

Strontium in AT 2017gfo

Daniele Bjørn Malesani
on behalf of HEAVYMETAL

DAWN



Darach
Watson



Albert
Sneppen



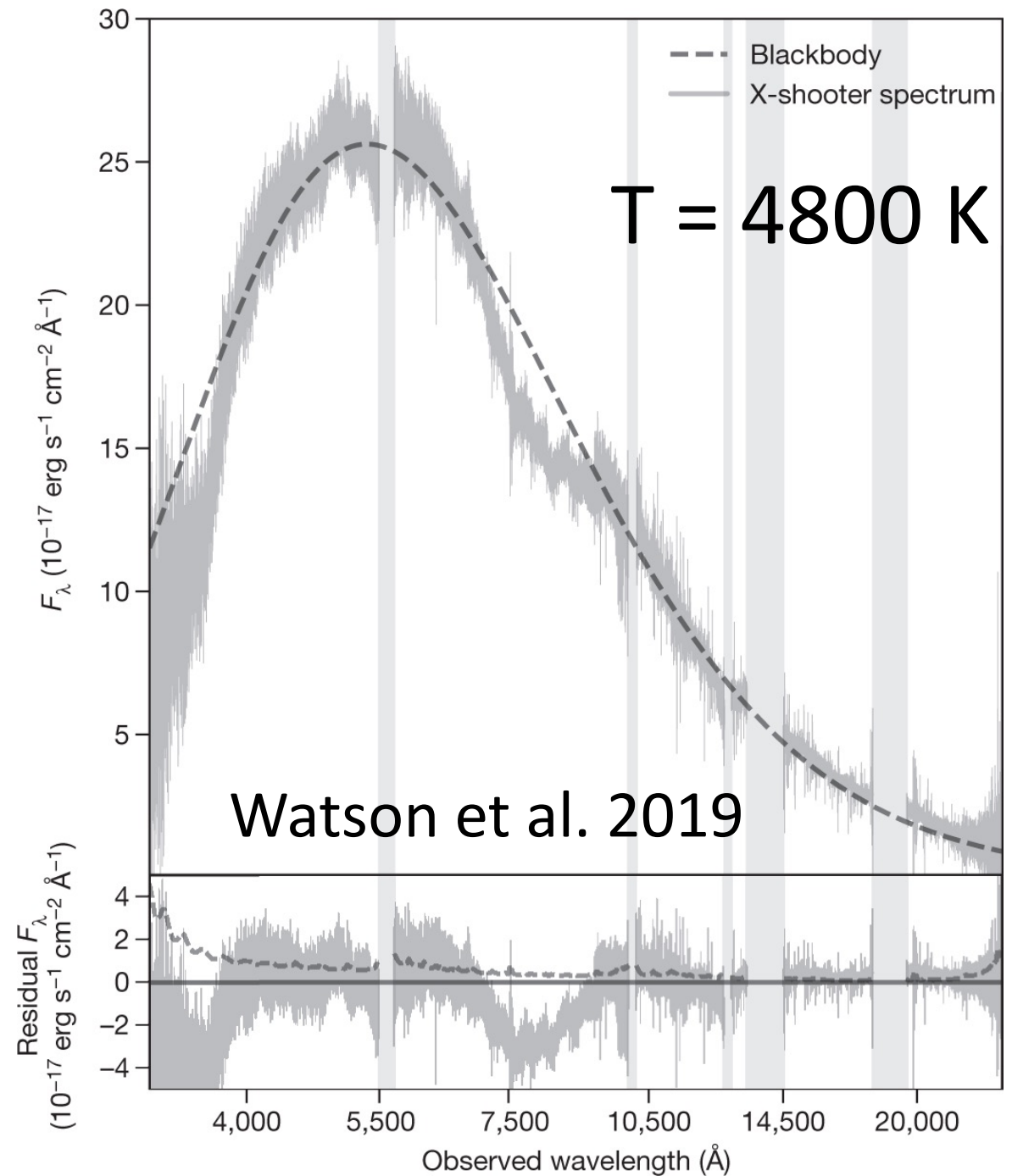
Rasmus
Damgaard Nielsen



Strontium in AT 2017gfo

Broad-band spectrum
very well described by
a blackbody with
overimposed features.

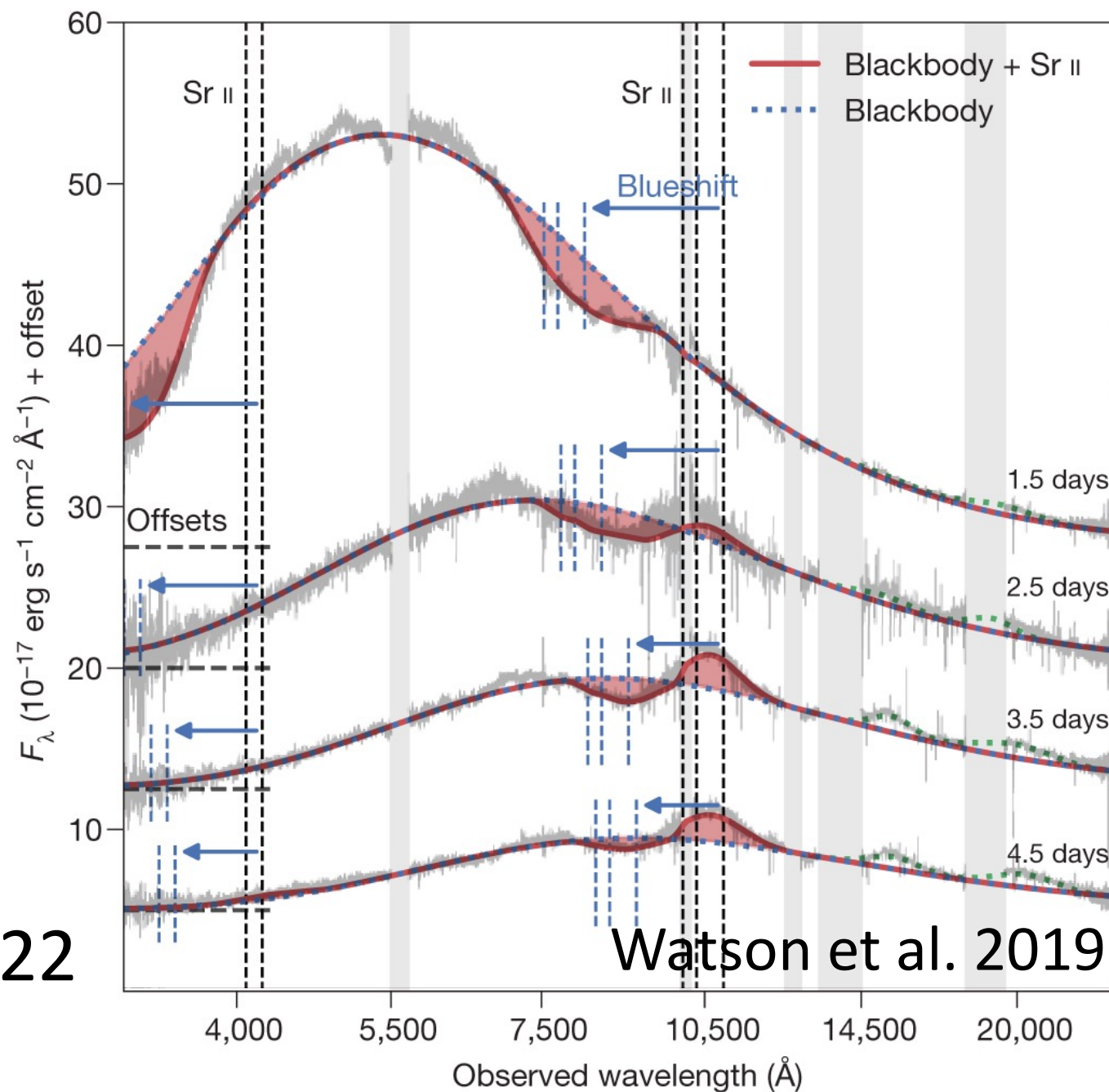
(Implication: geometry)



Strontium in AT 2017gfo

Development of a P-Cyg profile

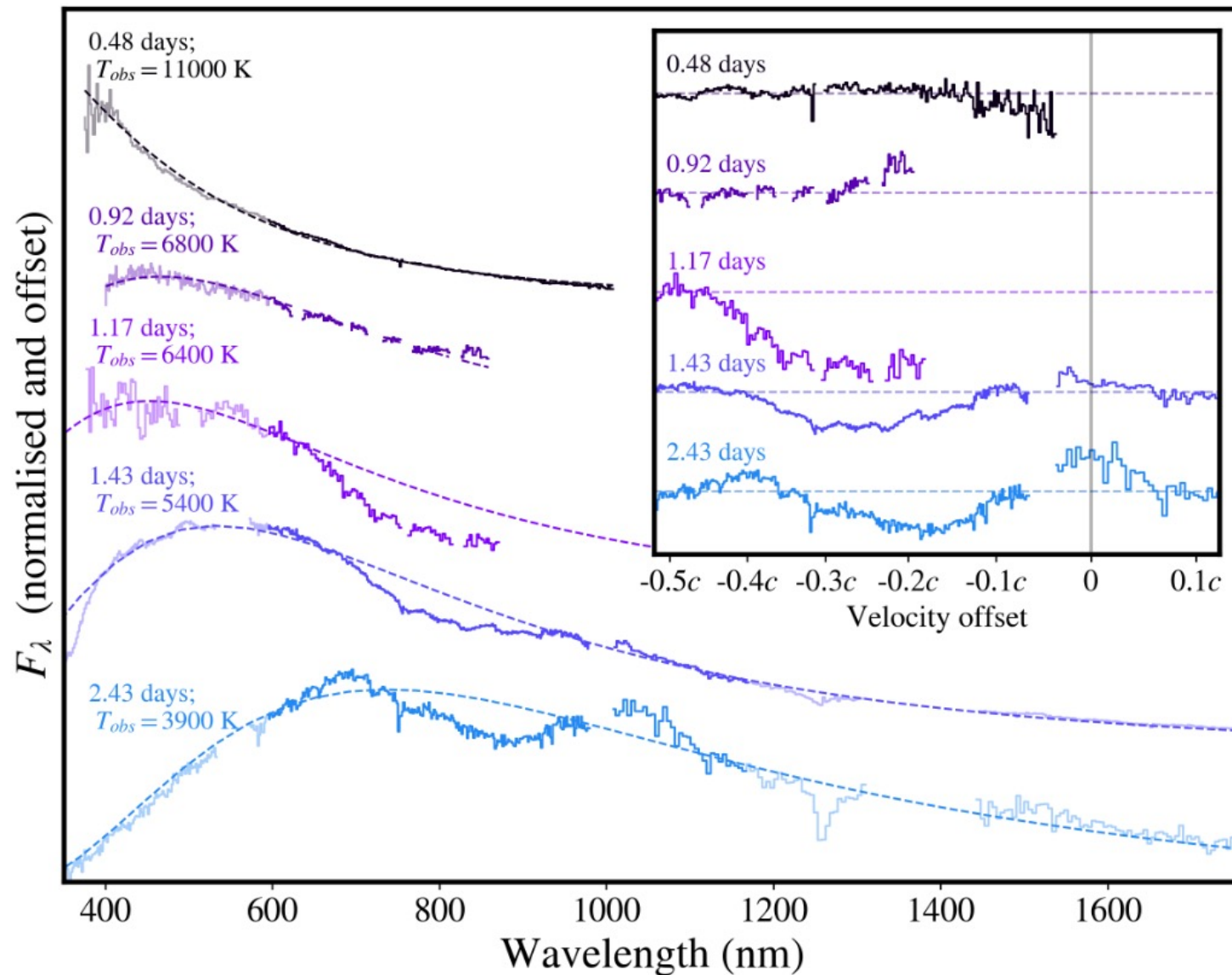
See also Gillanders et al. 2022
Vieira et al. 2023



Strontium in AT 2017gfo

Richer spectral
dataset:

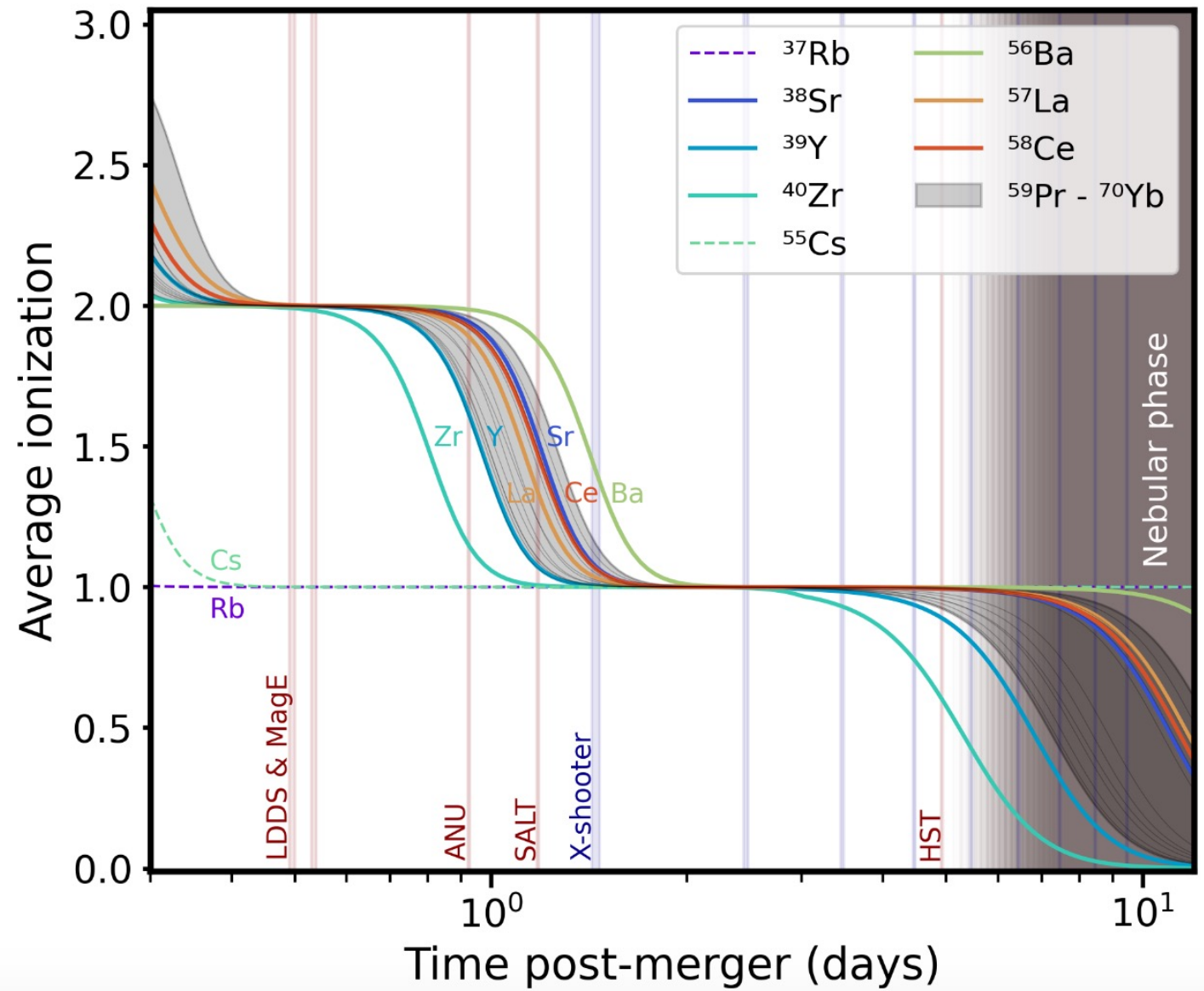
Emergence of the
Sr II feature



Sneppen et al. (2024) in preparation

Emergence of Sr II
tied to the time of
recombination

Sr III \rightarrow Sr II

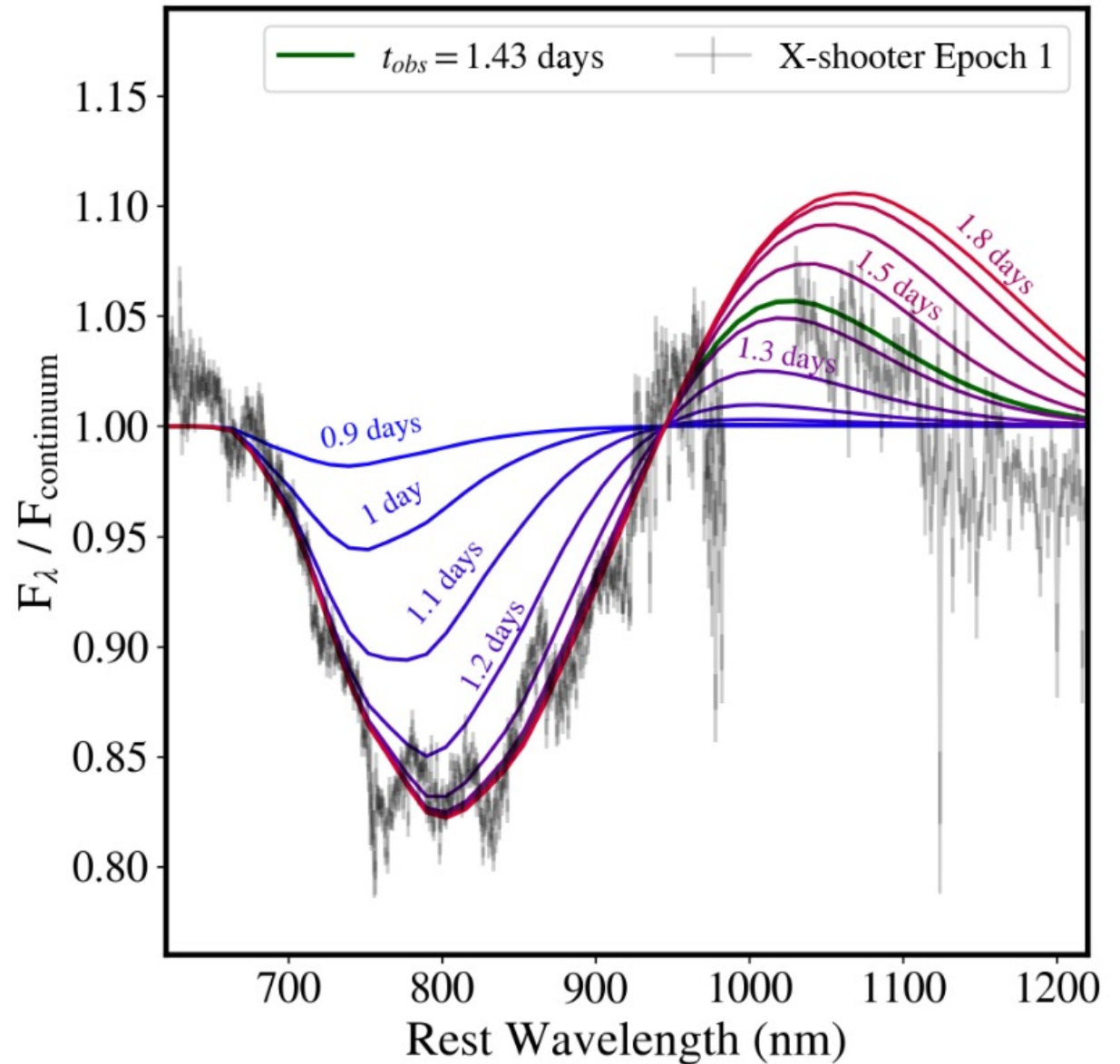


Sneppen et al. (2024) in preparation

Emergence of Sr II
tied to the time of
recombination

Sr III \rightarrow Sr II

Absorption /
emission ratio is
time dependent

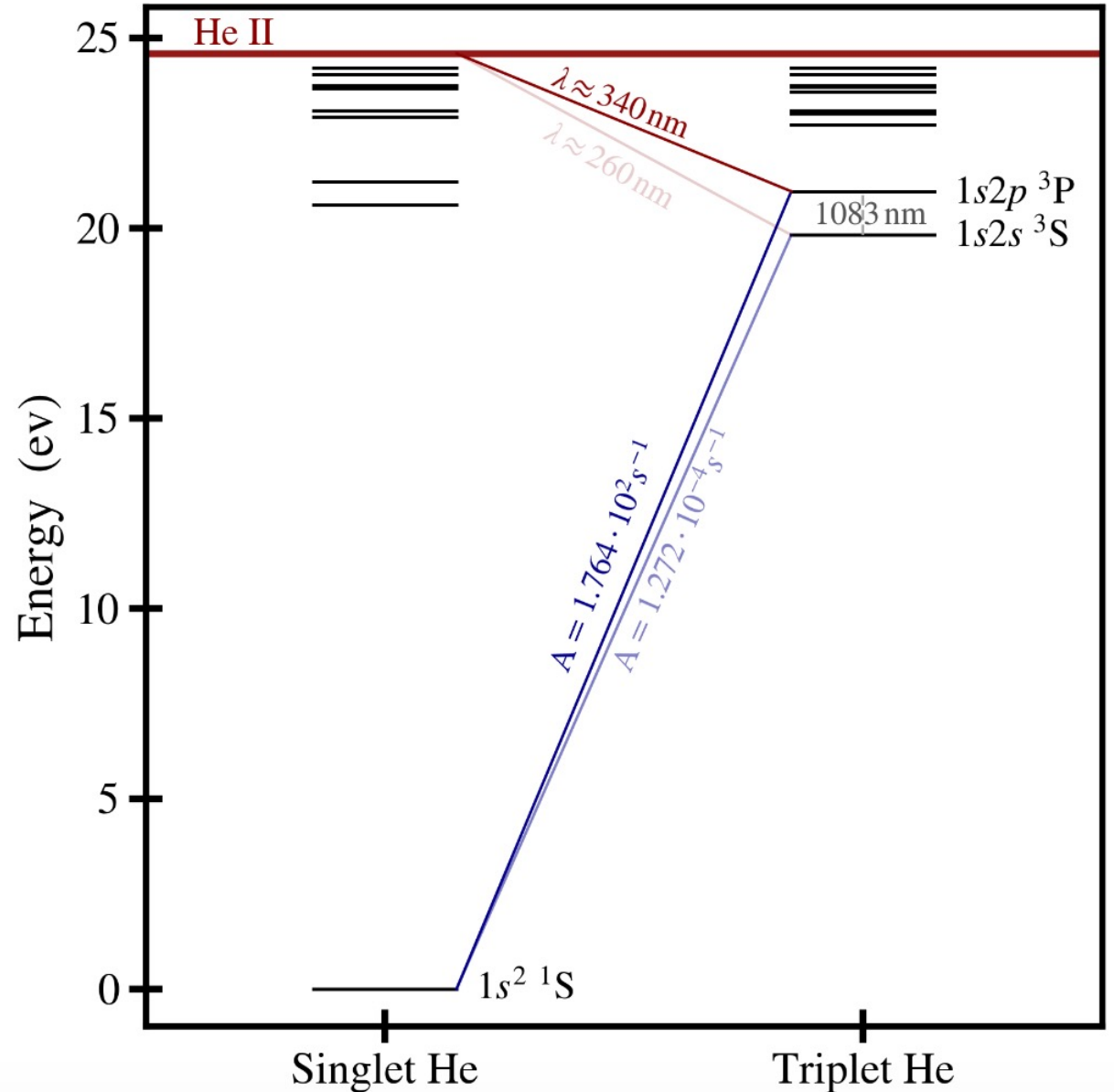


Sneppen et al. (2024) in preparation

Helium vs strontium

He has been suggested
in stead of Sr
(e.g. Tarumi et al. 2023)

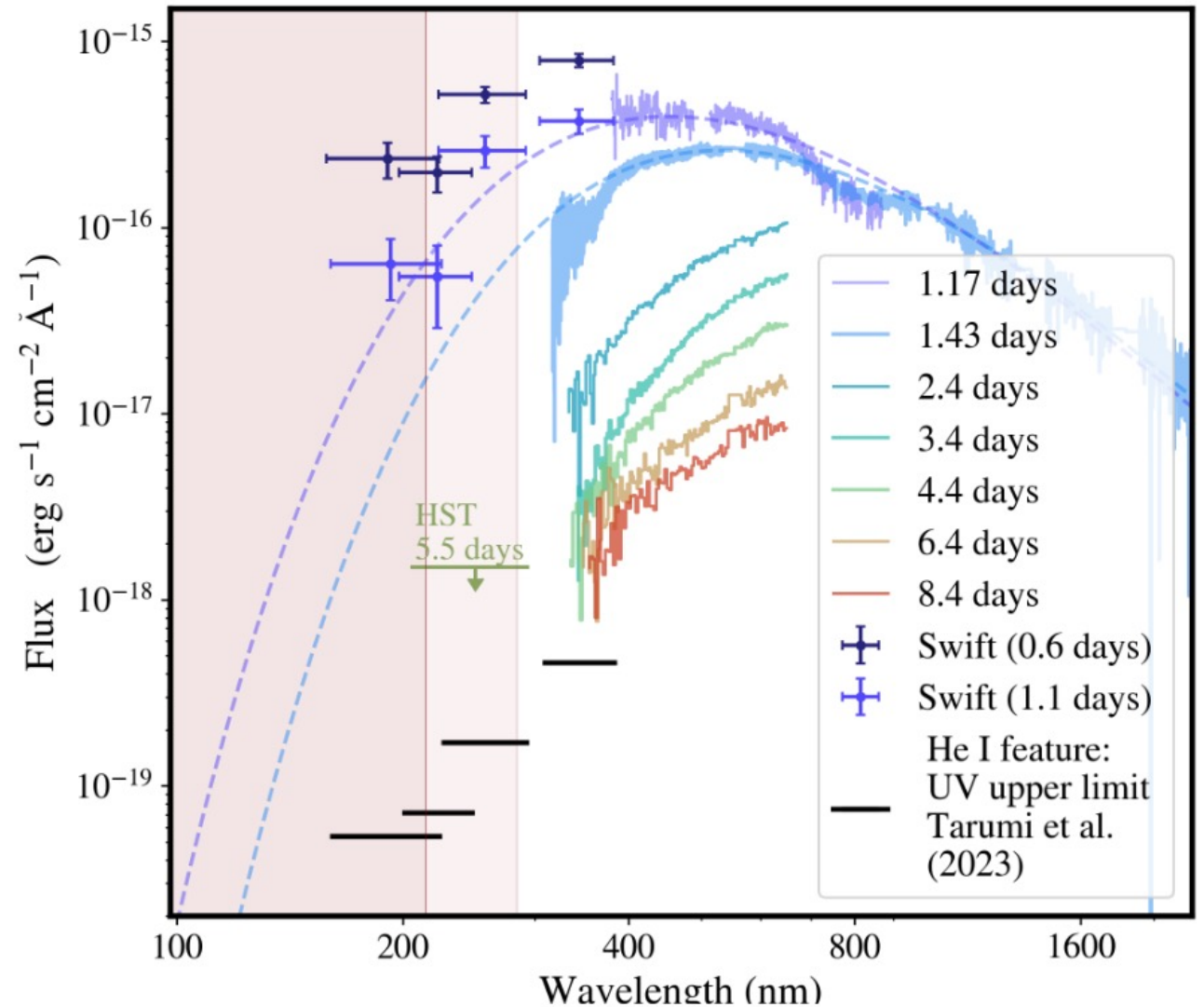
Depends on the
existence of He I



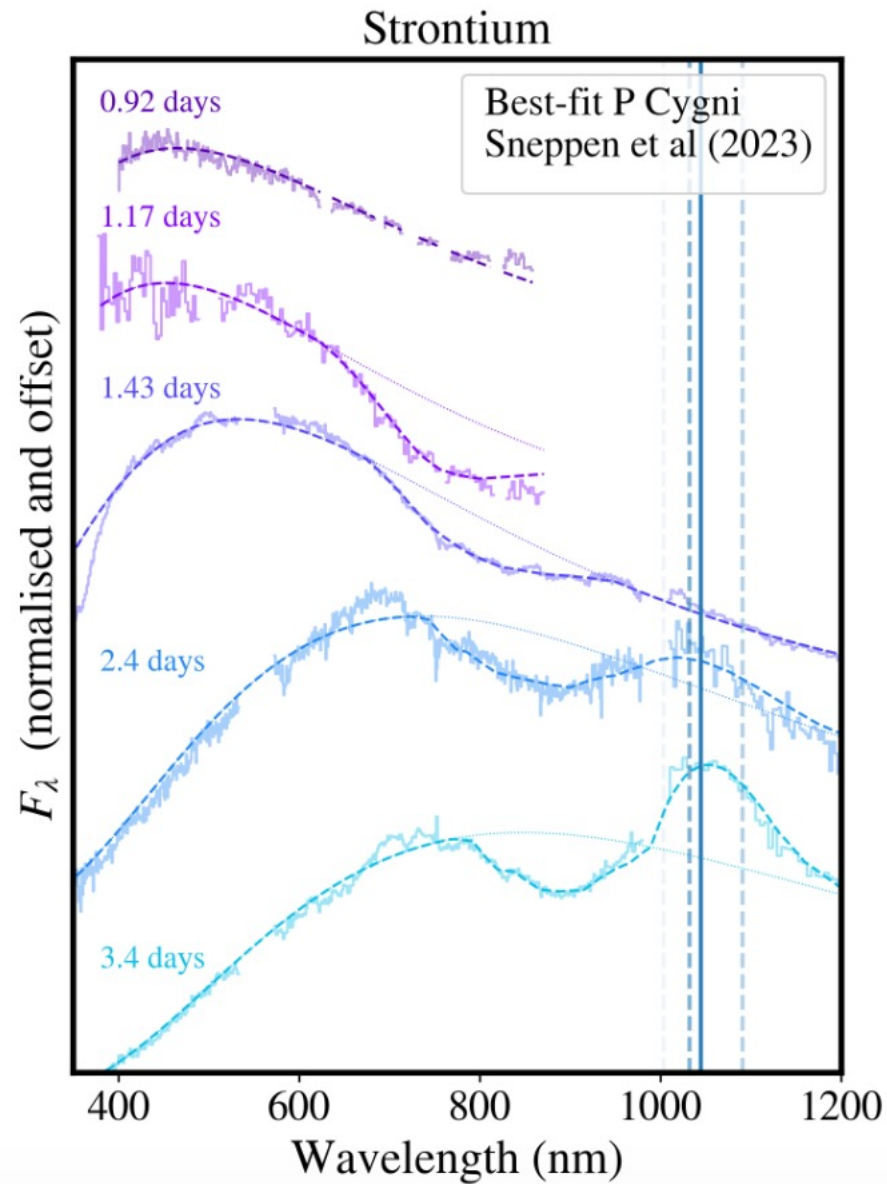
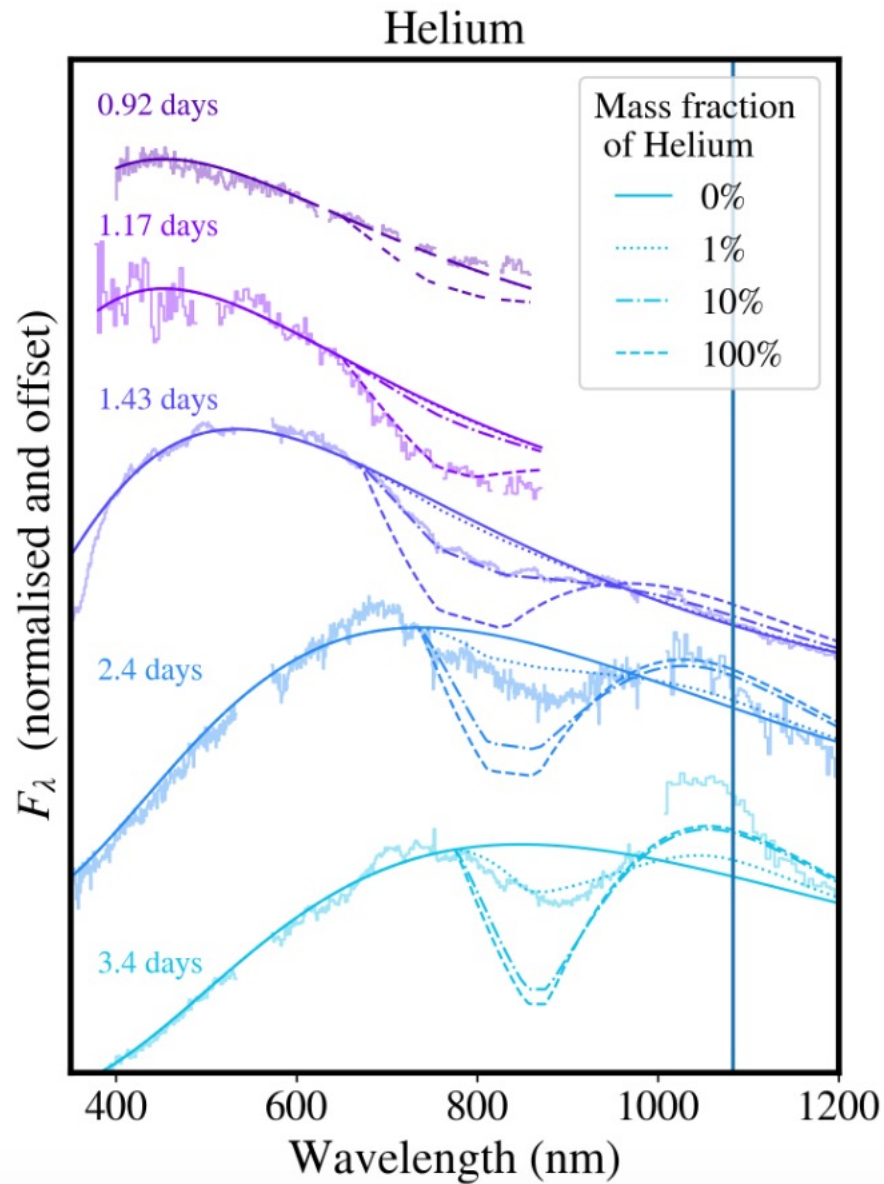
Sneppen et al. (2024) in preparation

Helium vs strontium

UV detections (Swift,
HST) imply low
population of He in the
triplet state at early
times



Sneppen et al. (2024) in preparation



Too large
helium
masses
required to
explain the
data

$$10^{-2} M_\odot$$

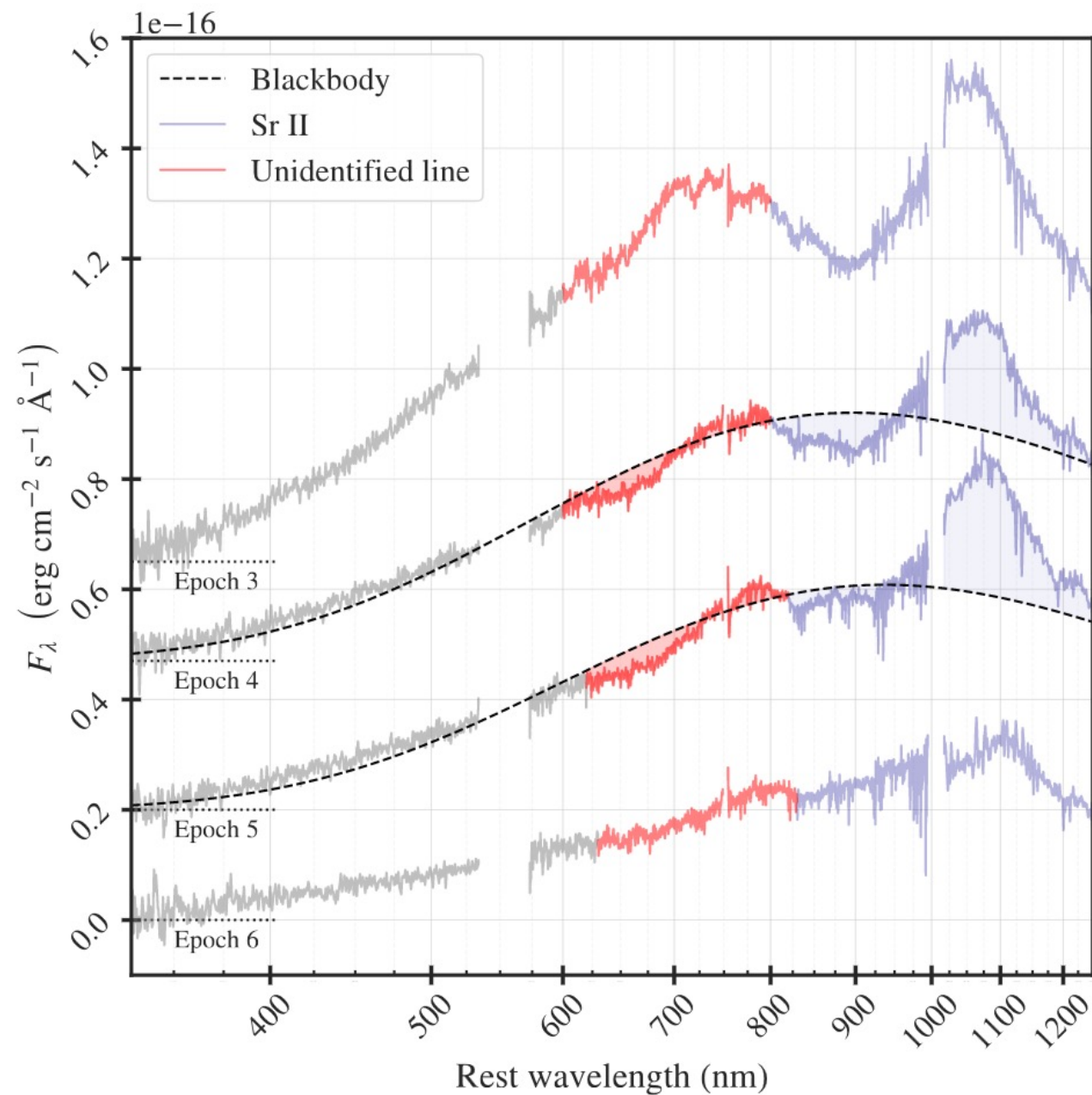
Sneppen et al. (2024) in preparation

See also Perego et al. (2022)

Beyond Strontium

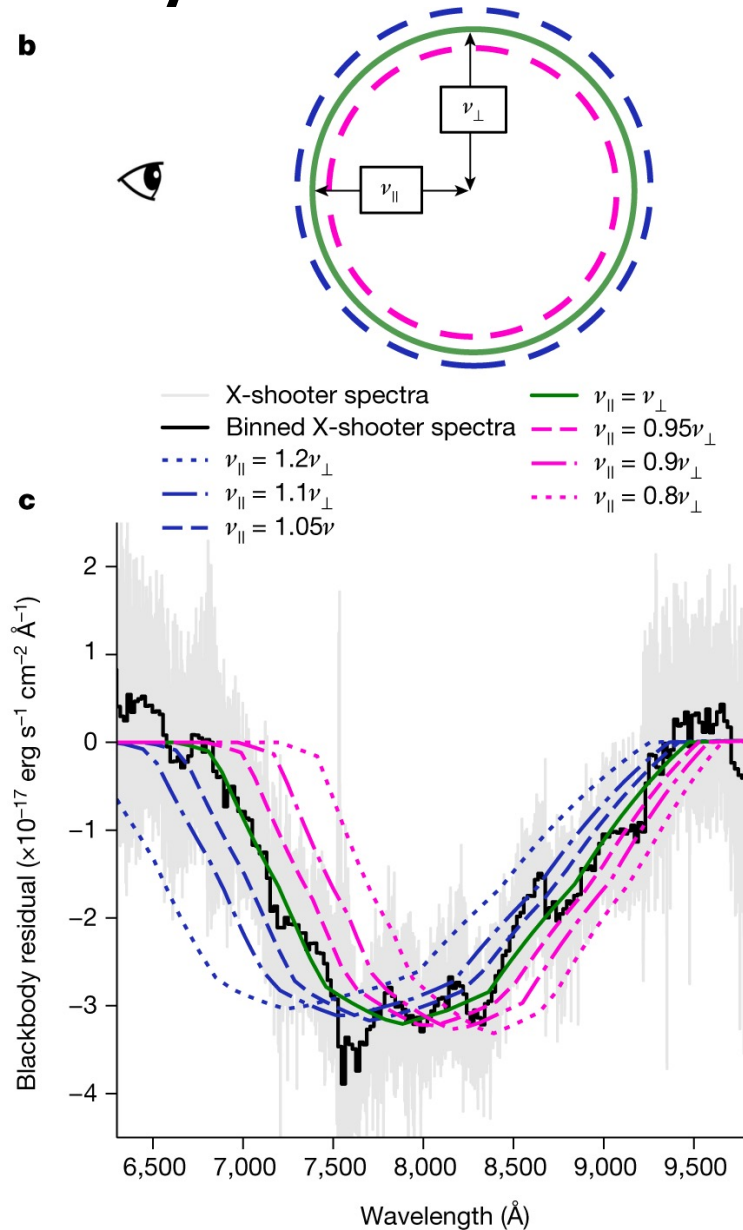
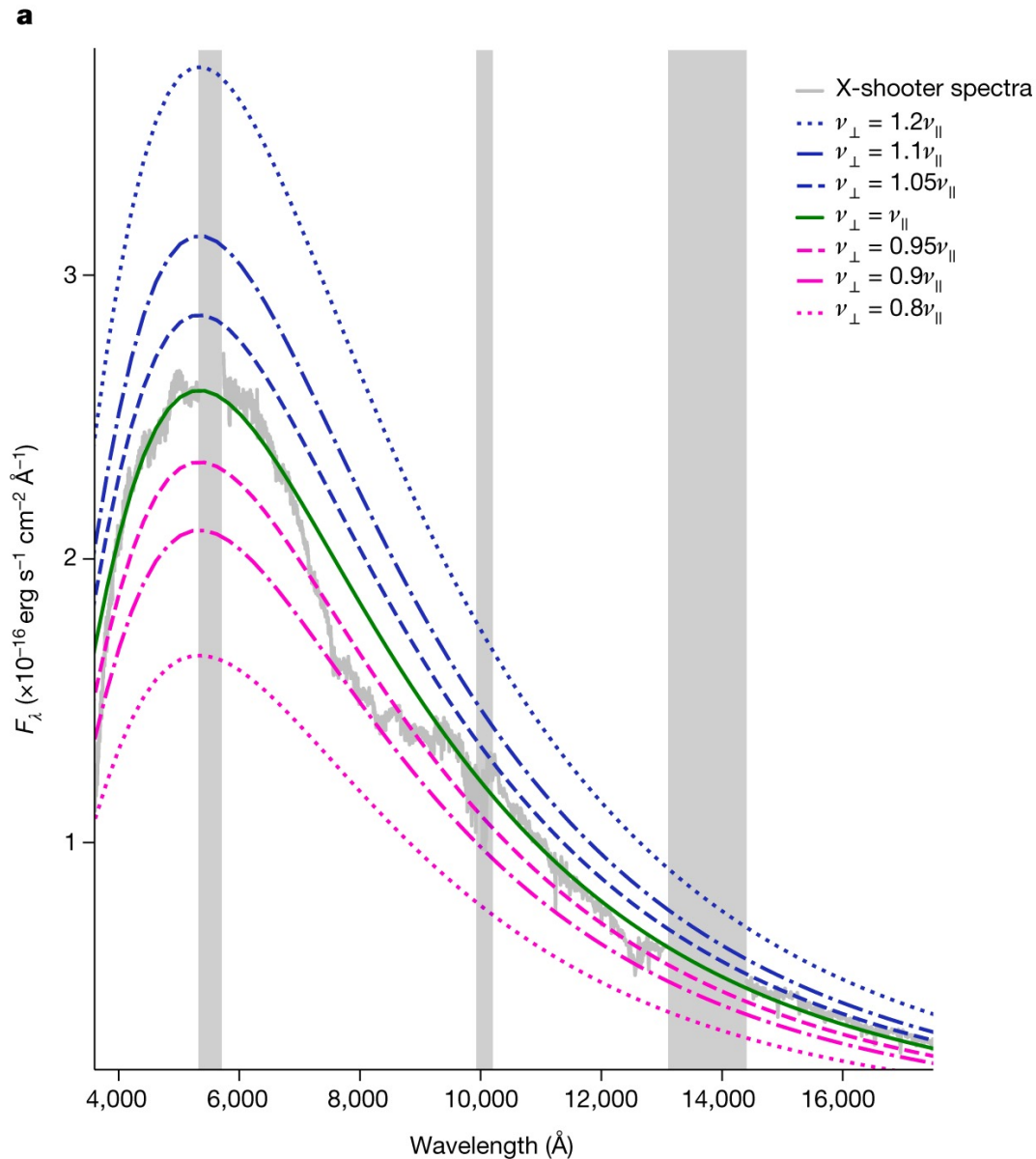
Yttrium P-Cyg profile
also identified in AT
2017gfo spectra.

$$\sim 10^{-4} M_{\odot}$$



Sneppen et al. 2023

Geometry



Sneppen
et al.
2023

Tellurium in GRB 230307A

First identified in
late spectra of
AT 2017gfo
(Hotokezaka et al. 2023)

Levan et al. 2024;
Gillanders et al. 2023

