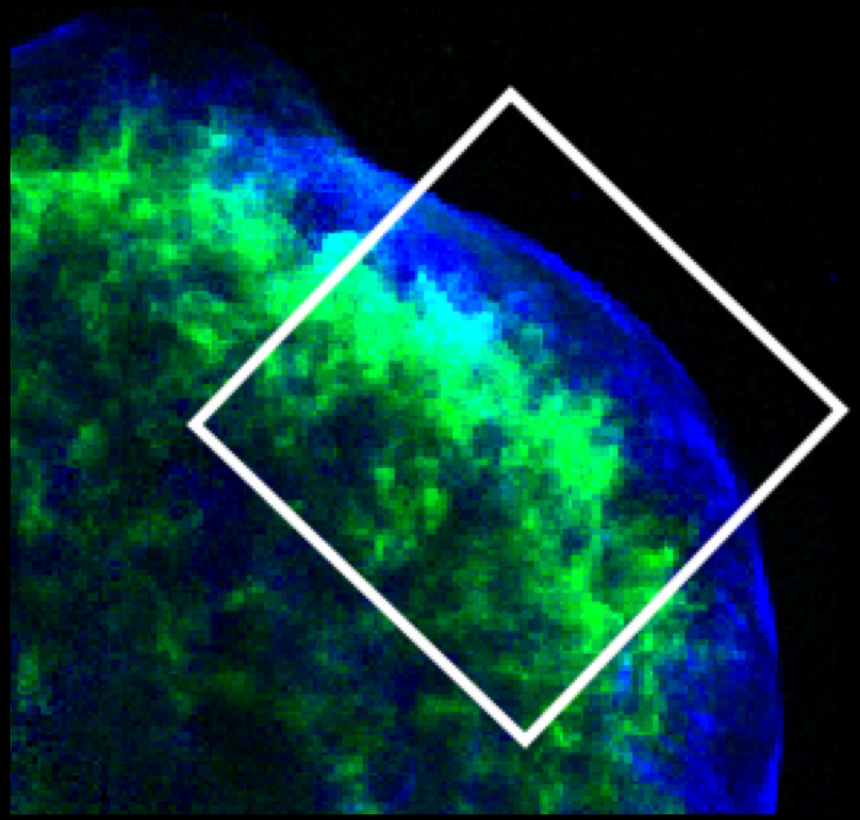
XSPEC12> data 1:1 myspectrum.pi
XSPEC12> resp 1:1 rmf_myspectrum.rmf
XSPEC12> arf 1:1 arf_ImageFeK_GMCA.arf
XSPEC12> resp 2:1 rmf_myspectrum.rmf
XSPEC12> arf 2:1 arf_ImageSync_GMCA.arf

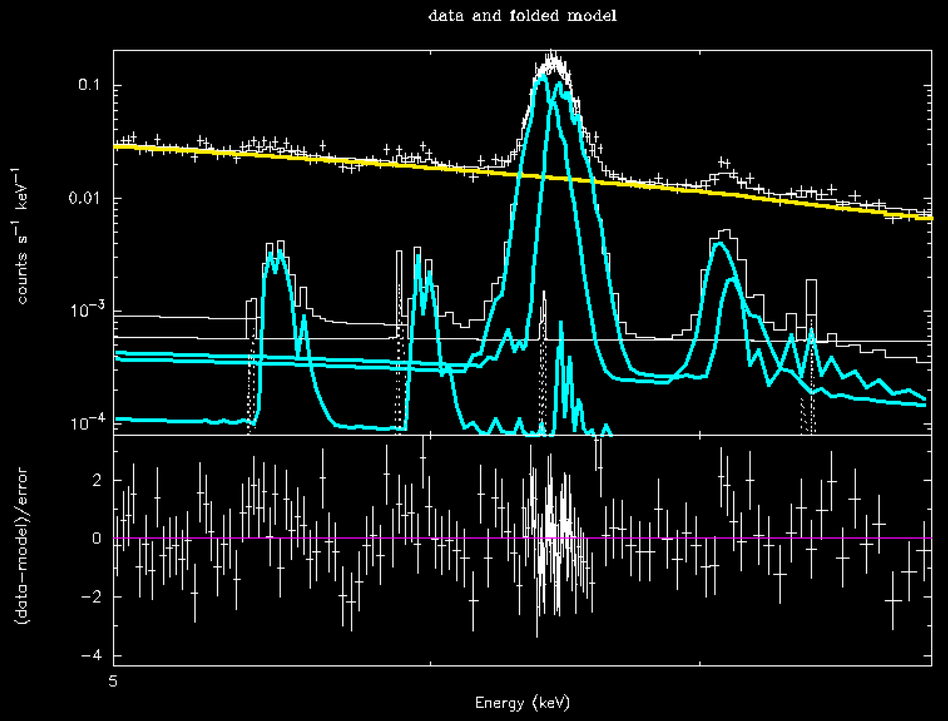


model 1:ejecta + bvvpshock (Fe, rear) + bvvpshock (Fe, front)
model 2:sync powerlaw

Multi-response data analysis

How does it affect the fit





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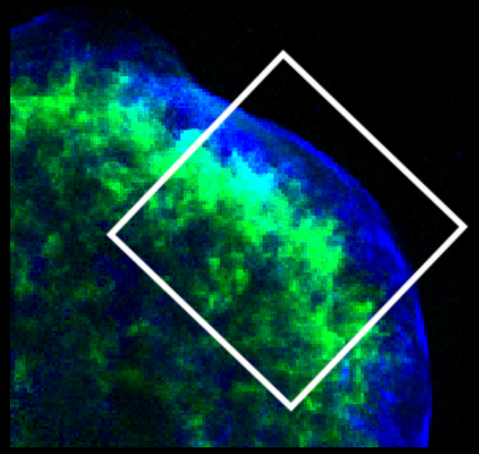
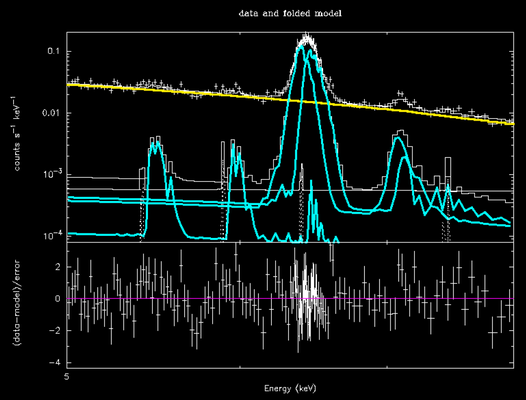


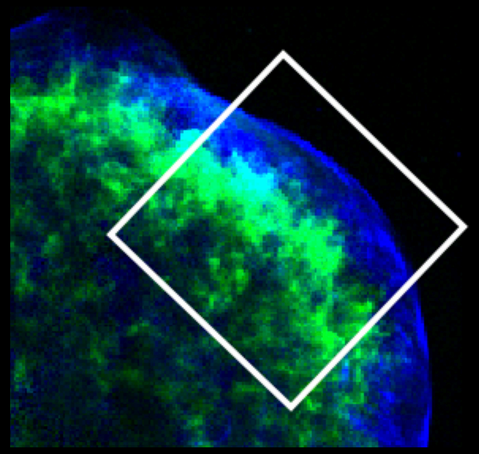


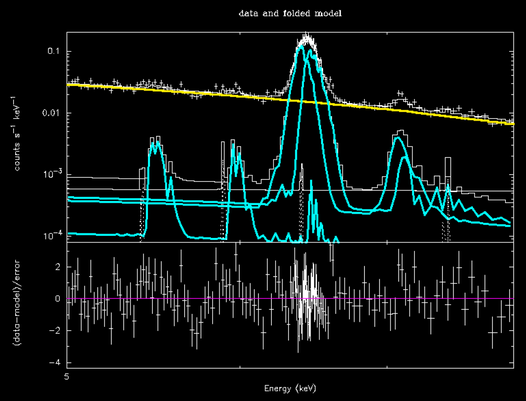
Different tests:

- Different ARFs for different components: Fe image for thermal emission, synchrotron image for non-thermal emission
- Fe image for both the components
- Synchrotron image for both the components
- Broad image for both the components

Multi-response data analysis

How does it affect the fit





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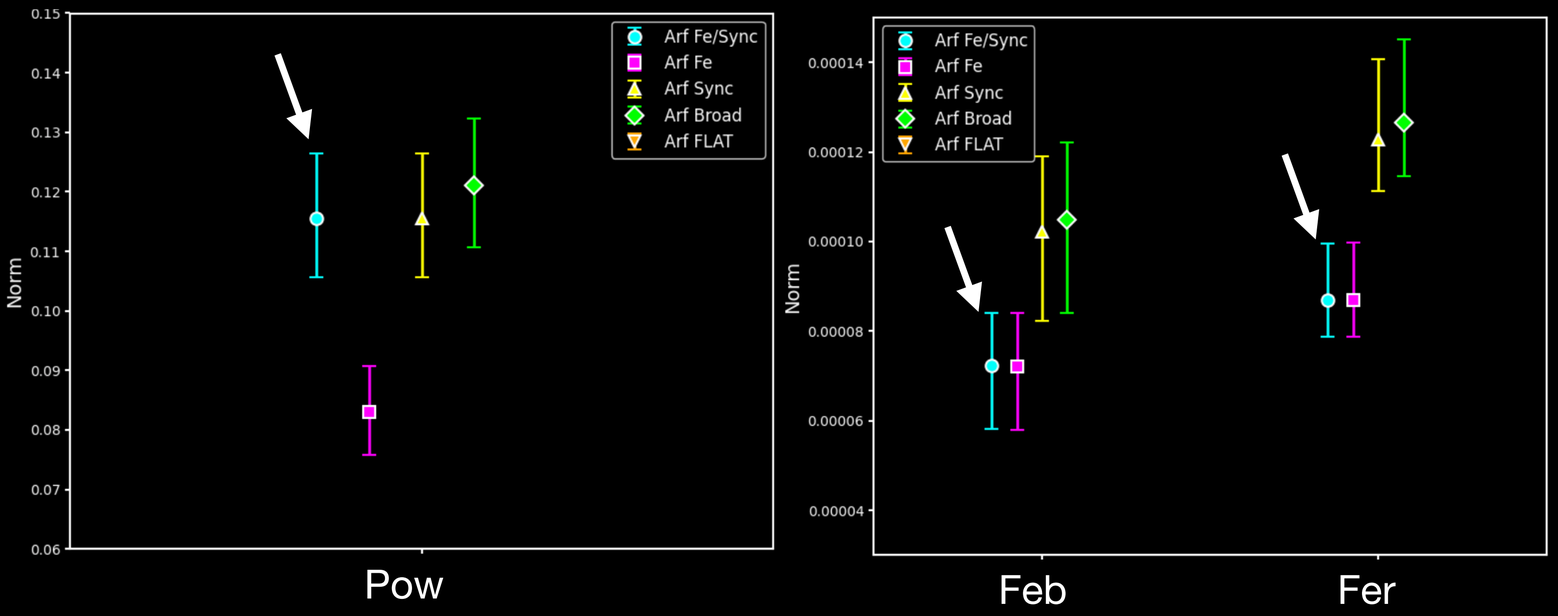
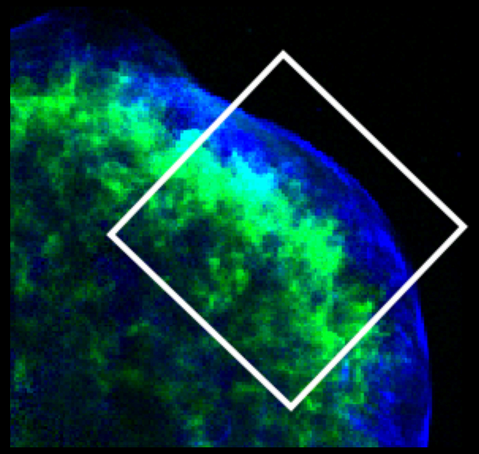
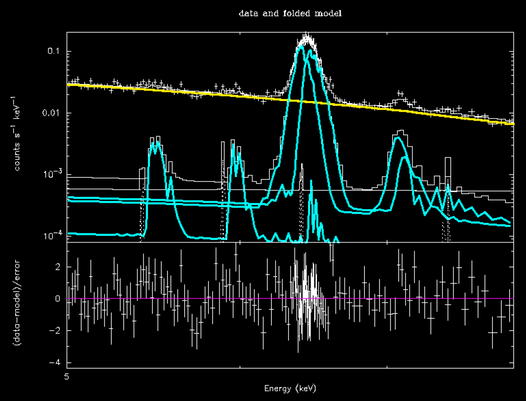


Different normalization depending on the ARF!!!!

Multi-response data analysis

How does it affect the fit?





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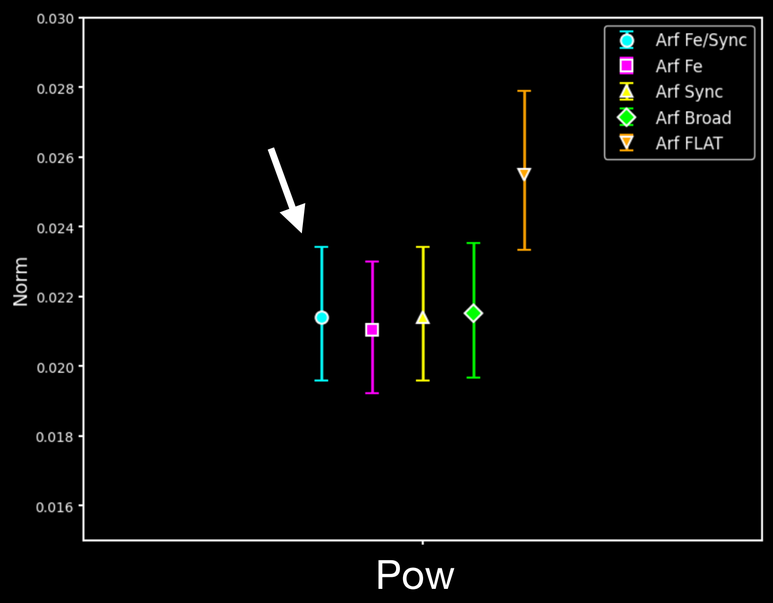
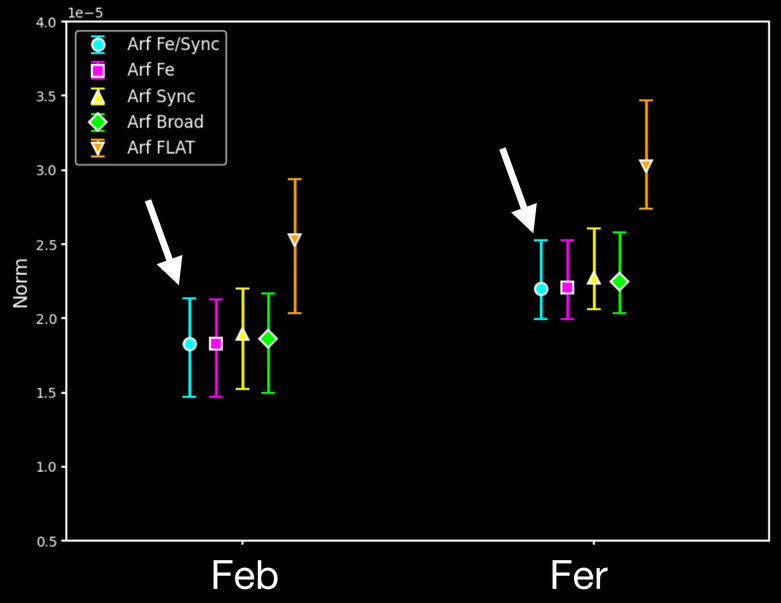


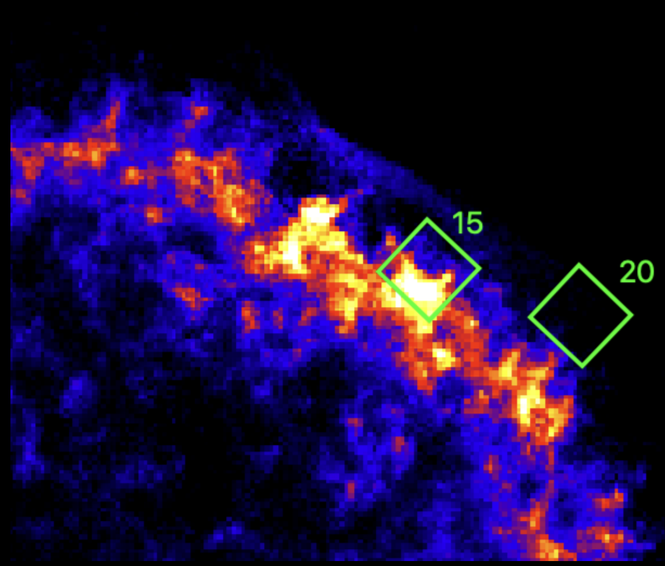


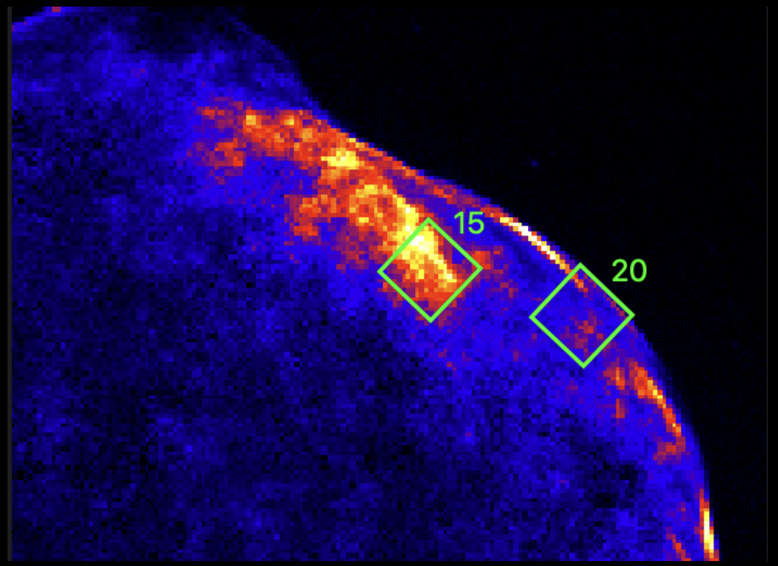
NEED TO MULTIPLY THE NORMALIZATION FOR THE FLUX RATIO BETWEEN THE ANALYZED REGION AND THE TOTAL INPUT IMAGE USED TO GENERATE THE ARF!!!!!

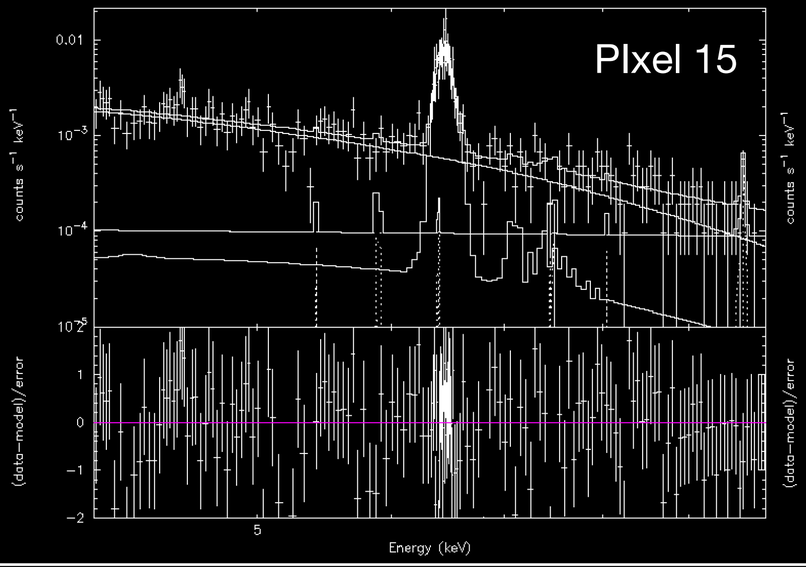
See François's talk

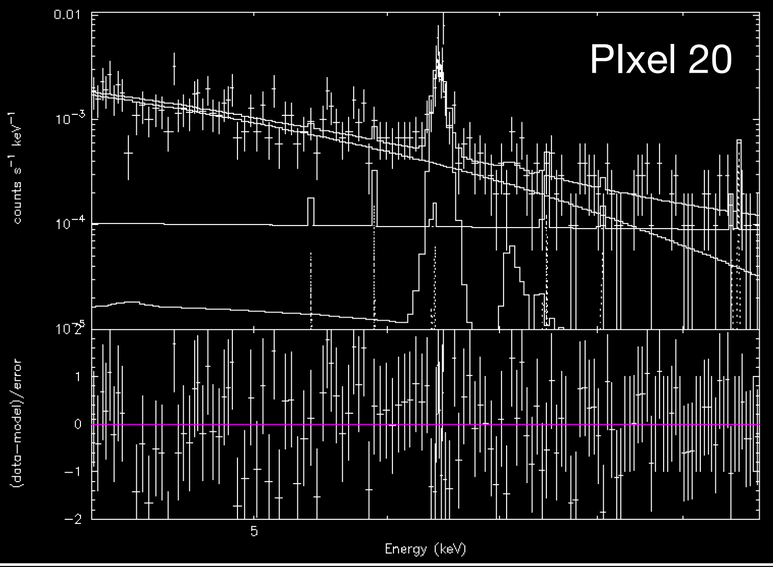
Multi-response data analysis

How does it affect the fit?



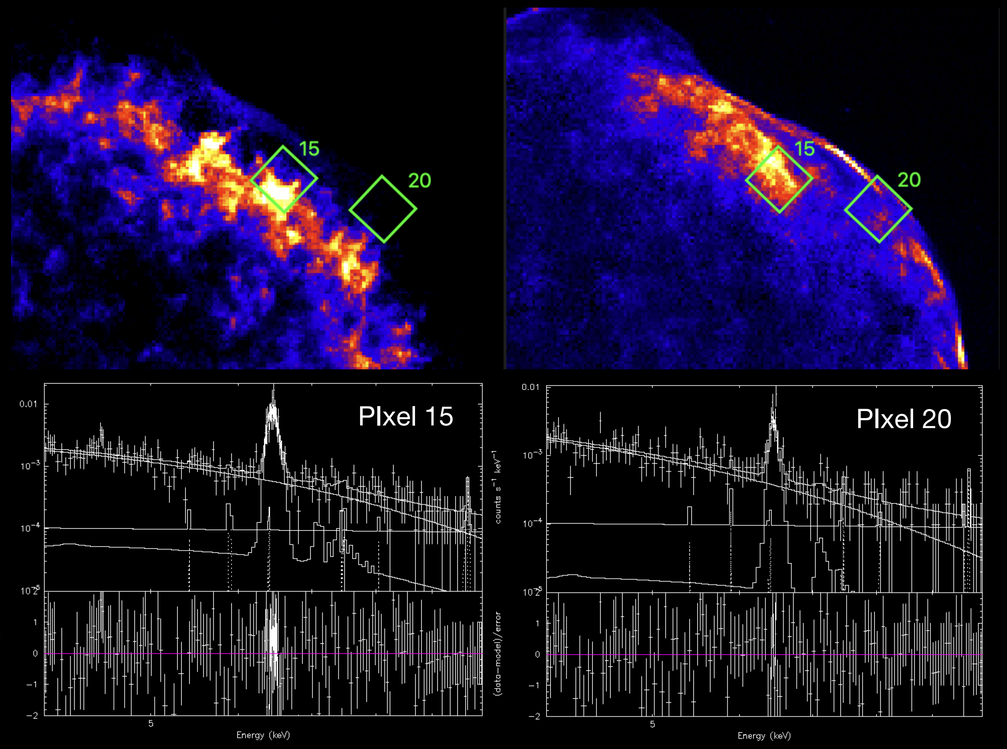




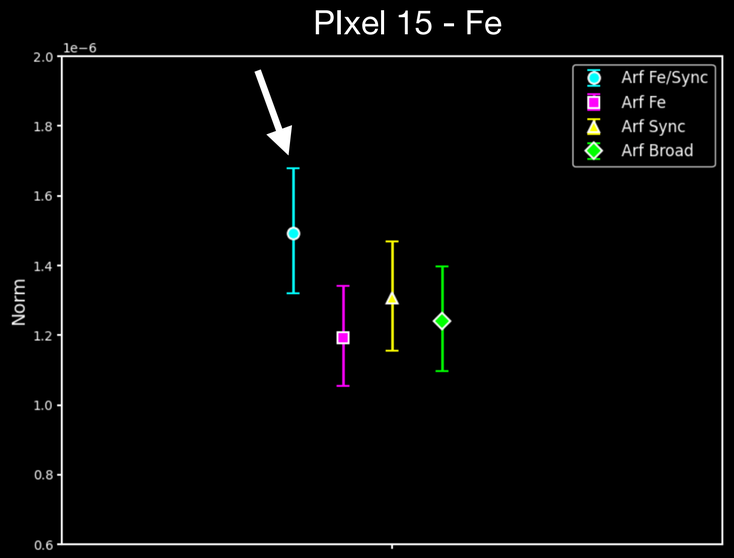


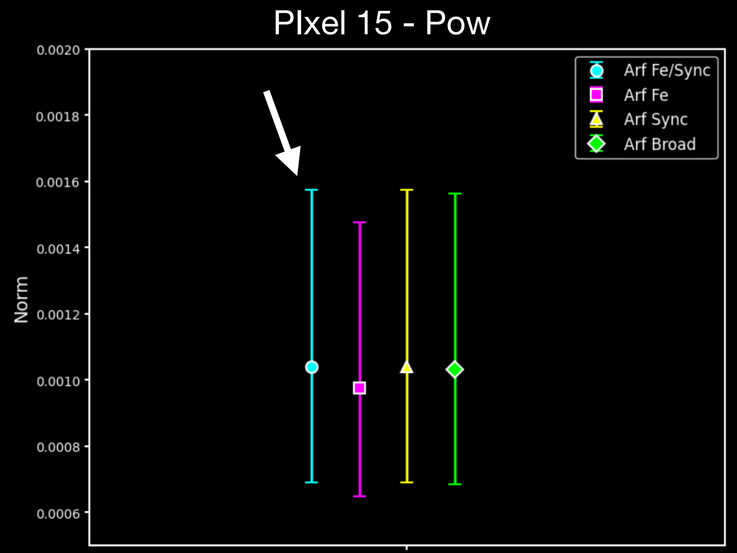
Multi-response data analysis

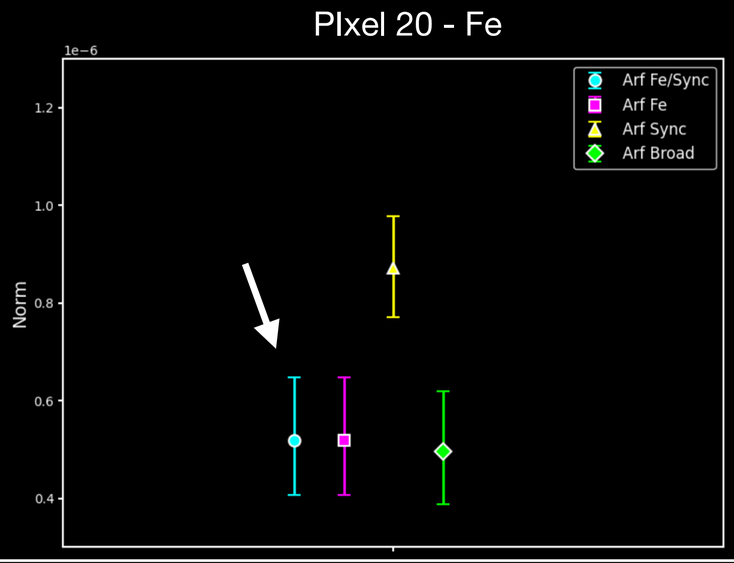
How does it affect the fit?

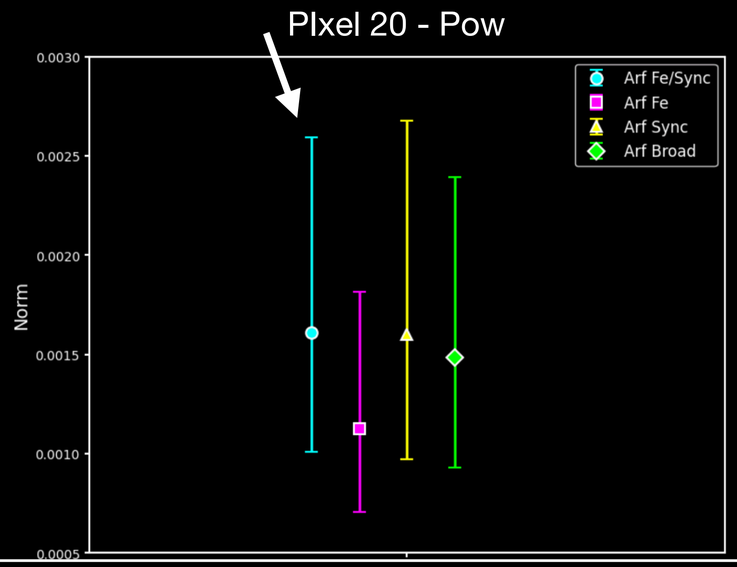


N.B. I already considered the flux ratio





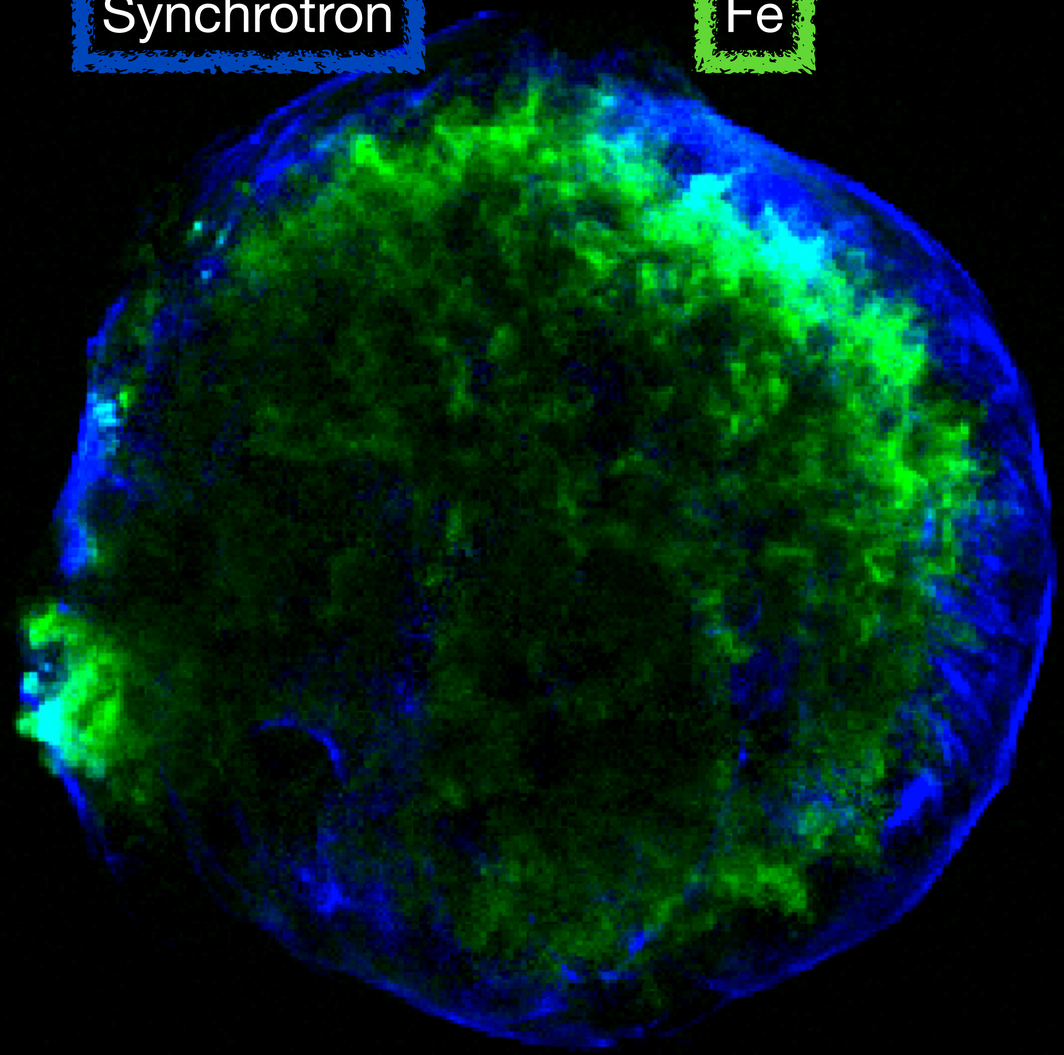




CONCLUSION: USE THE MULTIRESPONSE ANALYSIS

Synchrotron

Fe



SAFER

FAST

DOES NOT HURT

EXPLICATIVE

HELPS FOR SSM???