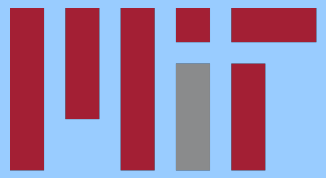
X-ray news from RW Auriga

Optical dimming with iron rich plasma and an exceptional column density

Hans Moritz Günther

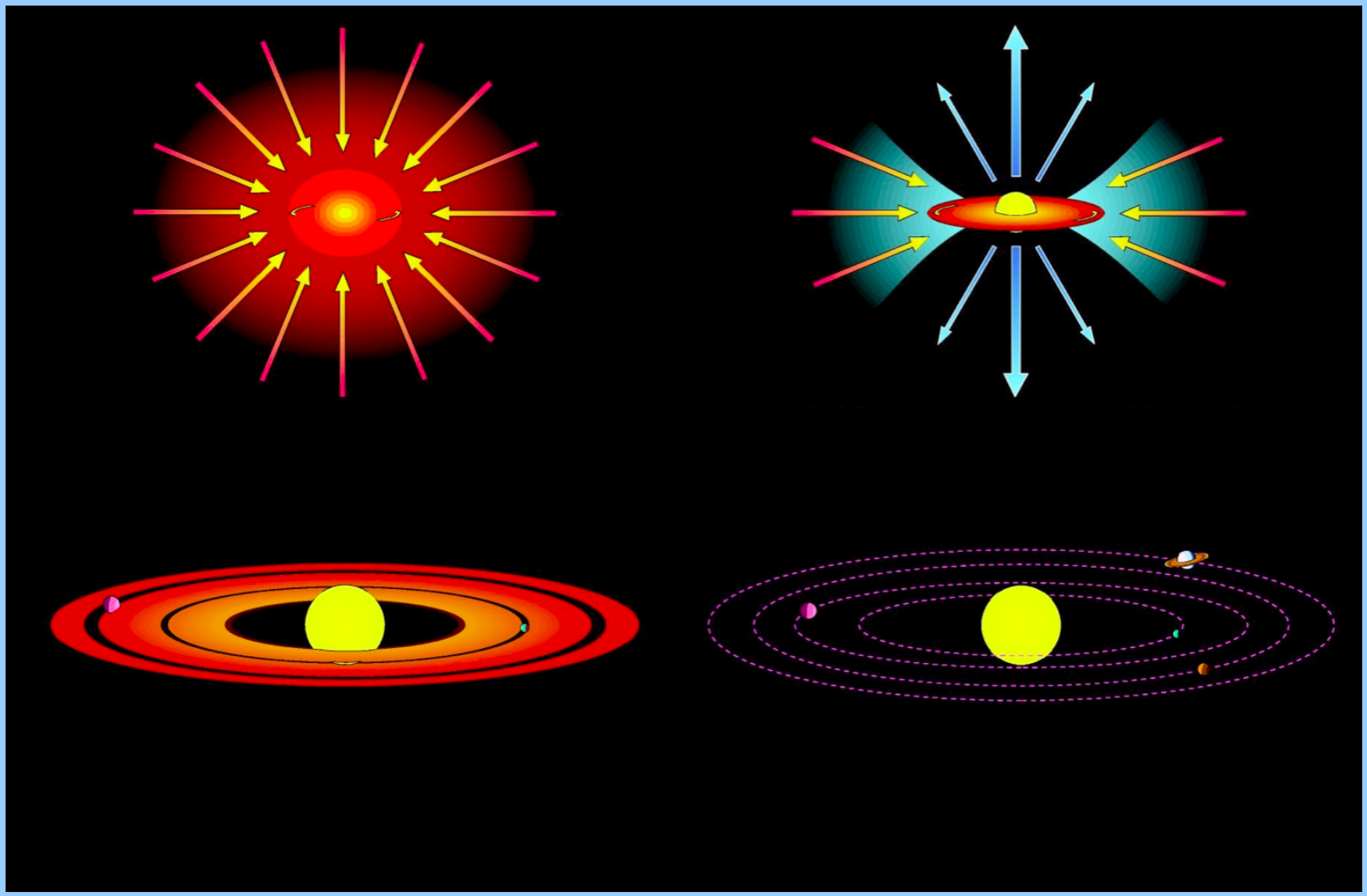


Massachusetts Institute of Technology

Outline

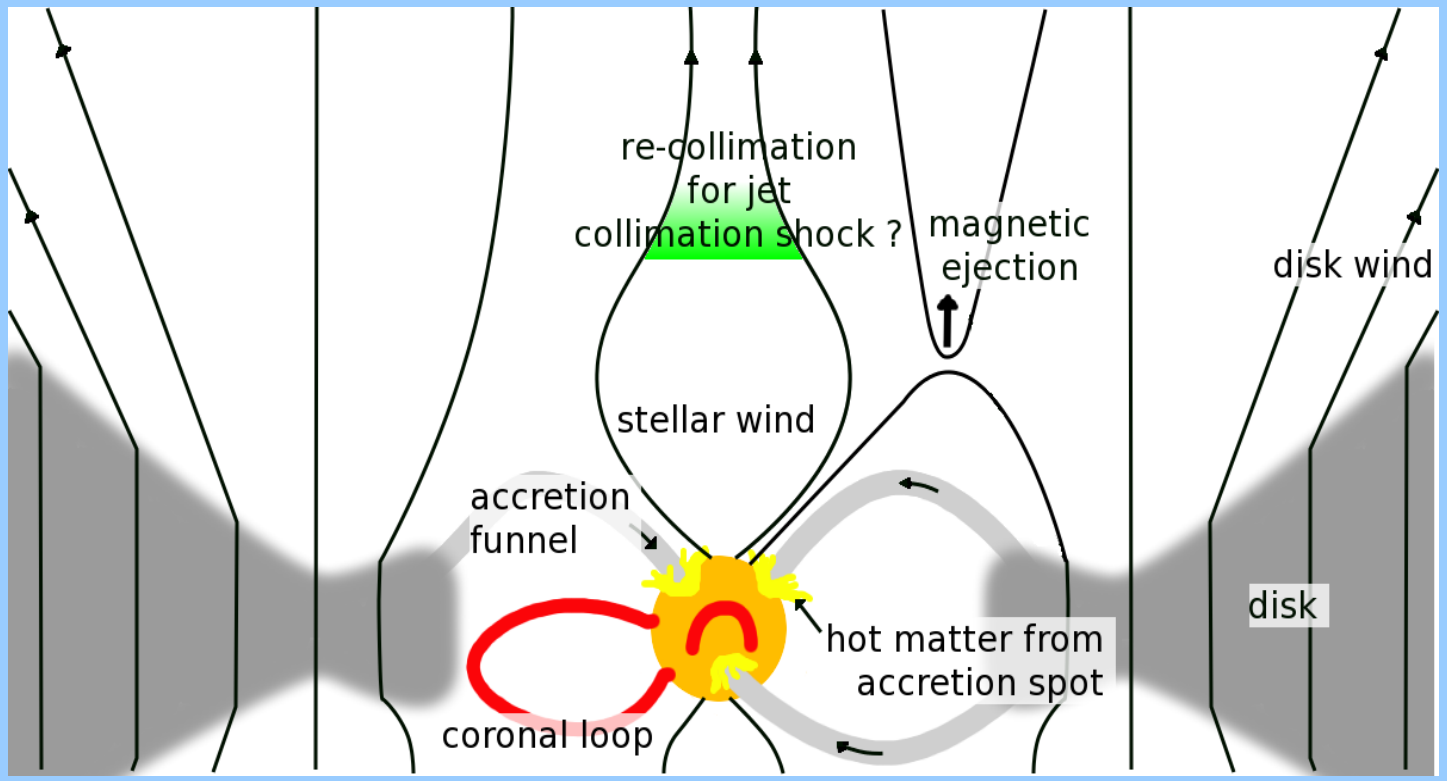
- Accretion on young stars
- Our target RW Aur
- What are we accreting? - Insights from X-ray spectra.

How does a star evolve?



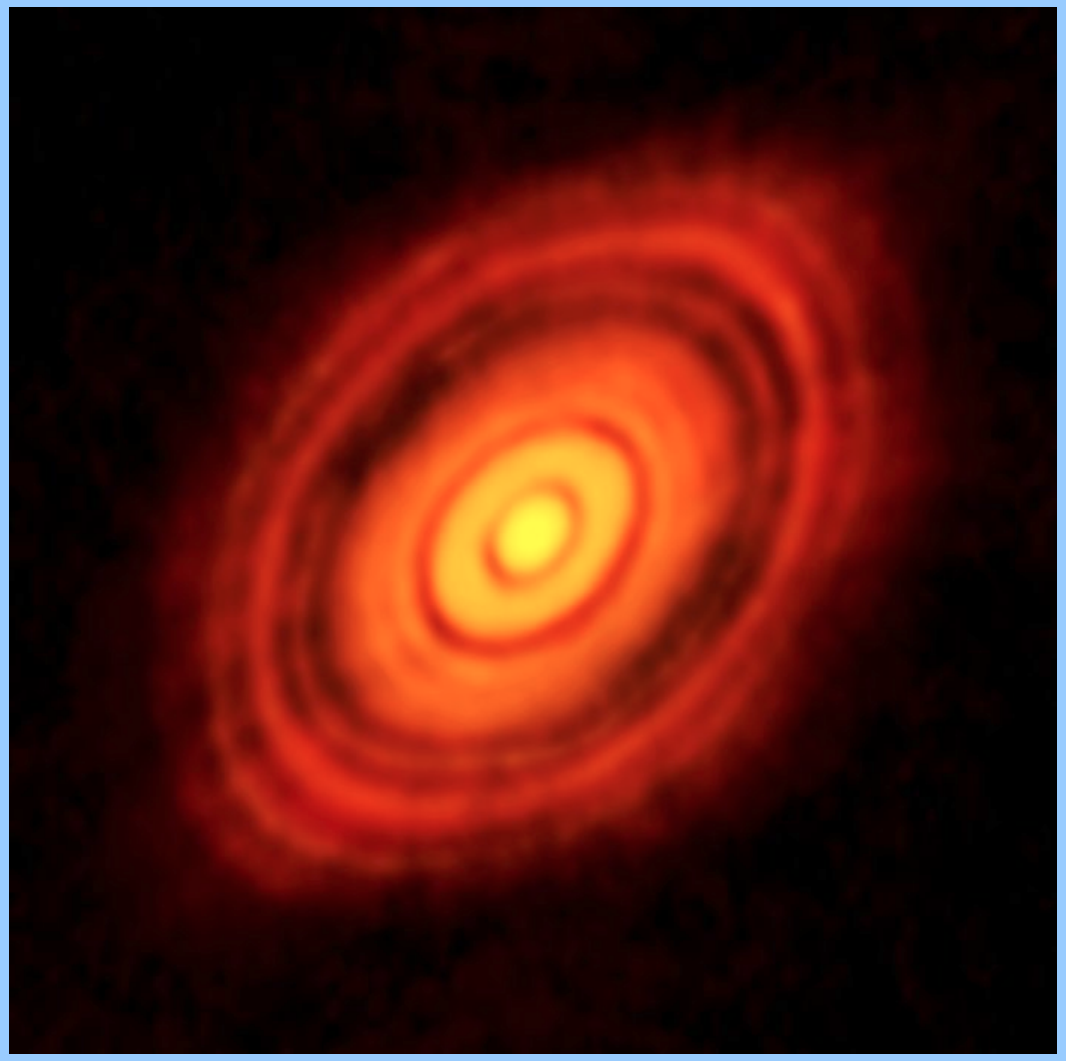
Artist: McCaughrean

Many components with different intrinsic time scales



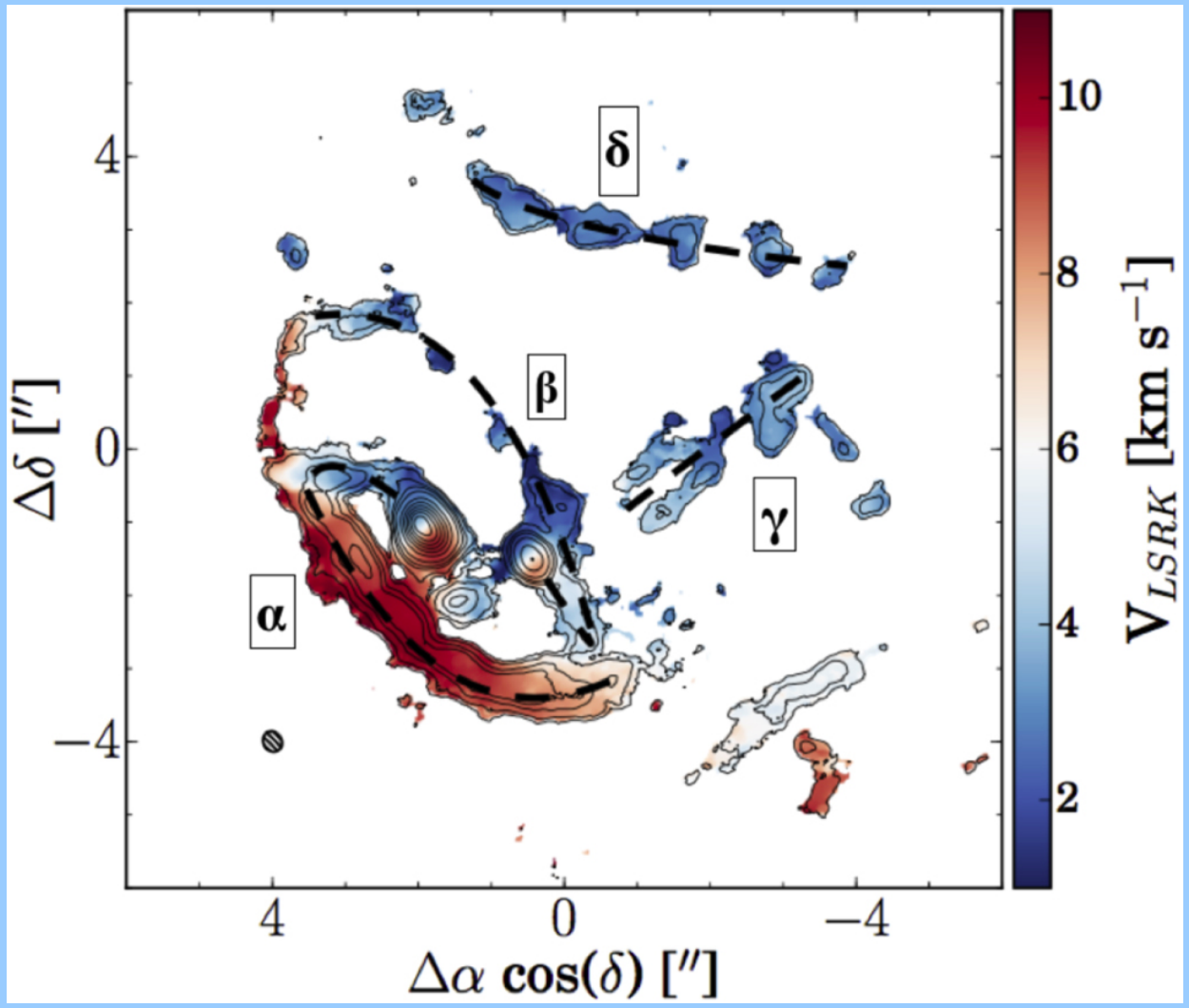
Günther (2013)

Disk structure in T Tauri stars: Planet formation and migration



The best image of a disk we have: HL Tau (ALMA Partnership et al., 2015)

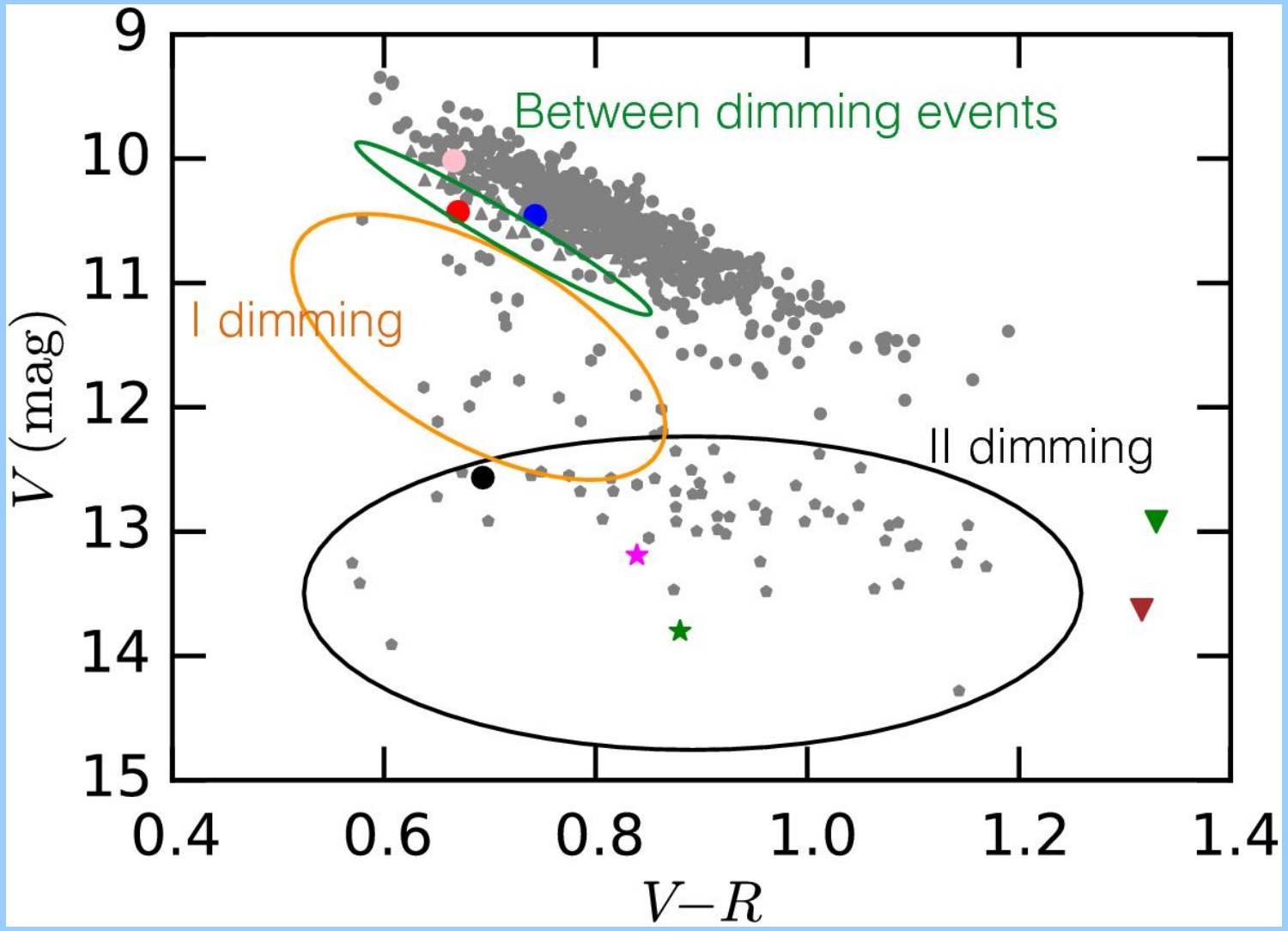
RW Aur and its surroundings



ALMA CO 2-1 first moment map

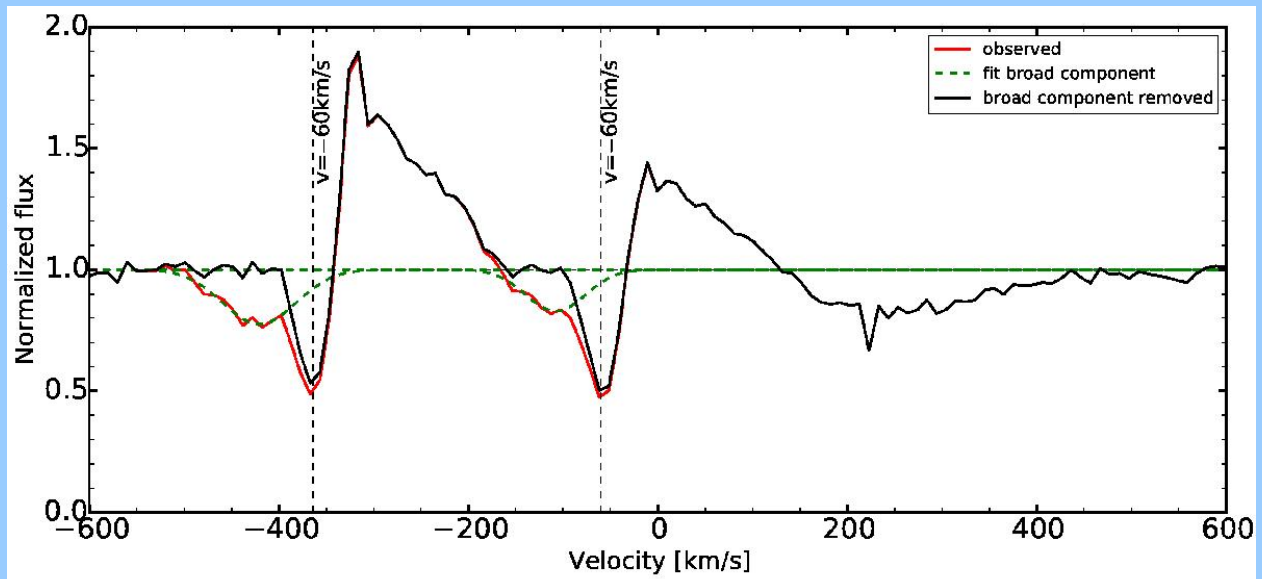
Rodriguez et al. (2018), ApJ 859, 150

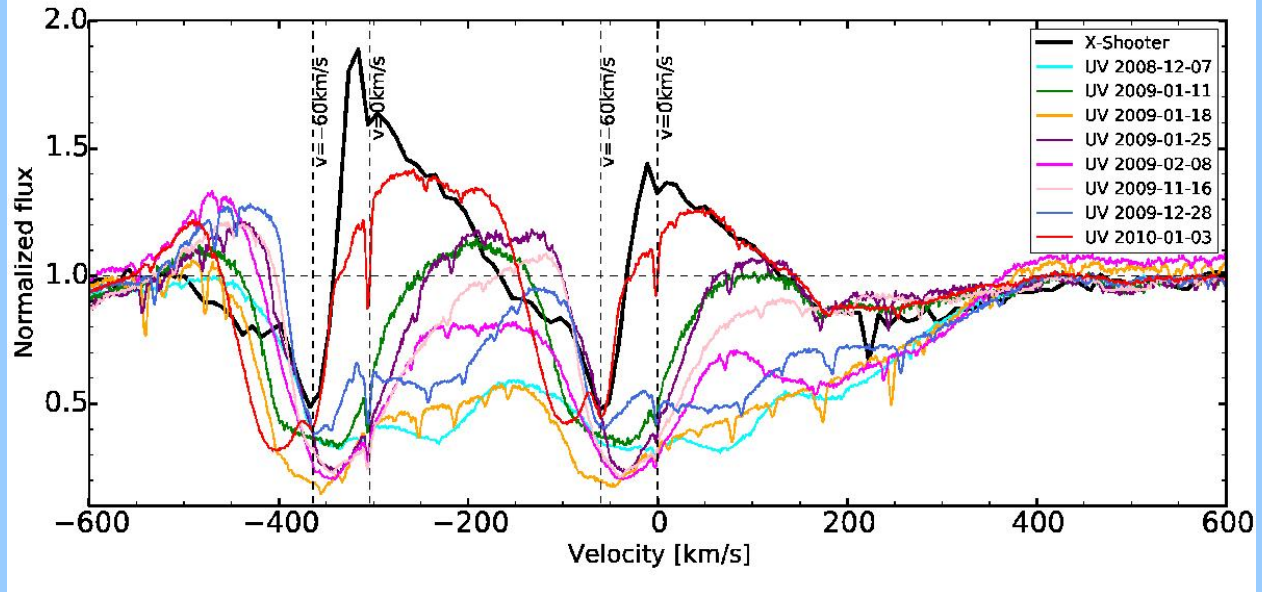
Optical dimming is gray



Facchini et al. (2016)

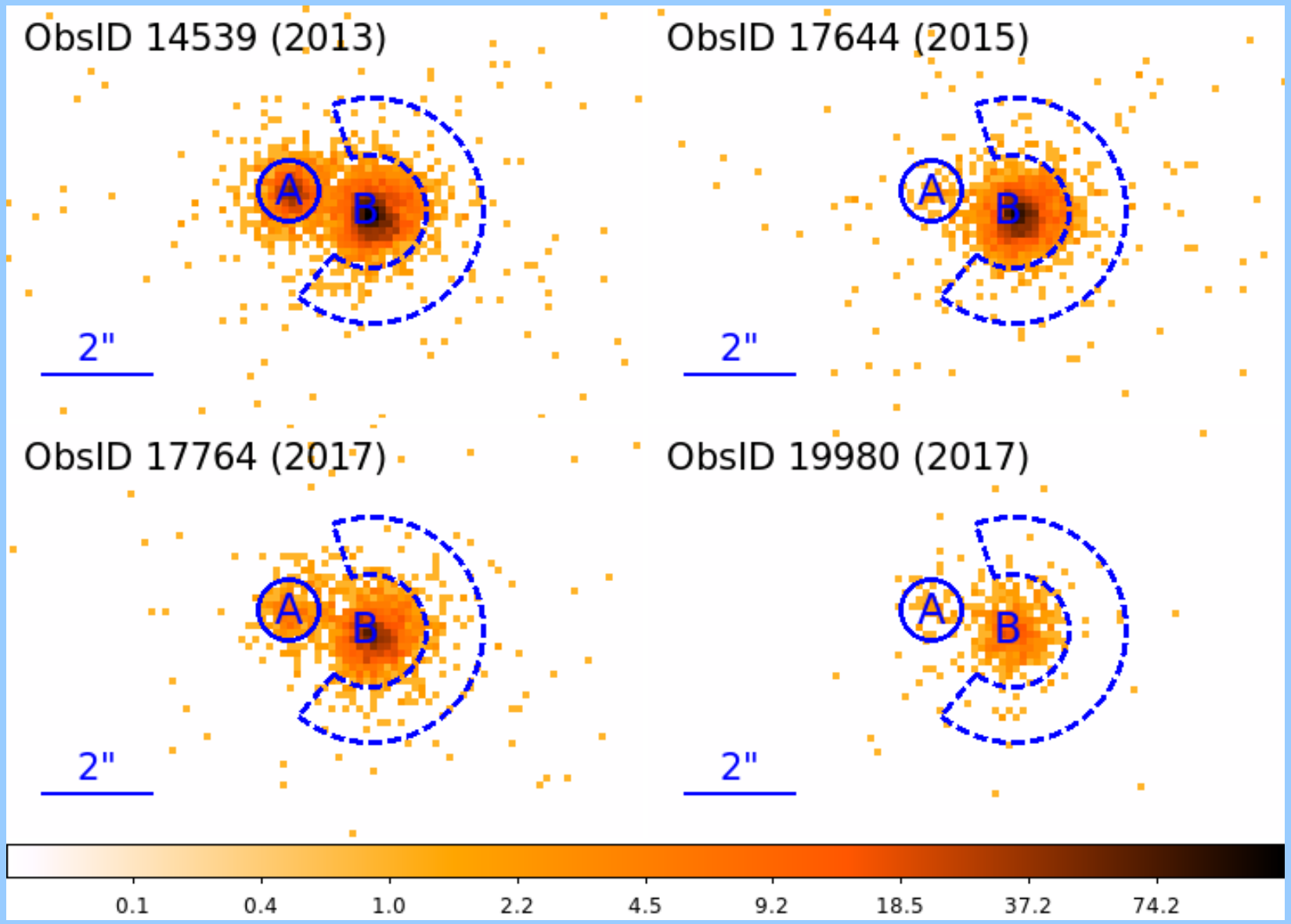
Wind and accretion in optical lines



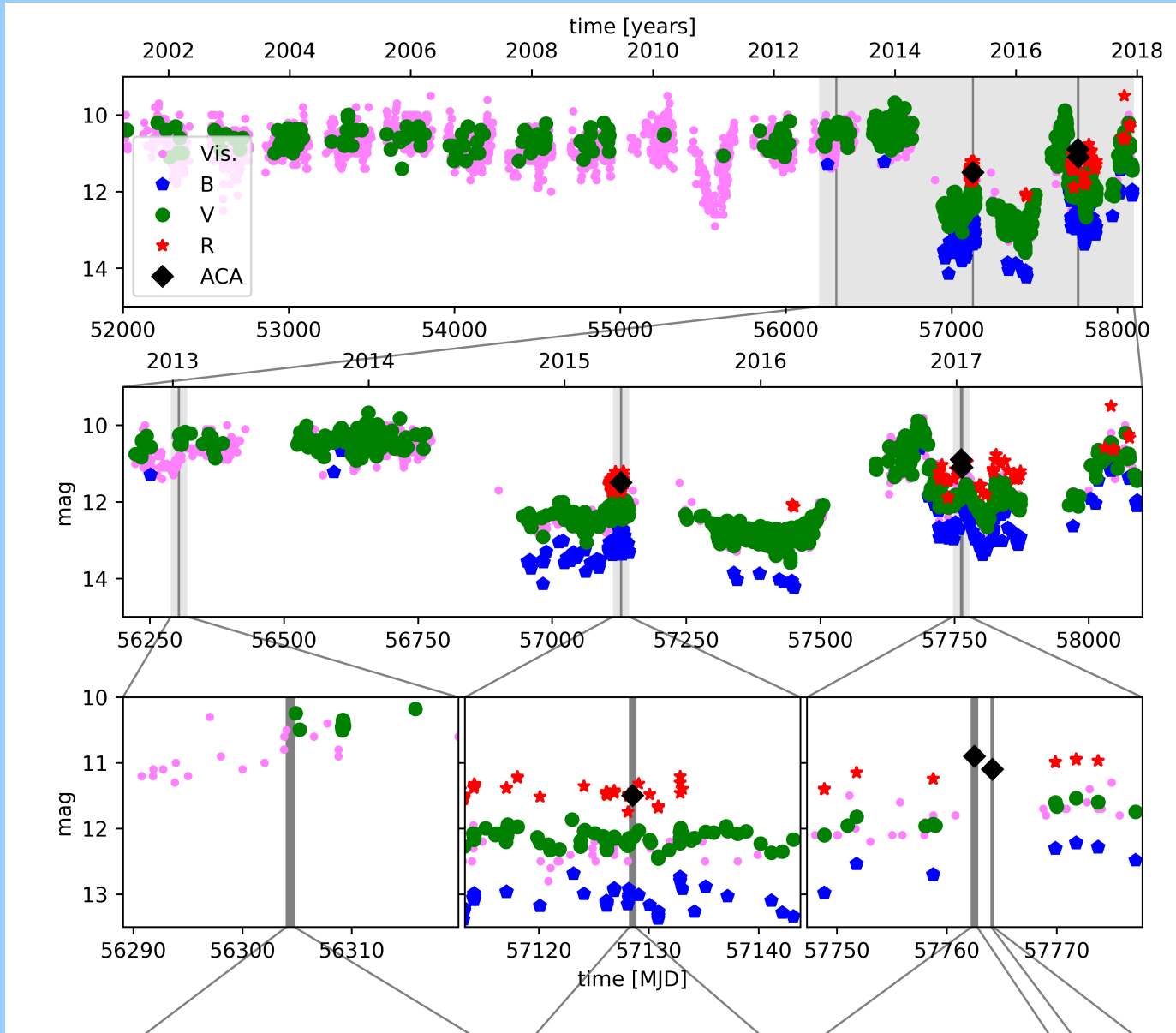


Facchini et al. (2016)

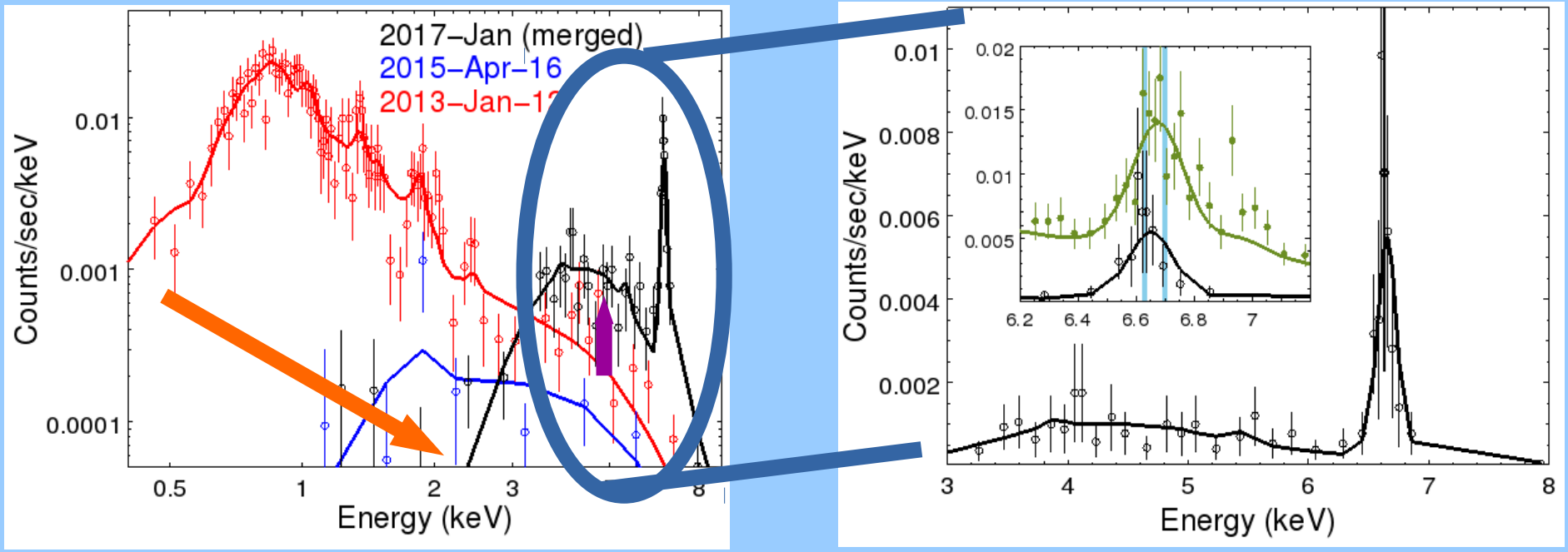
Chandra observations and lightcurve



Chandra observations and lightcurve



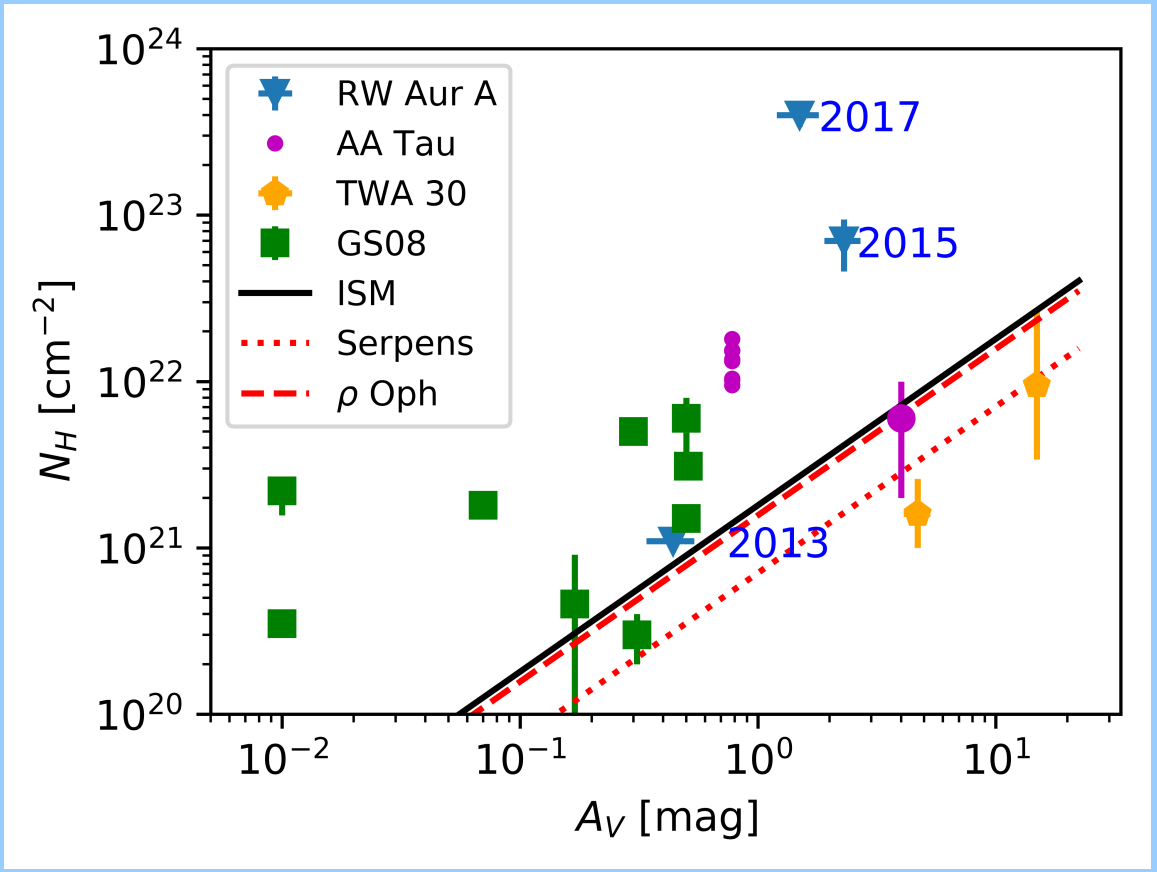
Chandra spectra: Vastly different every time we look



In the spectrum we observe: between 2013 and 2017

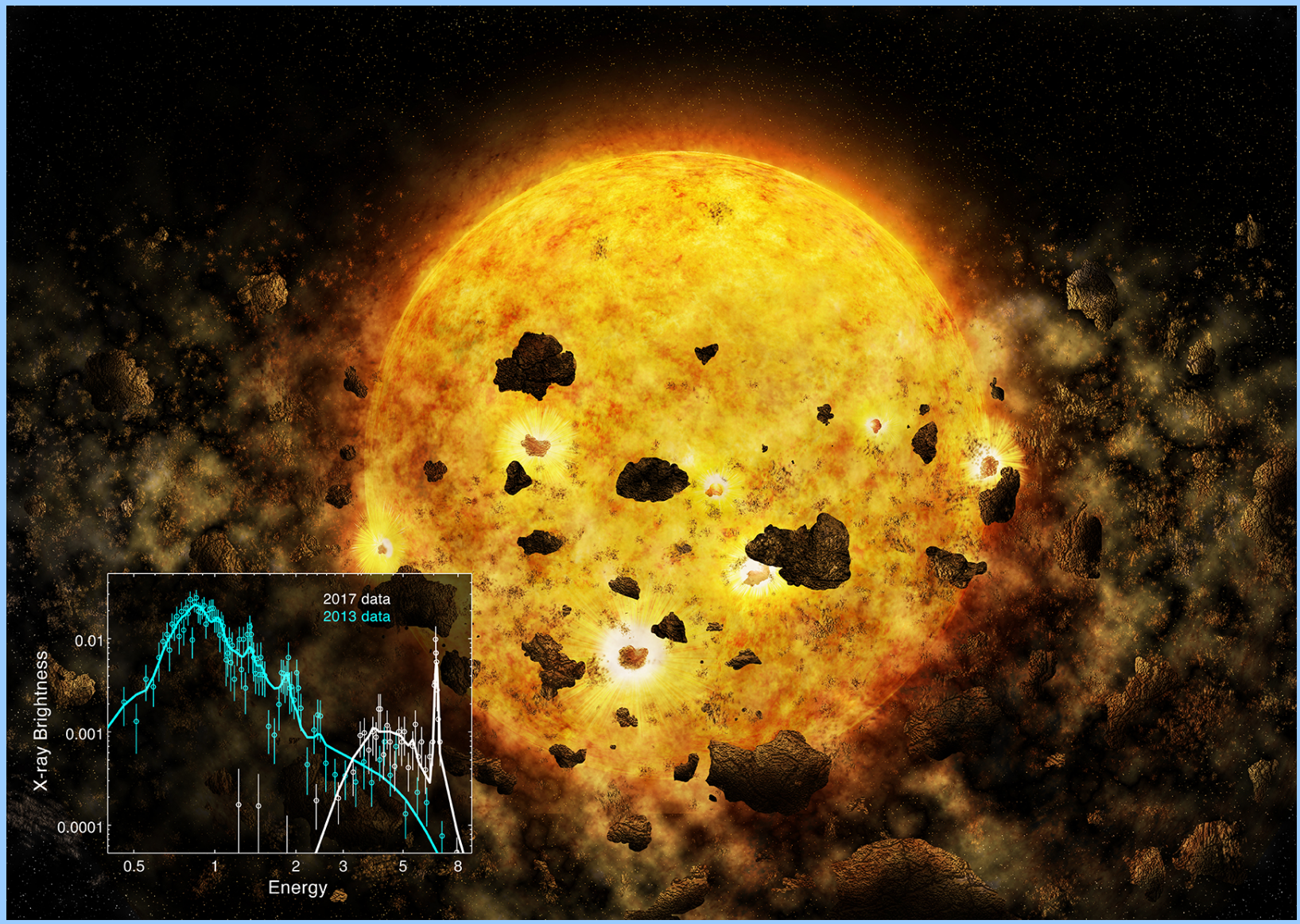
- emission at high energies multiplies
- absorbing column density N_H increases from $1*10^{21}$ to $4*10^{23}$ cm^{-2}
- Fe abundance in corona increases from 0.5 to 15 times solar

Absorber



- Optical extinction is gray → thick absorber or large grains
- N_H/A_V skyrockets: gas rich absorber? (or at least non-ISM grains)

Origin of the Fe rich dust grains



Summary

- N_H goes up by 400
- Fe abundance goes up by 30
- Need to accrete Fe rich material
- Limited knowledge of precursor of the Fe rich material