Determination of the X-ray Temperature Distribution of Young, Hot Stars

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X-ray Temperatures of Hot Stars

- Physics of shocks, magnetic fields manifest in temperature distribution, line spectrum.
- High Resolution Spectroscopy allows strong constraints on temperature distribution
- Definitive models not available

Differential Emission Measure

$$\mathrm{DEM} \equiv \frac{d \int n_e^2 dV}{d \log T}$$

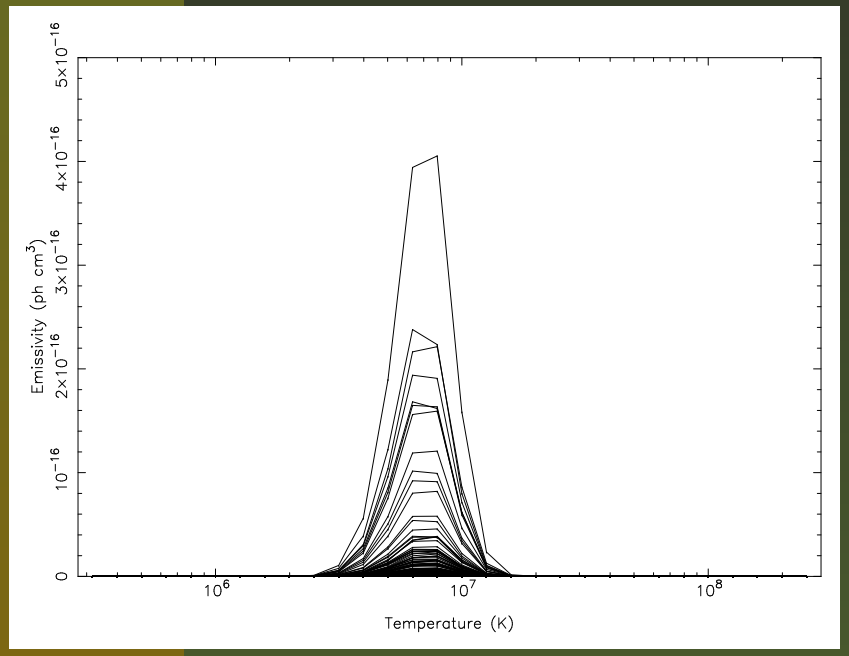
and a line luminosity is

$$L = \int P(T) \mathrm{DEM}(T) d \log T$$

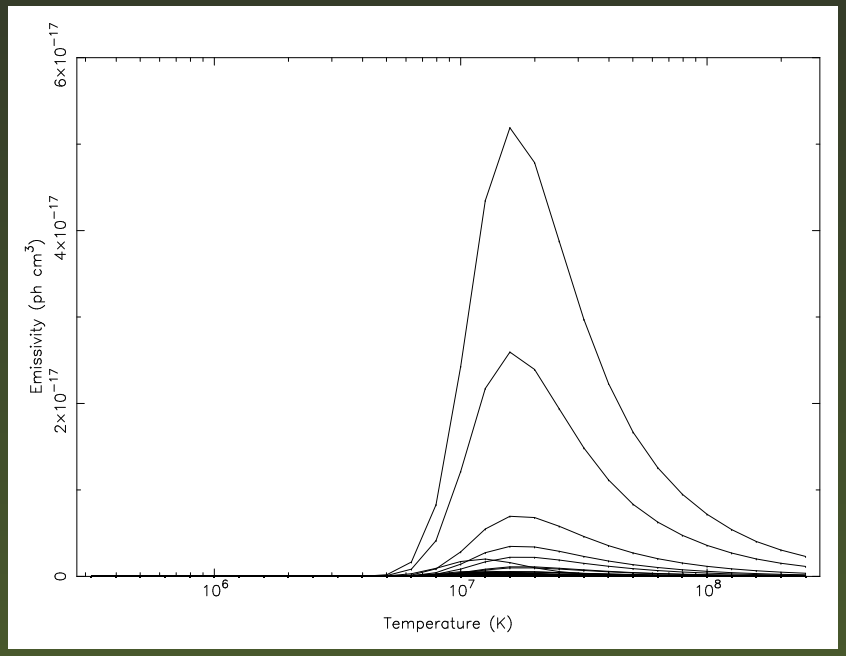
Problems: resolution, line blends, tedium

Single Ion Similarity

Fe XVIII



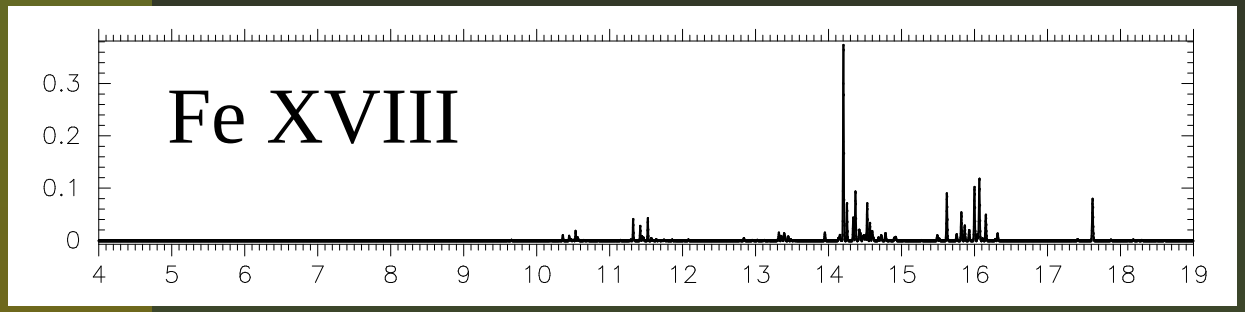
Si XIV



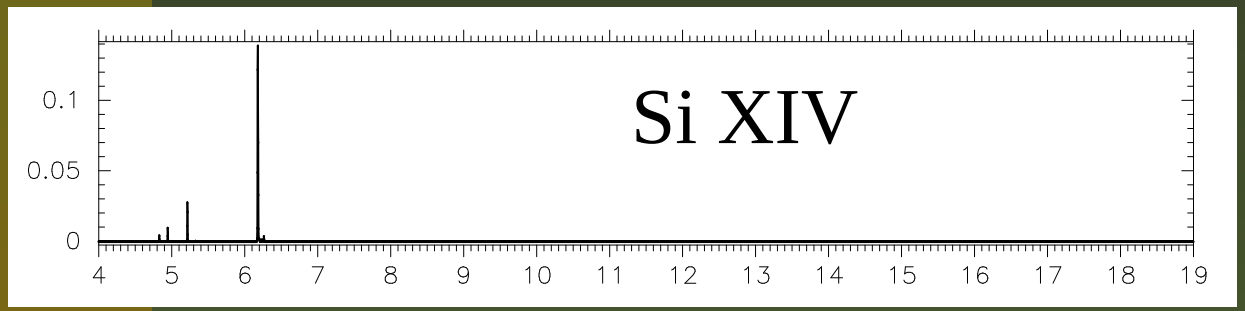
Data from APED

Ion Fitting

Fit spectrum with:

+ 

+...

+ 

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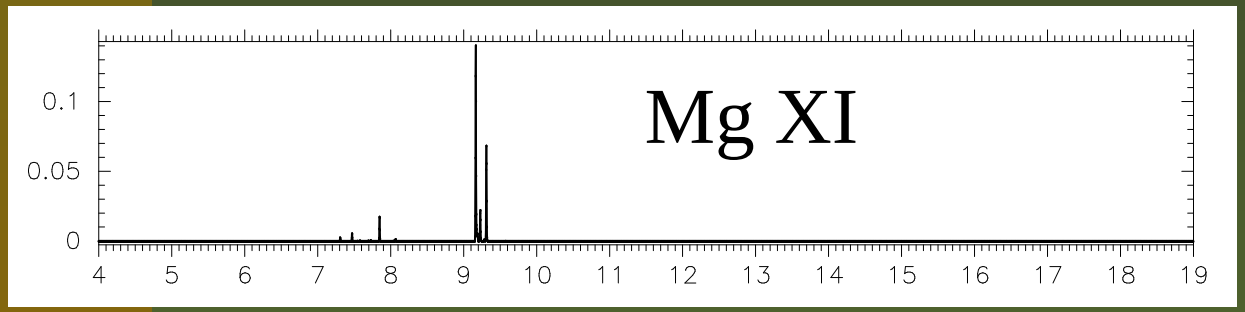
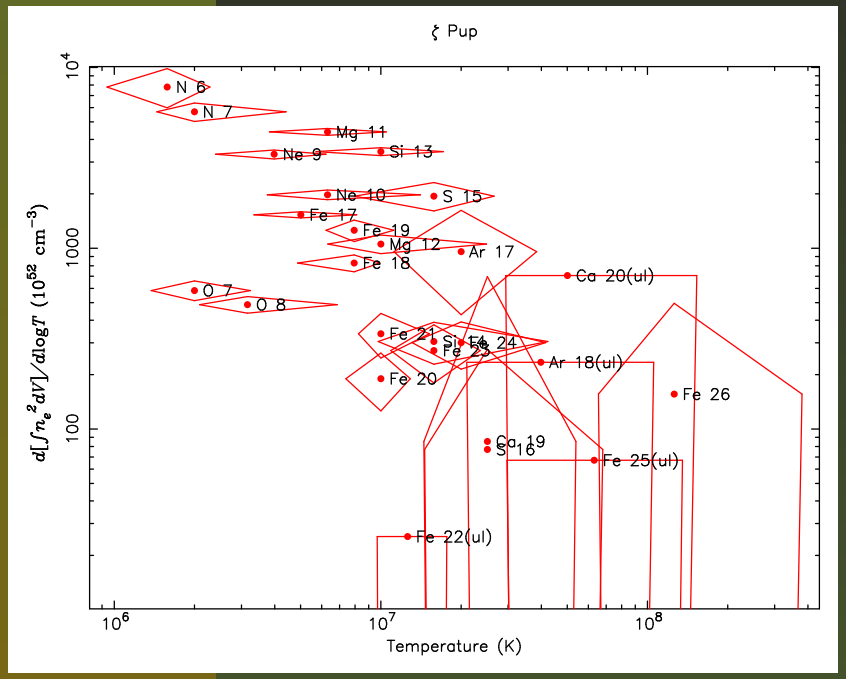
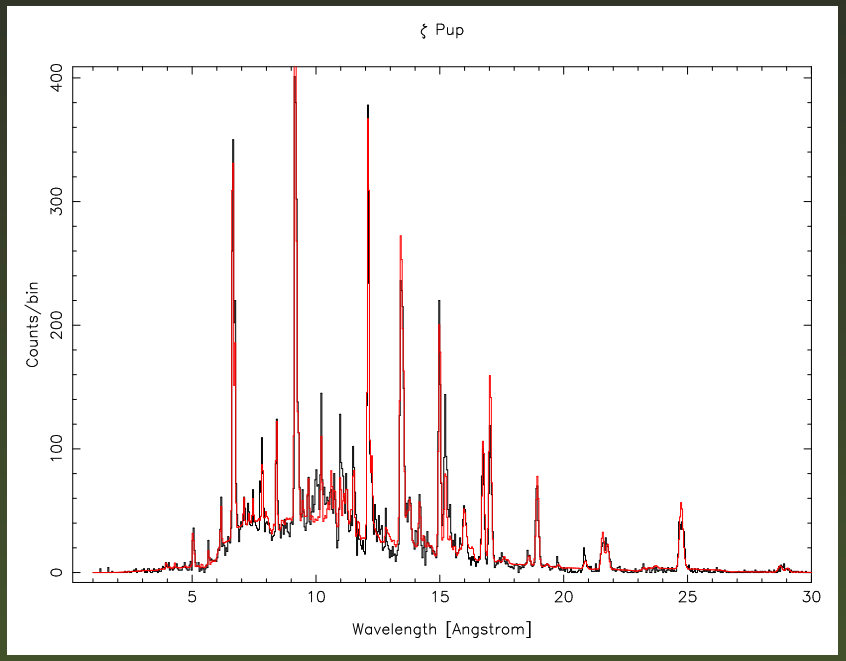
+ 

+...

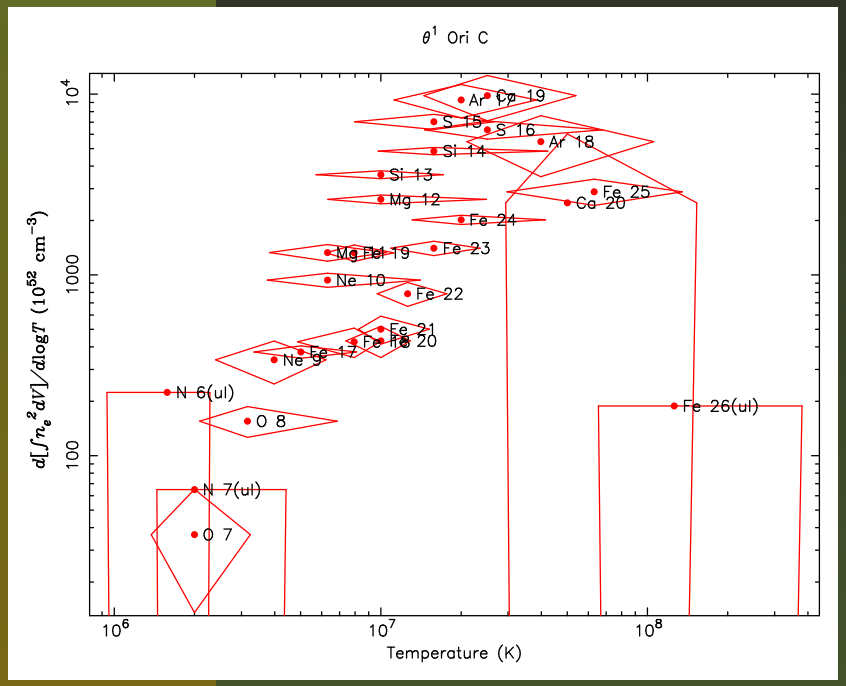
+ bremss continua

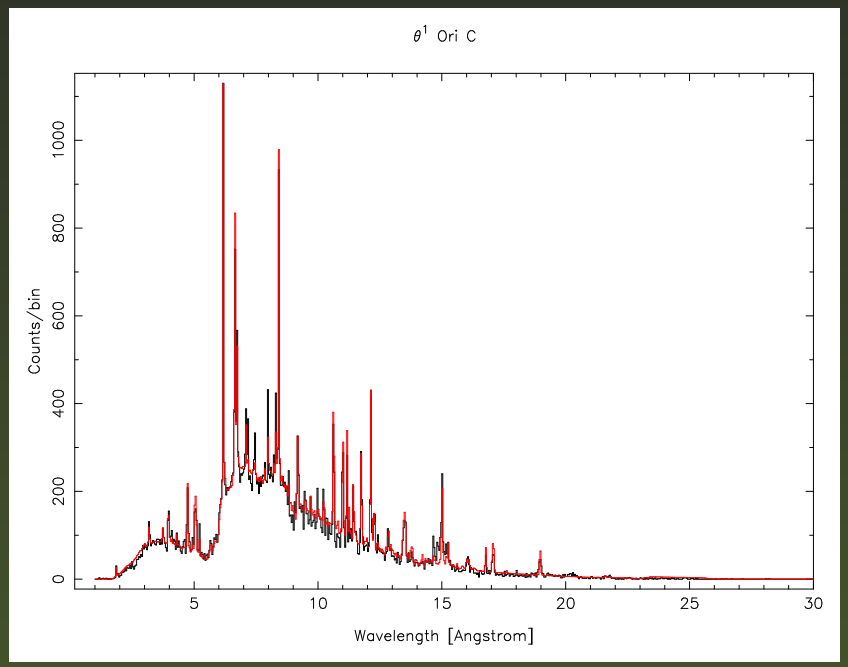
ζ Pup


ζ Pup
N 6
N 7
Mg 11
Ne 9
Si 13
Ne 10
S 15
Fe 17
Fe 19
Mg 12
Ar 17
Fe 18
Ca 20(ul)
O 7
O 8
Fe 21
Si 14
Fe 23
Fe 24
Ar 18(ul)
Fe 20
Fe 26
Ca 19
S 16
Fe 25(ul)
Fe 22(ul)
Temperature (K)

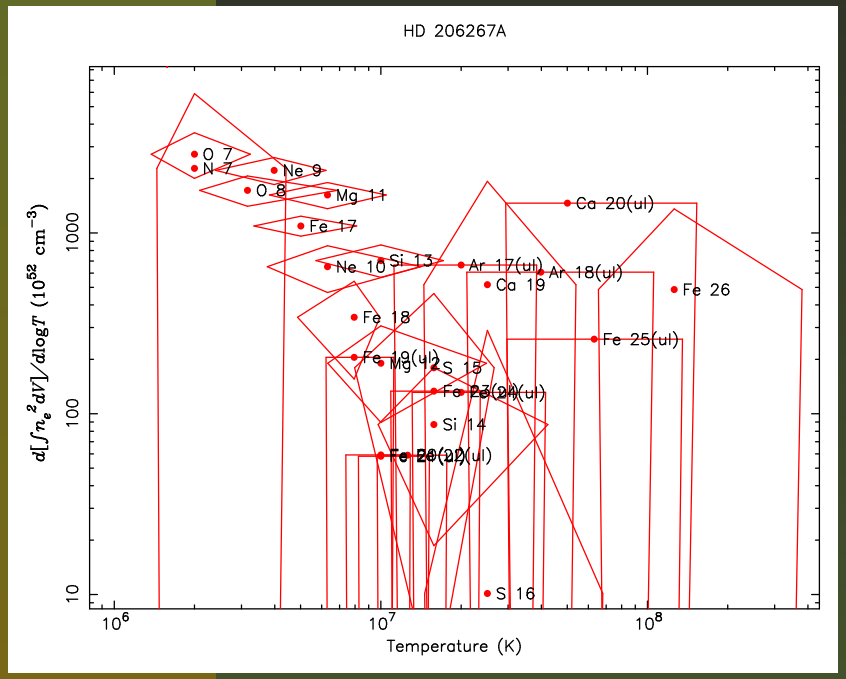

ζ Pup
Counts/bin
Wavelength [Angstrom]

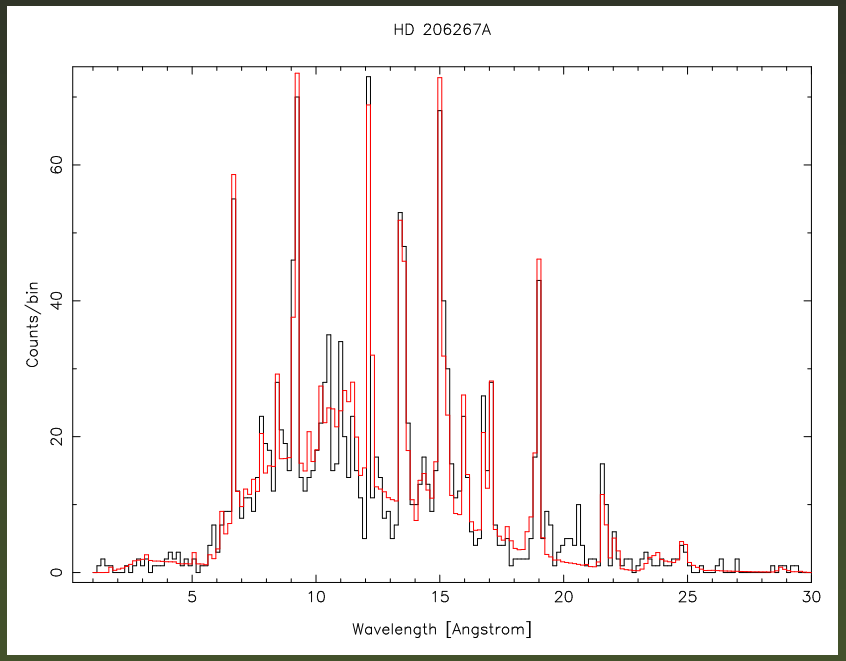
$\theta^1 C$ Ori


θ1 Ori C
Ar 17
Ca 19
S 15
S 16
Ar 18
Si 14
Si 13
Fe 25
Ca 20
Mg 12
Fe 24
Fe 23
Mg 11
Fe 19
Ne 10
Fe 22
Fe 21
Fe 18
Fe 20
Fe 17
Ne 9
N 6(ul)
O 8
Fe 26(ul)
N 7(ul)
O 7
Temperature (K)

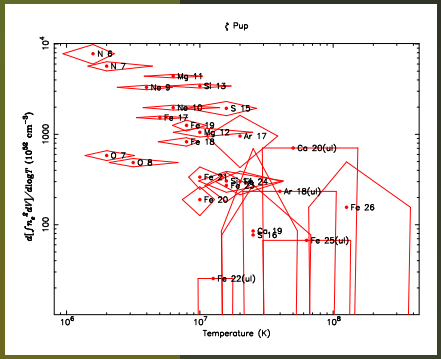

θ1 Ori C
Counts/bin
Wavelength [Angstrom]

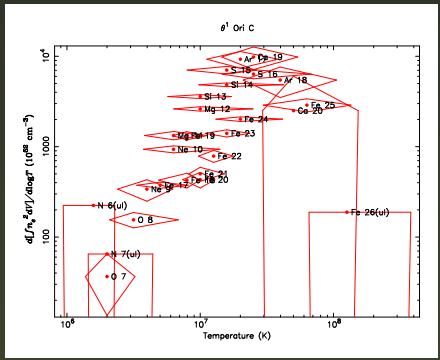
HD 206267A

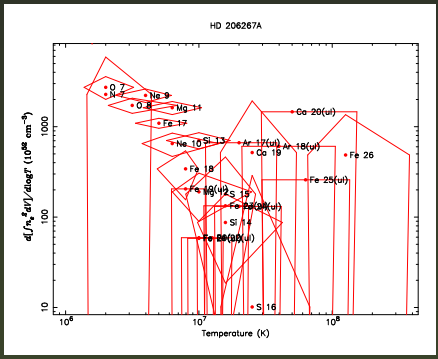

HD 206267A
O 7
N 7
Ne 9
O 8
Mg 11
Fe 17
Ne 10
Si 13
Ar 17(ul)
Ar 18(ul)
Ca 20(ul)
Ca 19
Fe 26
Fe 18
Fe 25(ul)
Fe 19(ul)
Mg 12
S 15
Si 14
S 16
Temperature (K)

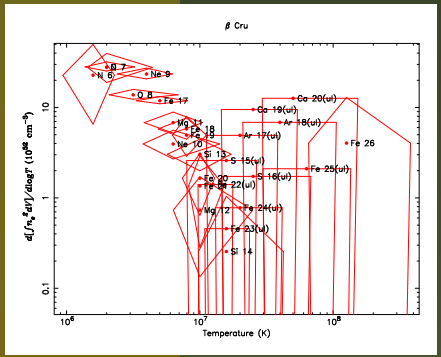

HD 206267A
Counts/bin
Wavelength [Angstrom]

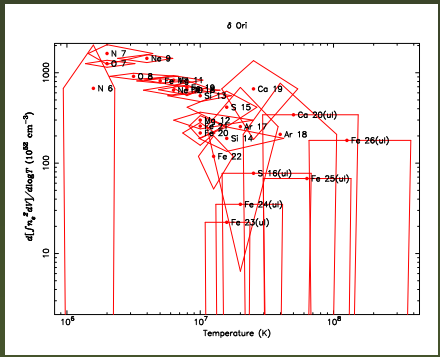
Gallery

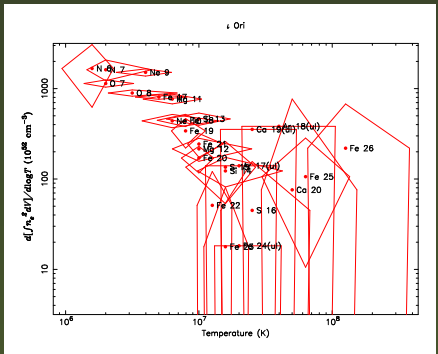

ζ Pup
Temperature (K)

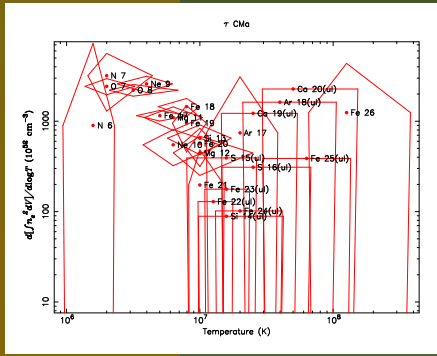

θ¹ Ori C
Temperature (K)

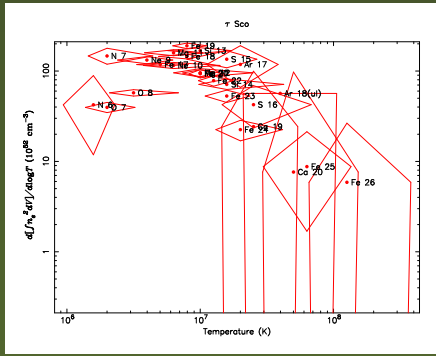

HD 206267A
Temperature (K)

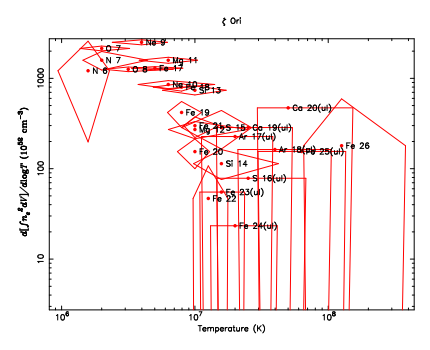

β Cru
Temperature (K)


δ Ori
Temperature (K)


ι Ori
Temperature (K)


τ CMa
Temperature (K)


τ Sco
Temperature (K)


ζ Ori
Temperature (K)

Drawbacks/Difficulties

- Computational Cost
- Continuum error (Ion Continua)

Conclusions/Con-X

- Very hot temperatures only for young Orion trapezium
- DEMs for large numbers of CIE plasmas