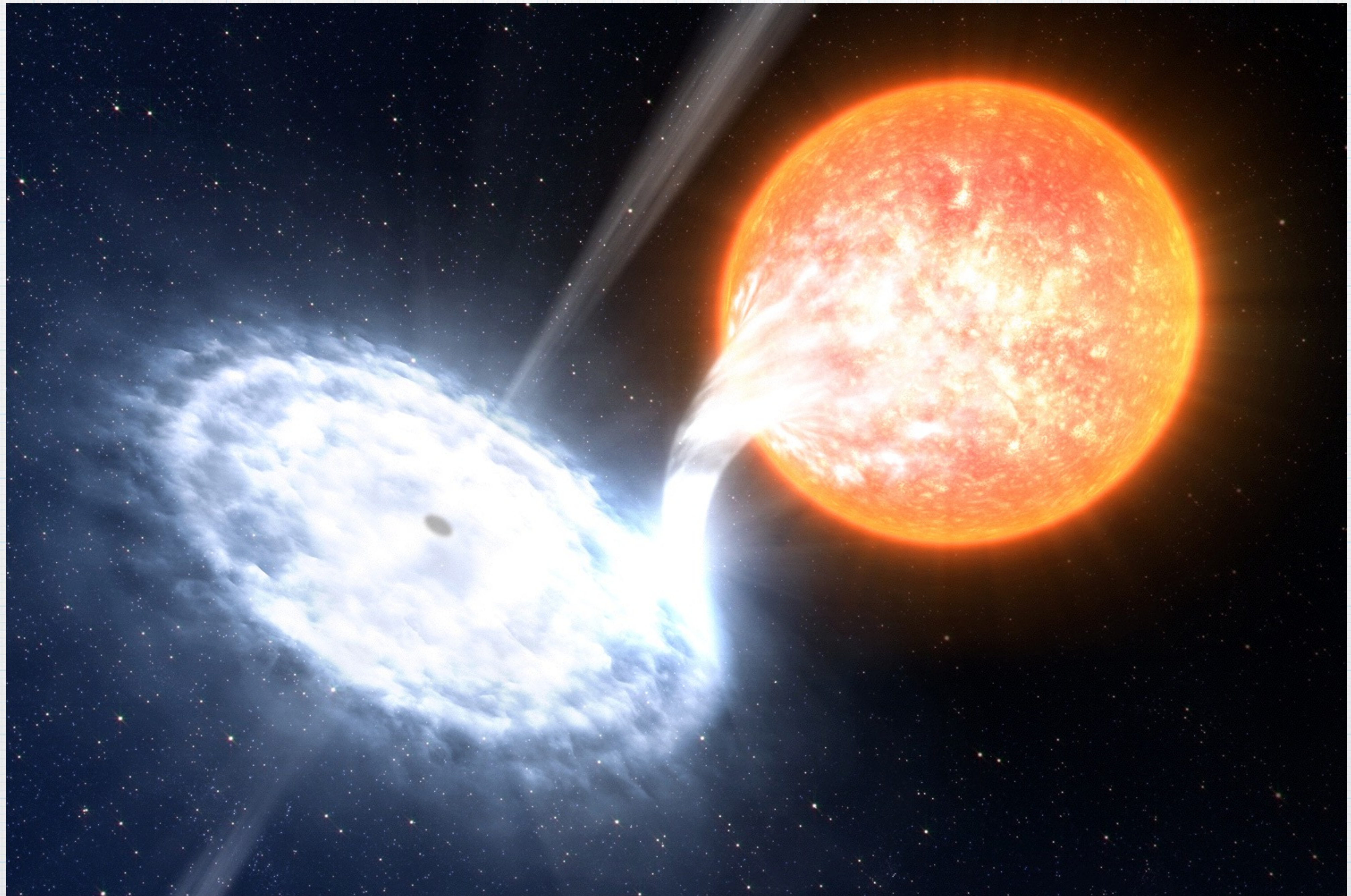


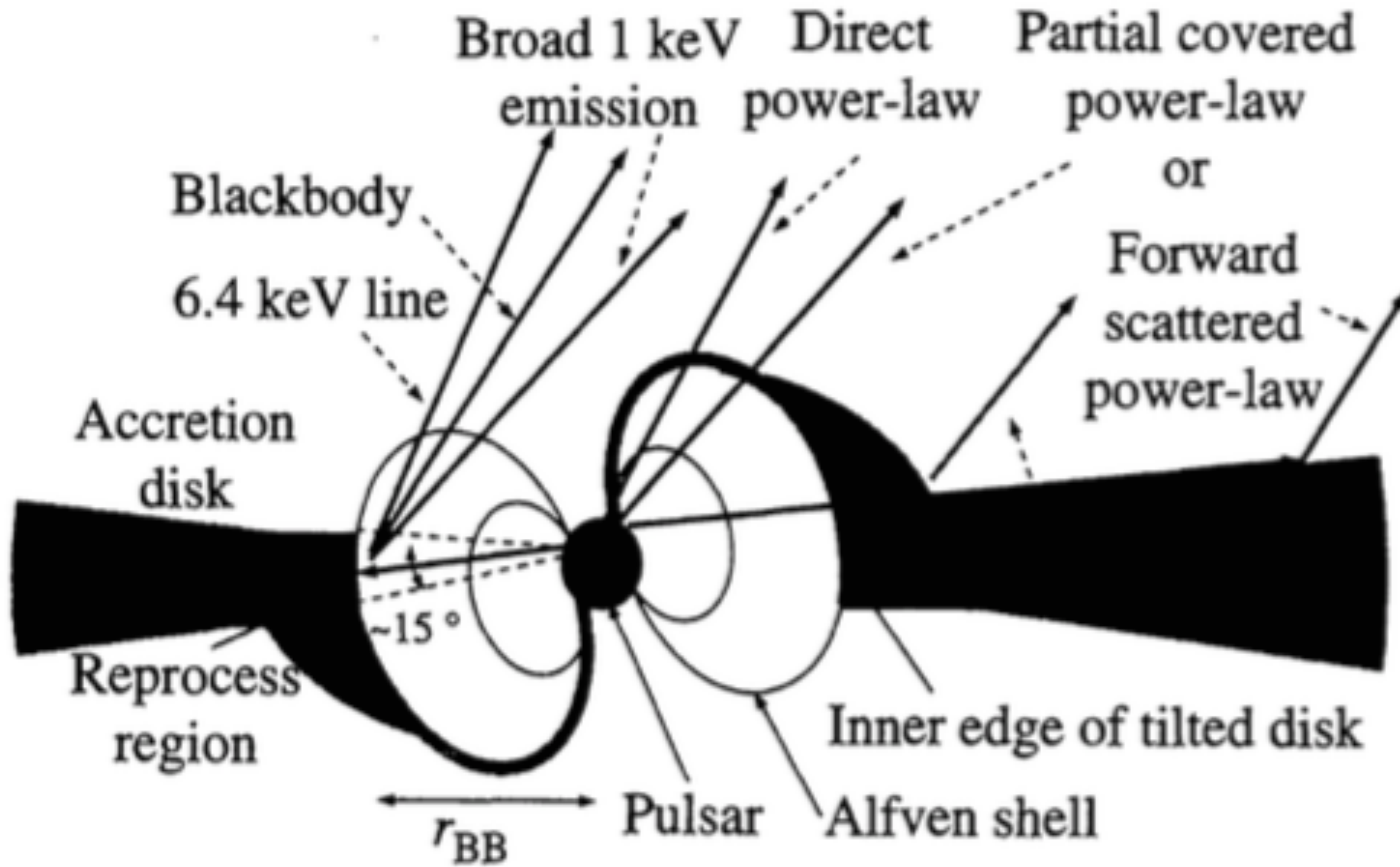
SpEctra of Blnary SysteMs using Cloudy

SEISMIC

CLOUDY @ IUCAA 2015

- 
1. Aru Beri
 2. Bari Maqbool
 3. Devraj Pawar
 4. Eeshankur Saikia
 5. Md Shah Alam
 6. Sharada Jogdand





Endo et al 2000

4U 1820-30

* Ultra Compact Binary located in Globular Cluster NGC 6624

* Orbital Period = 11.4 min

* Accretion Rate $\dot{M} \sim 5 \times 10^{-9} M_{\odot} \text{yr}^{-1}$

Cumming, 2003

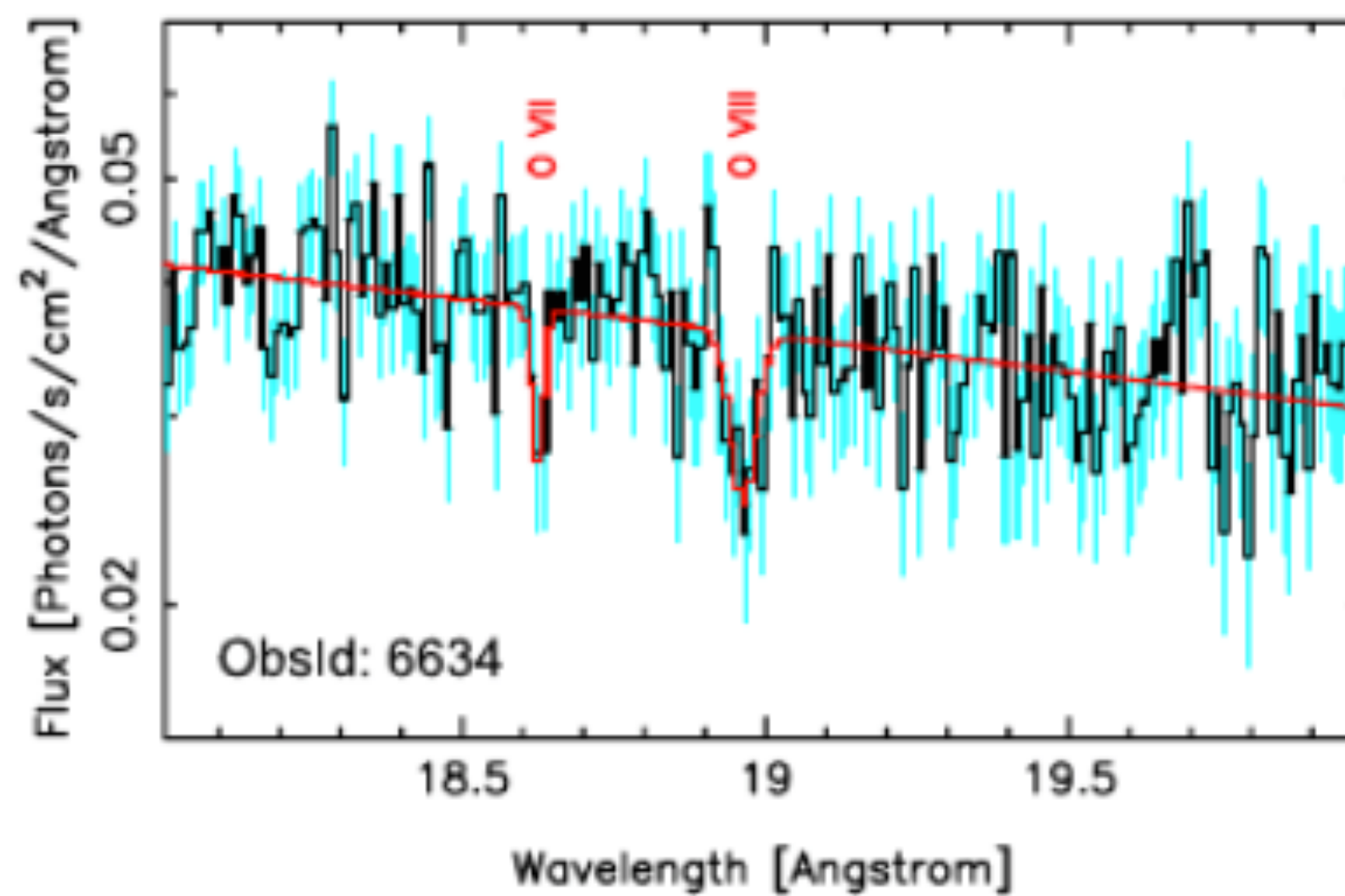
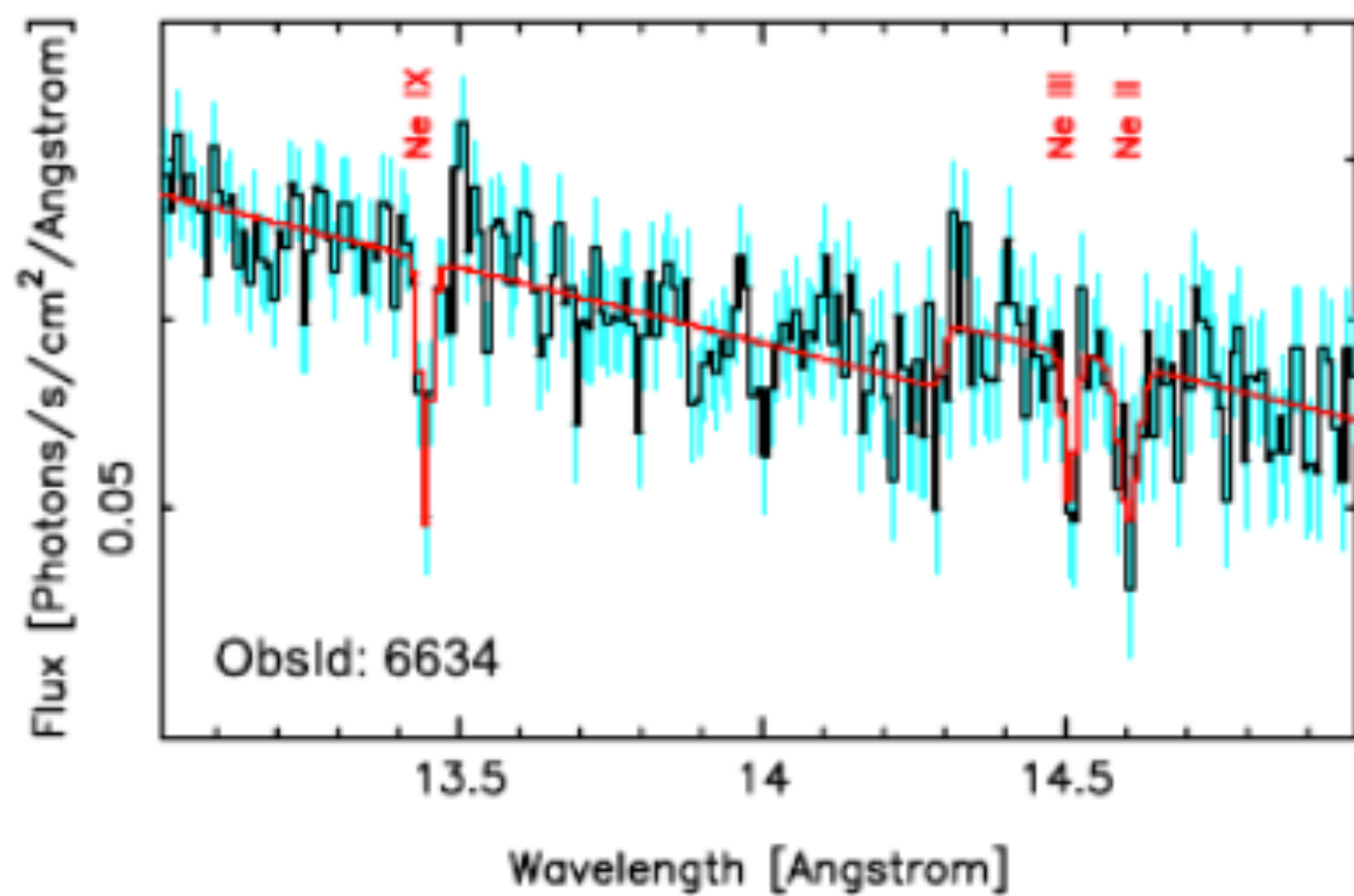
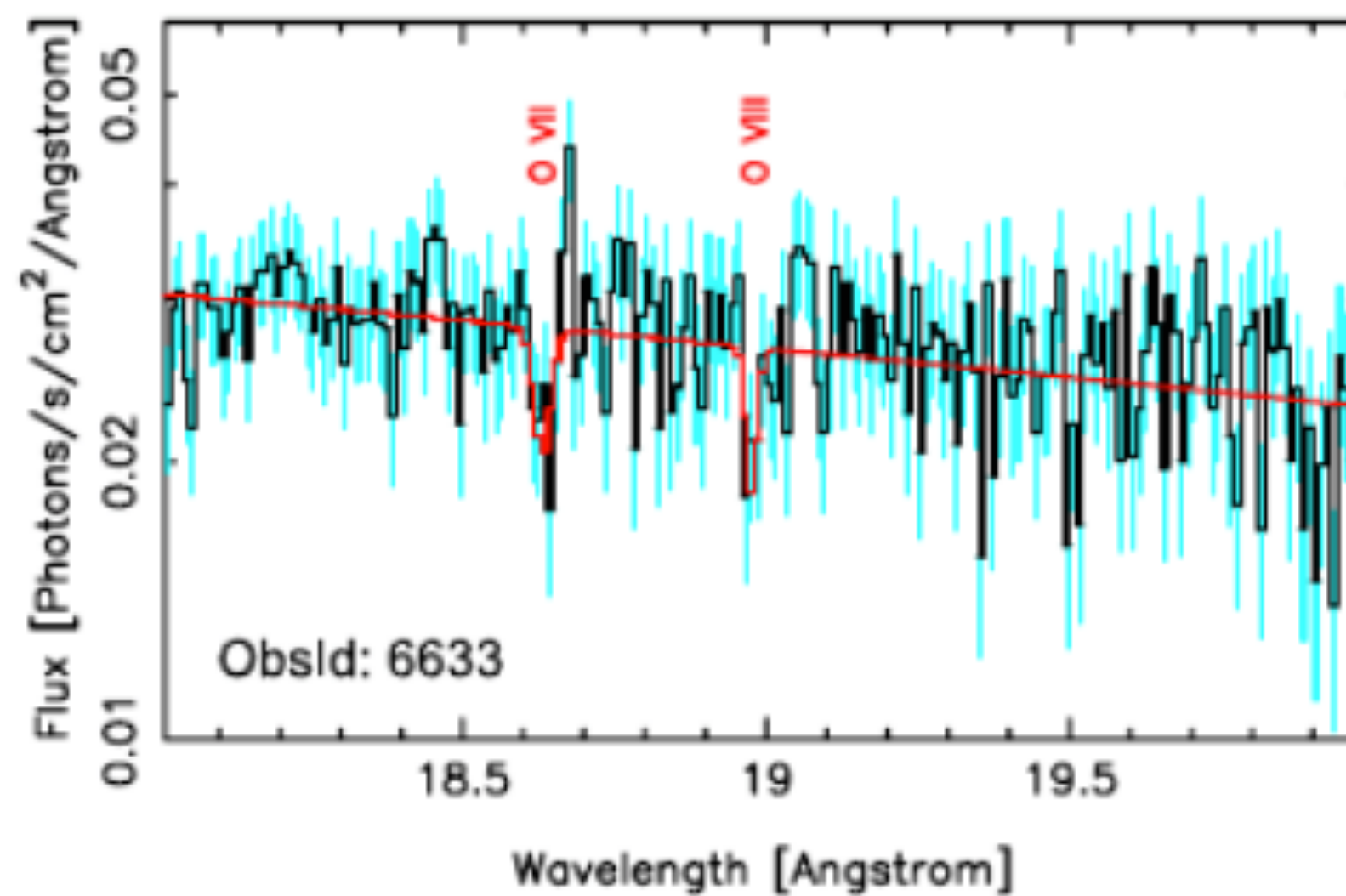
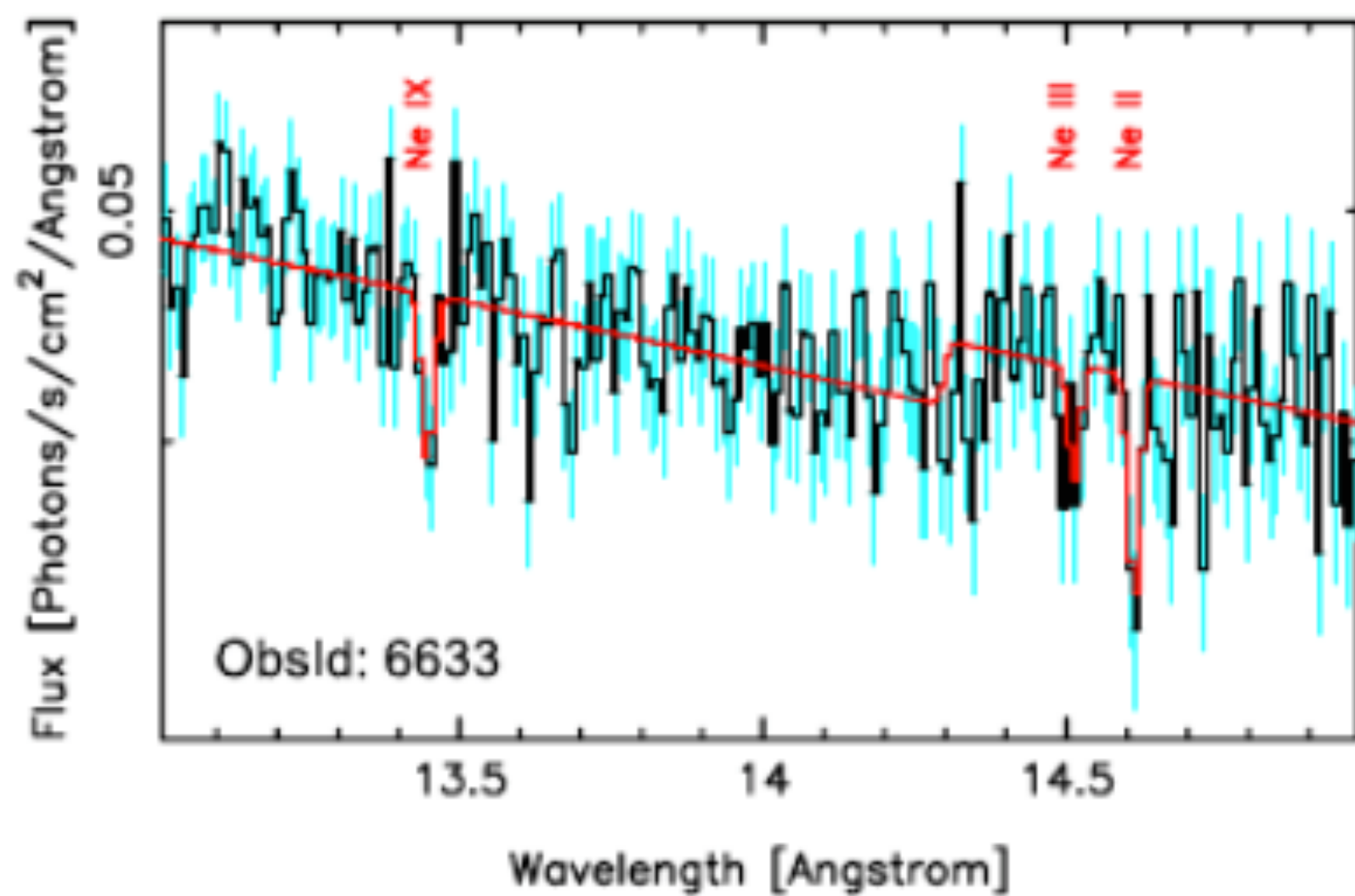
* Luminosity $L_x = 6 \times 10^{37} \text{ergs}^{-1}$

* Companion Star: White Dwarf

* Inclination Angle: $\angle i < 80^{\circ}$

Cackett et al, 2003

Motivation:

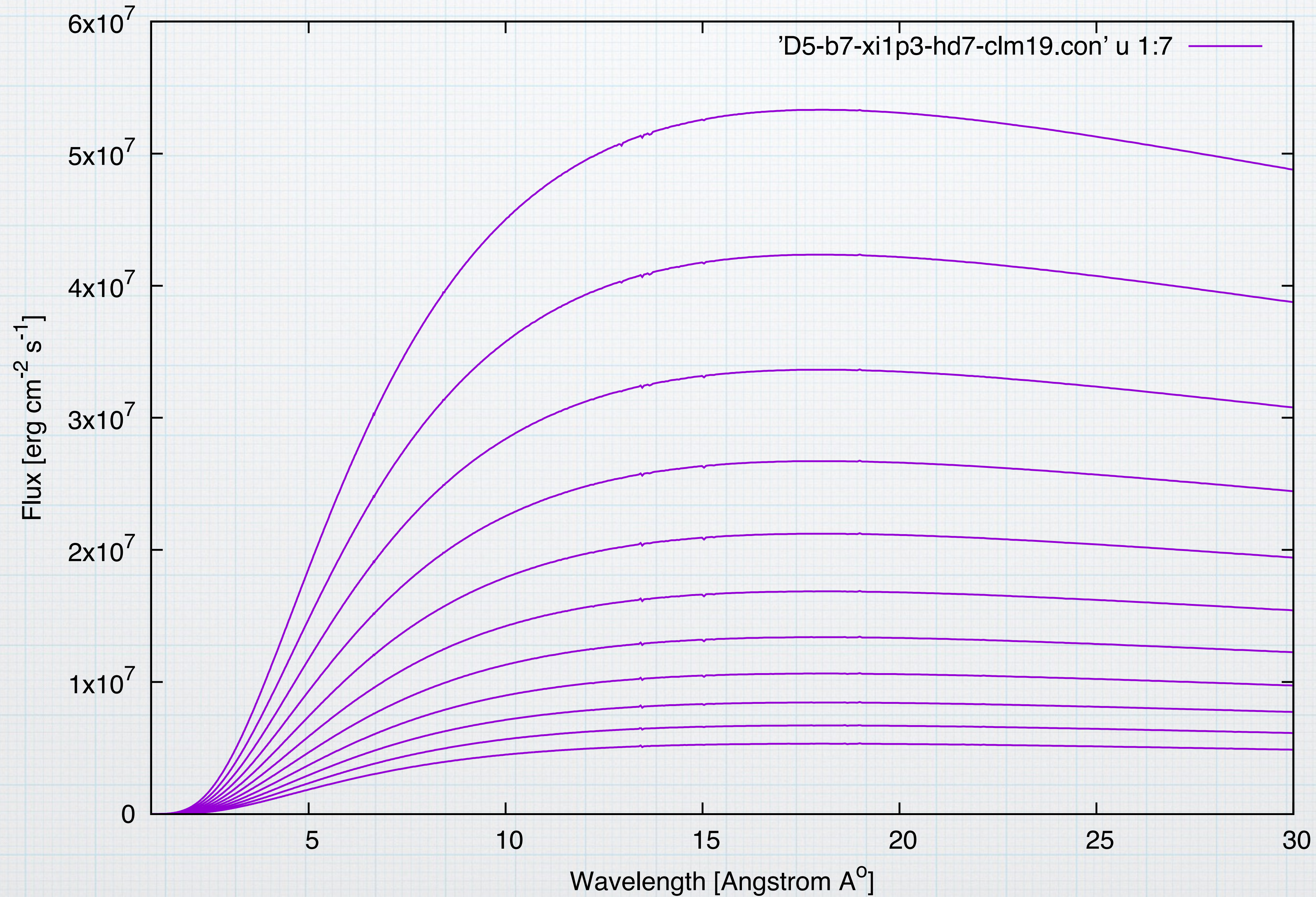


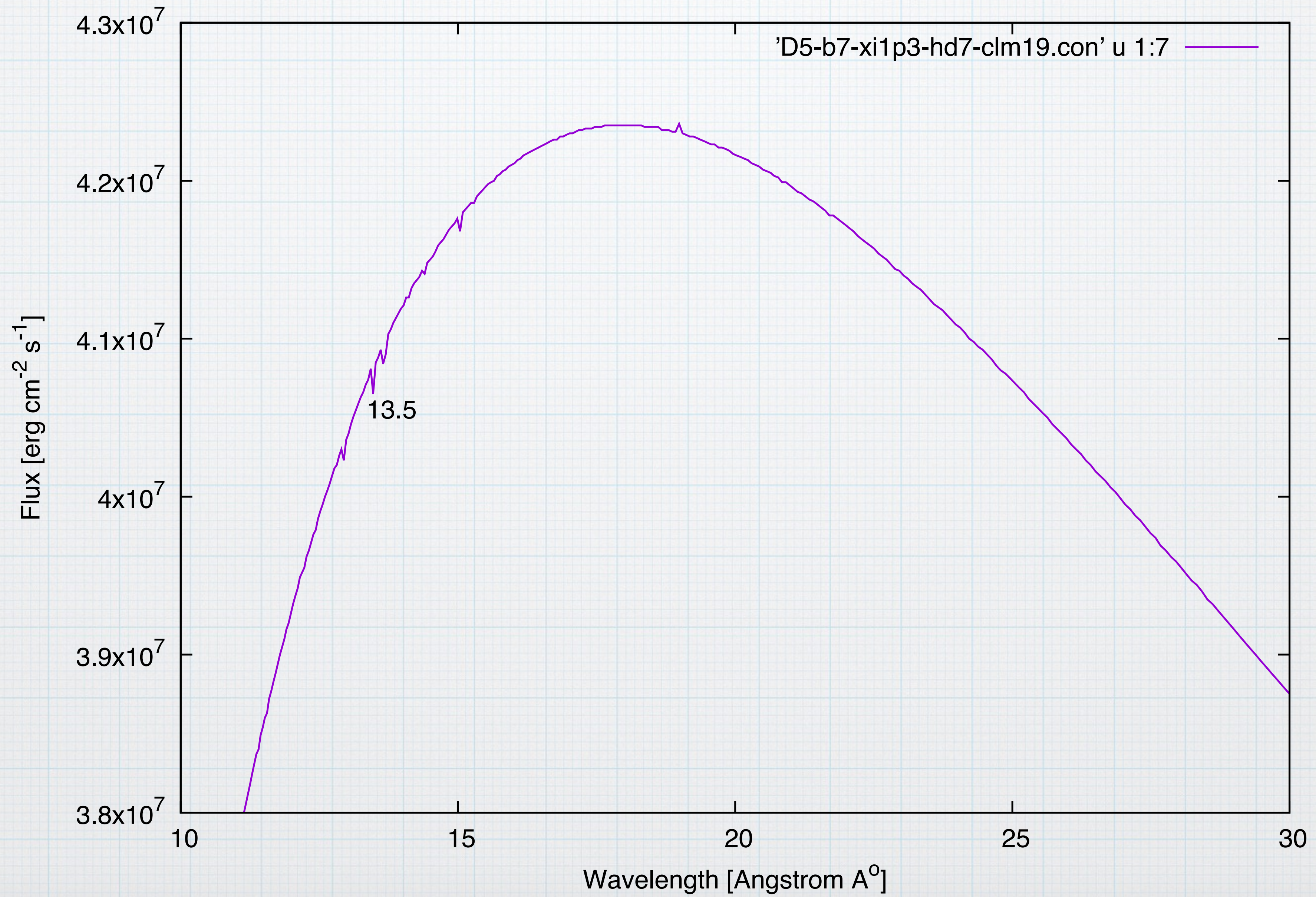
Methodology

Simulating Absorption lines using:

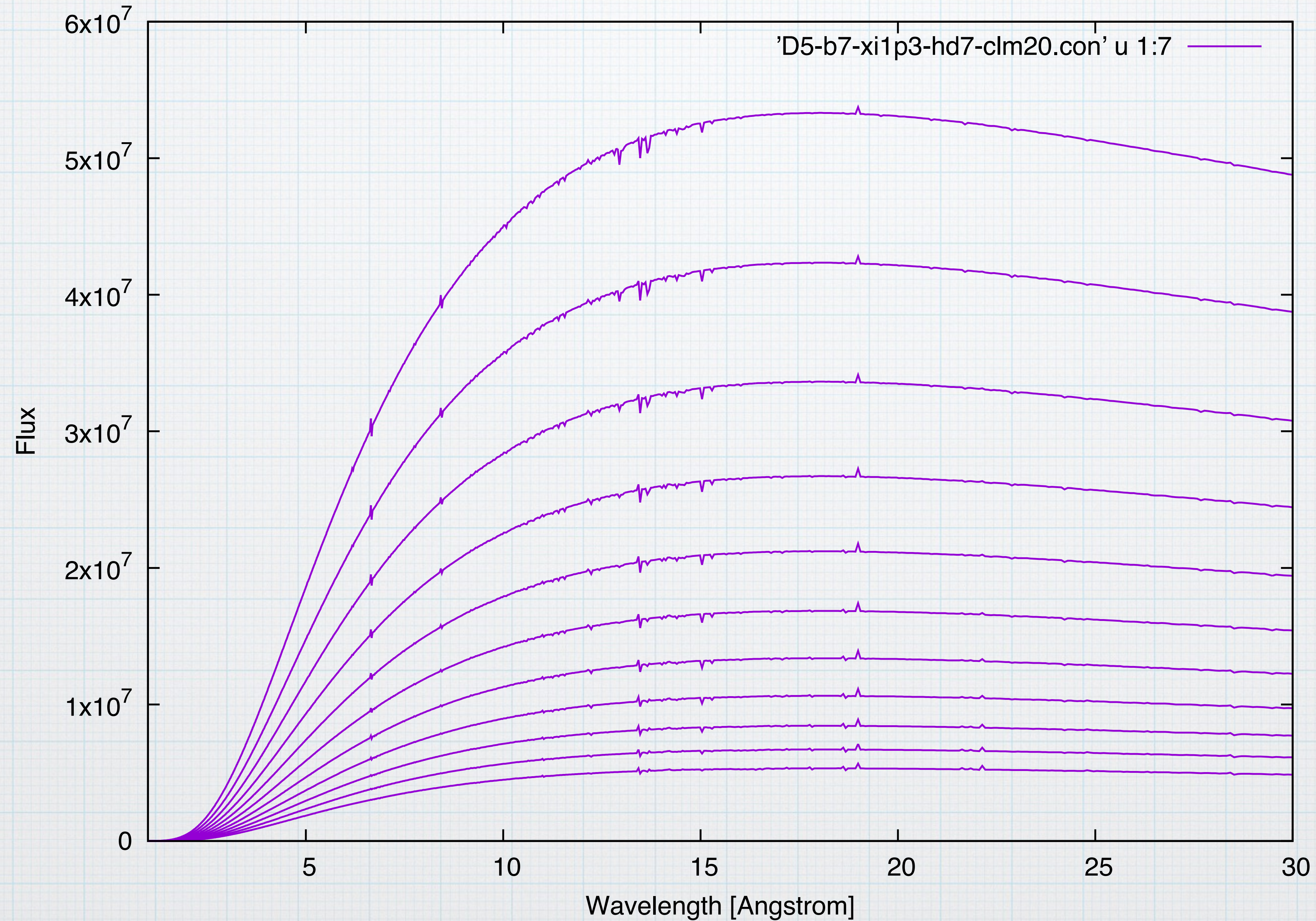
- Varying ionization parameter
- Varying 'hden' Average density
- Varying abundances
- Varying Column Density

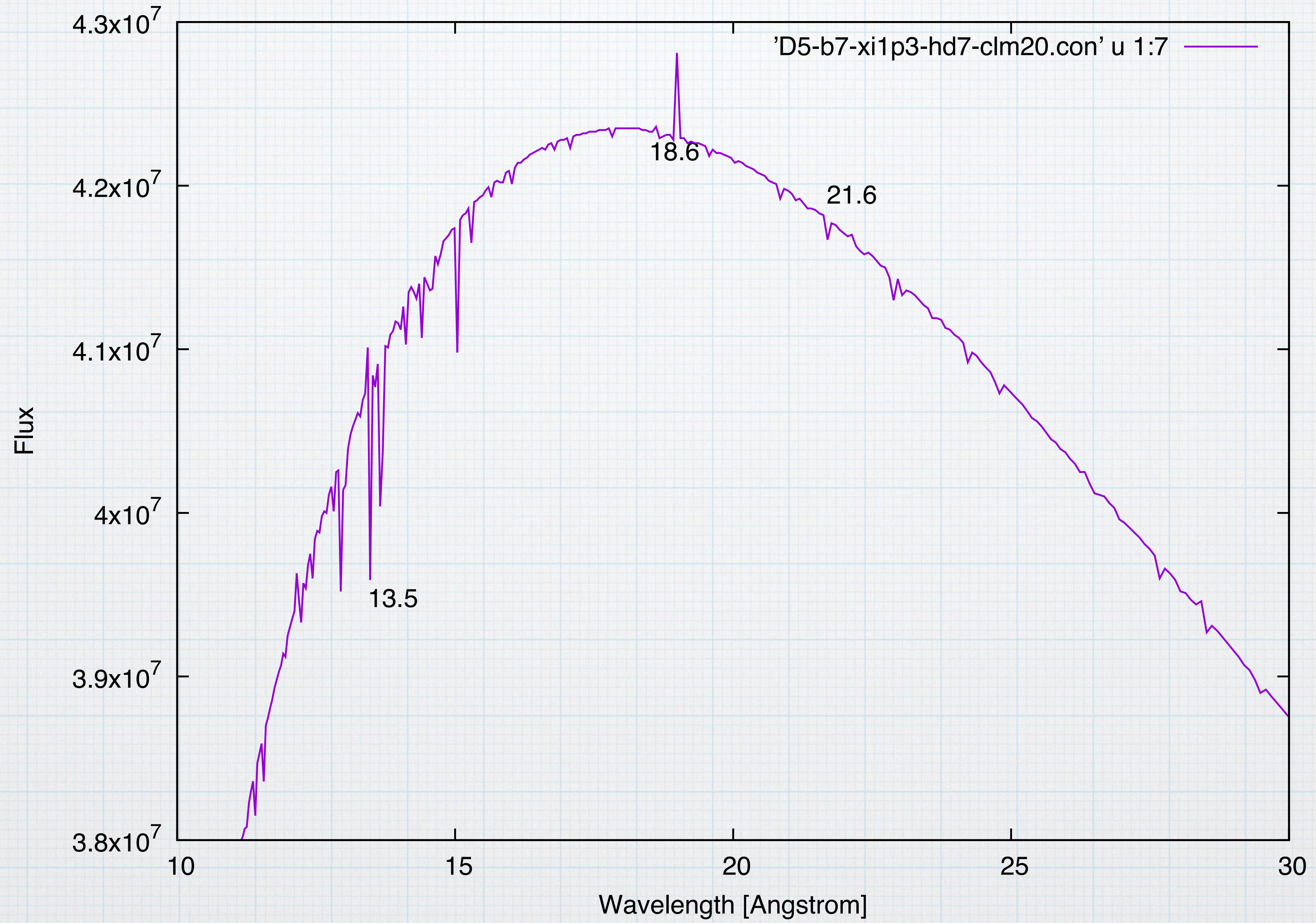
Variation with Ionization Parameter (1.3-2.3) at Column Density(n_H) = 10^{19} cm^{-2}



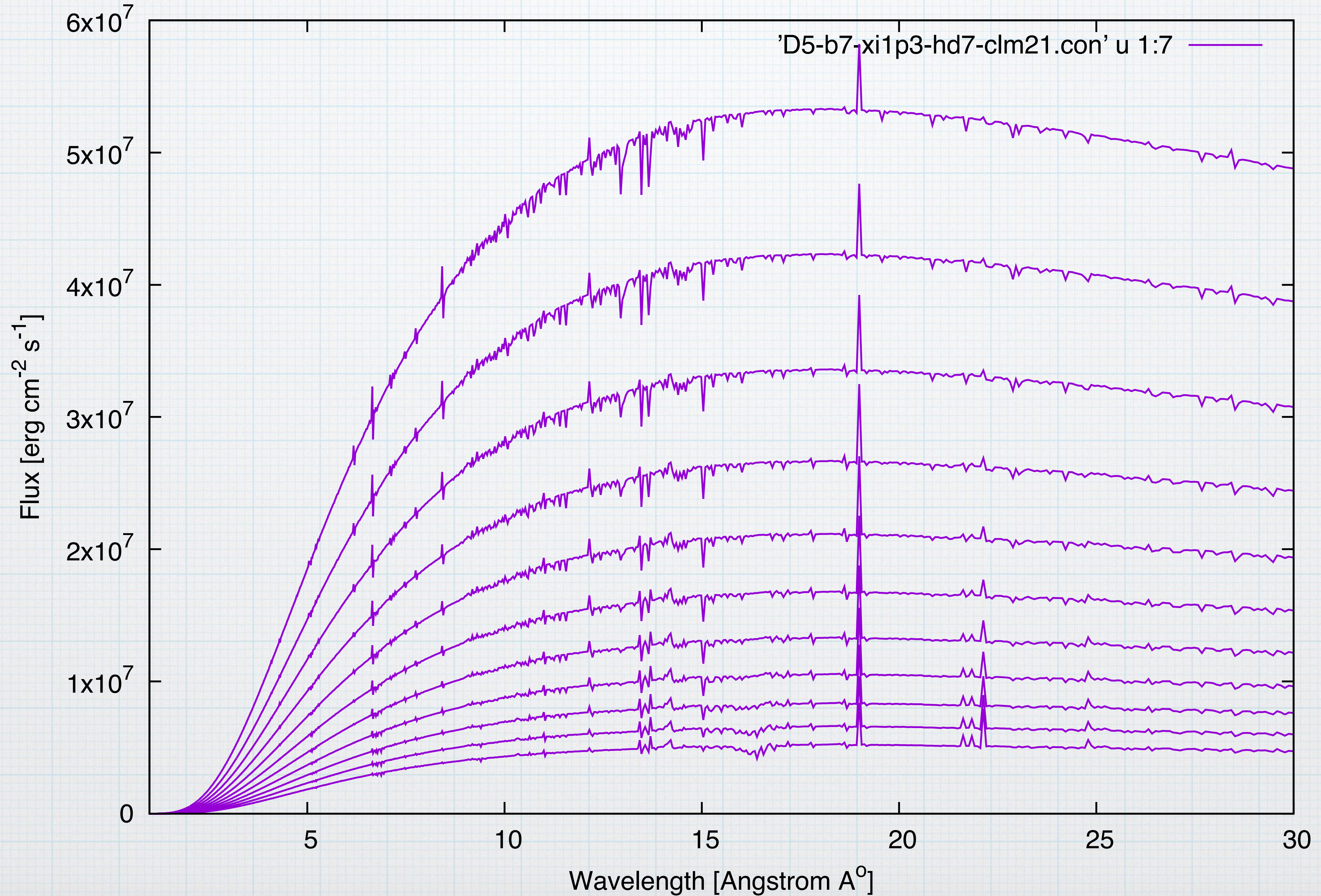


Variation with Ionization Parameter (1.3-2.3) at Column Density(n_H) = 10^{20} cm^{-2}

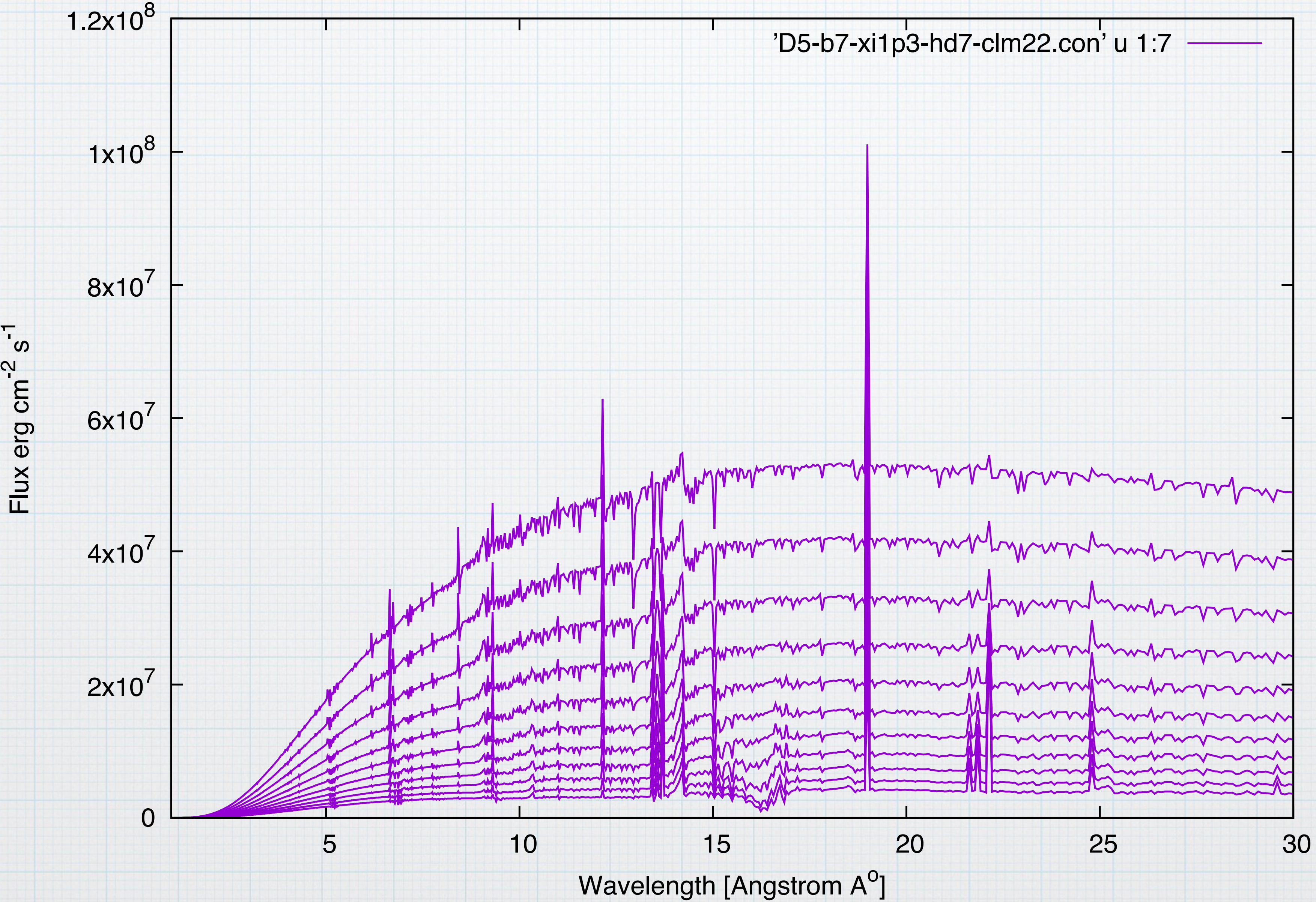




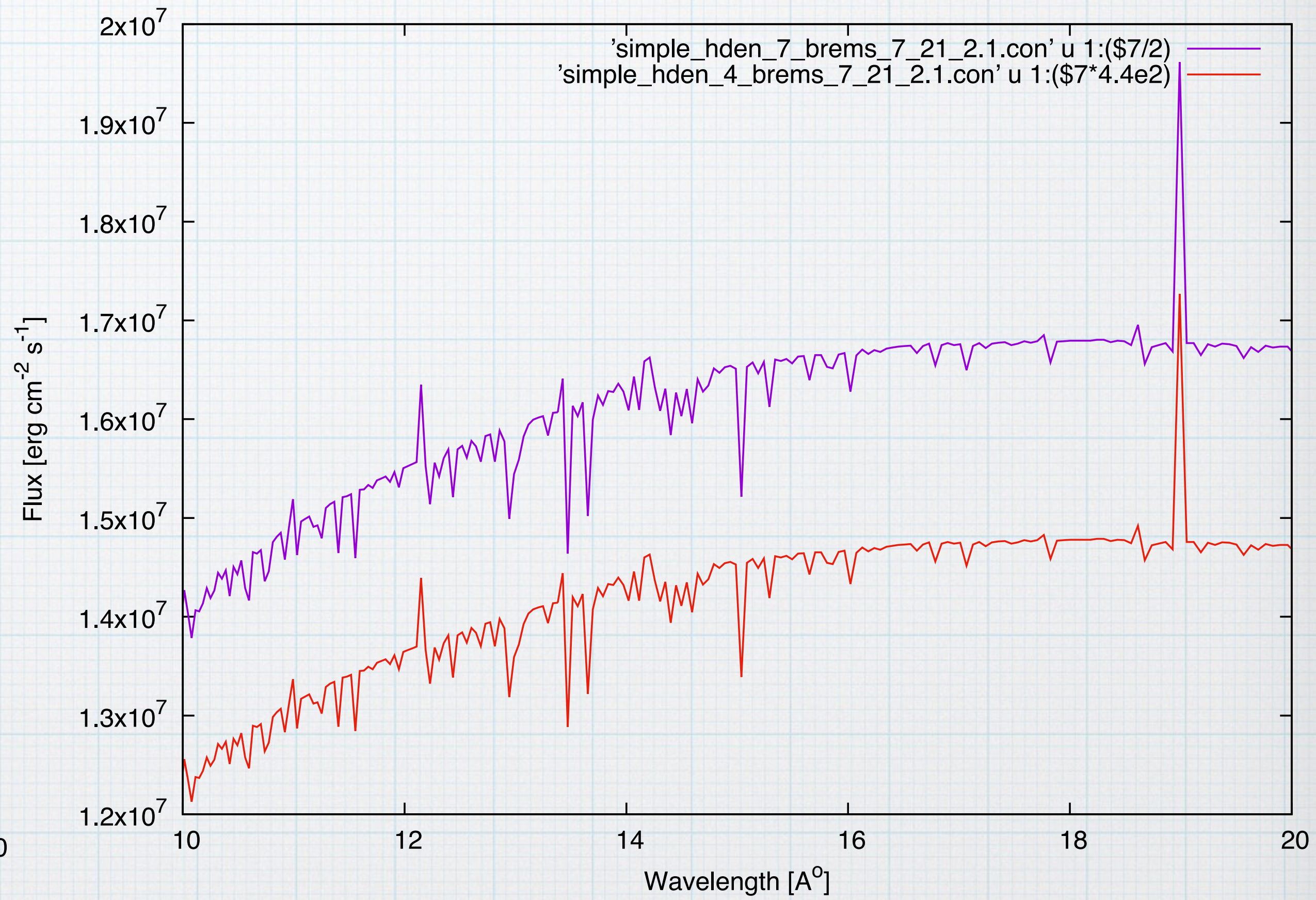
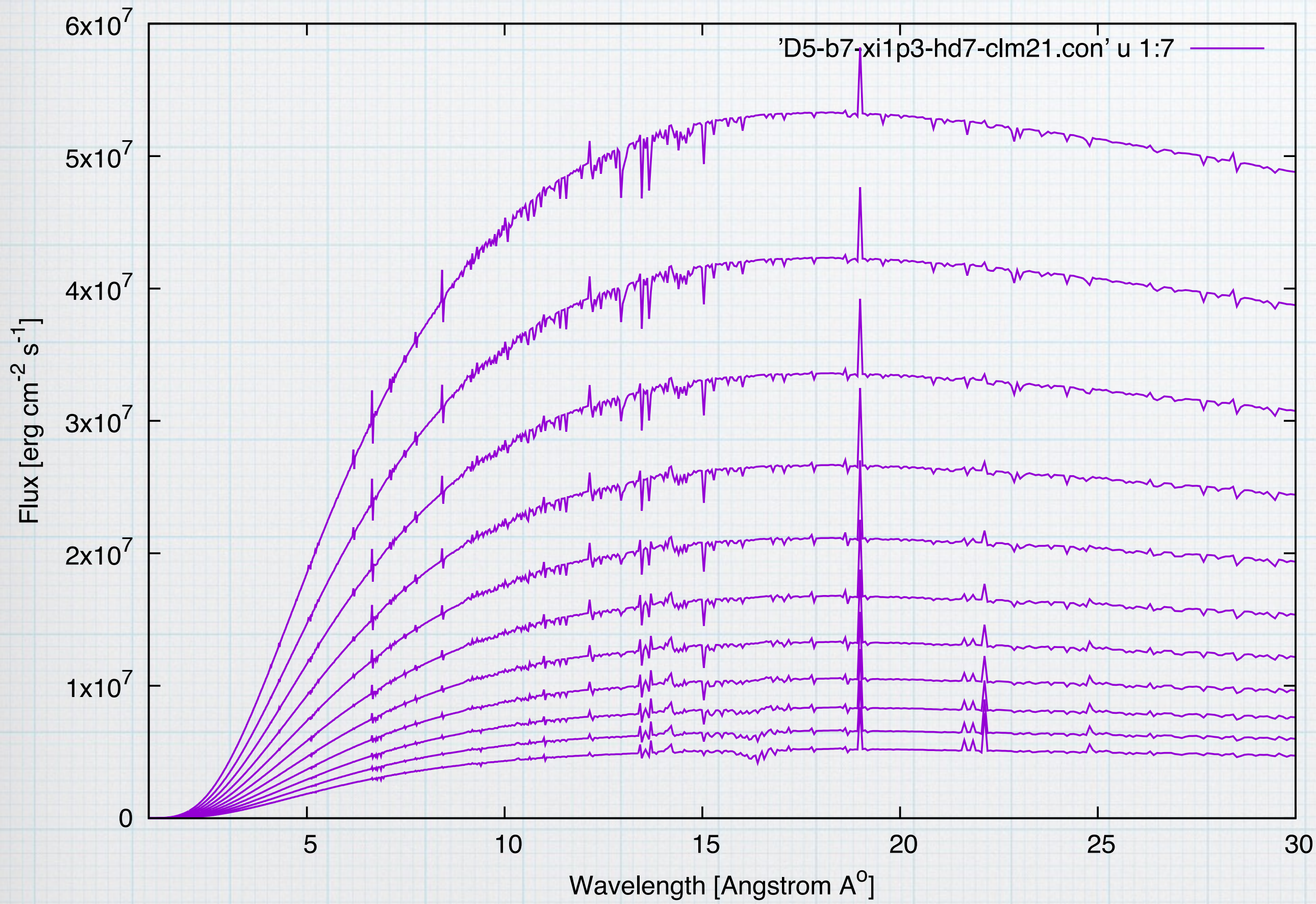
Variation with Ionization Parameter (1.3-2.3) at Column Density (nH) = 10^{21} cm^{-2}



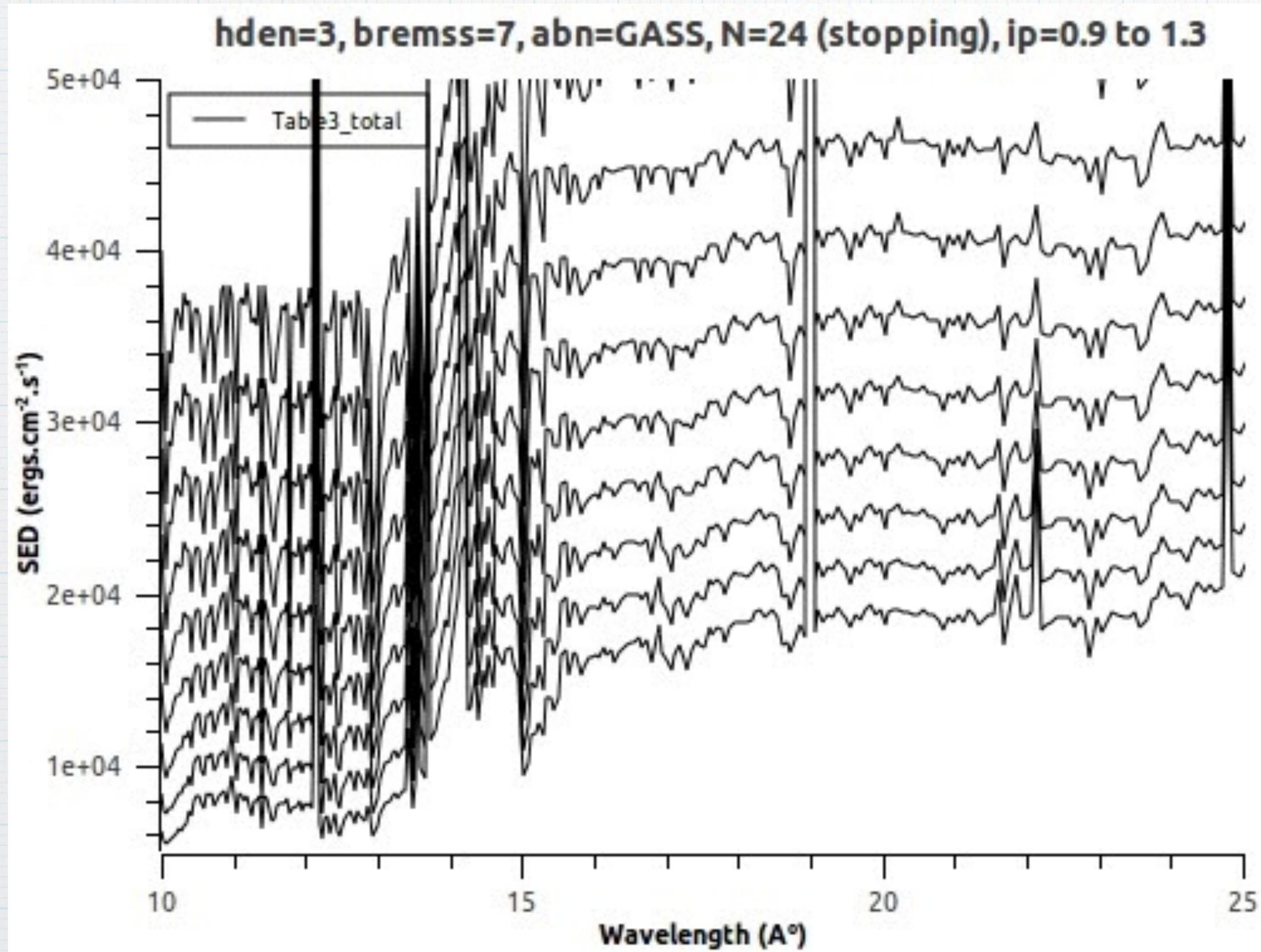
Variation with Ionization Parameter (1.3-2.3) at Column Density (nH) = 10^{22} cm^{-2}



Comparison of Absorption depths with $h_{den} = 7$ and 4 at $n_H = 10^{21} \text{ cm}^{-2}$

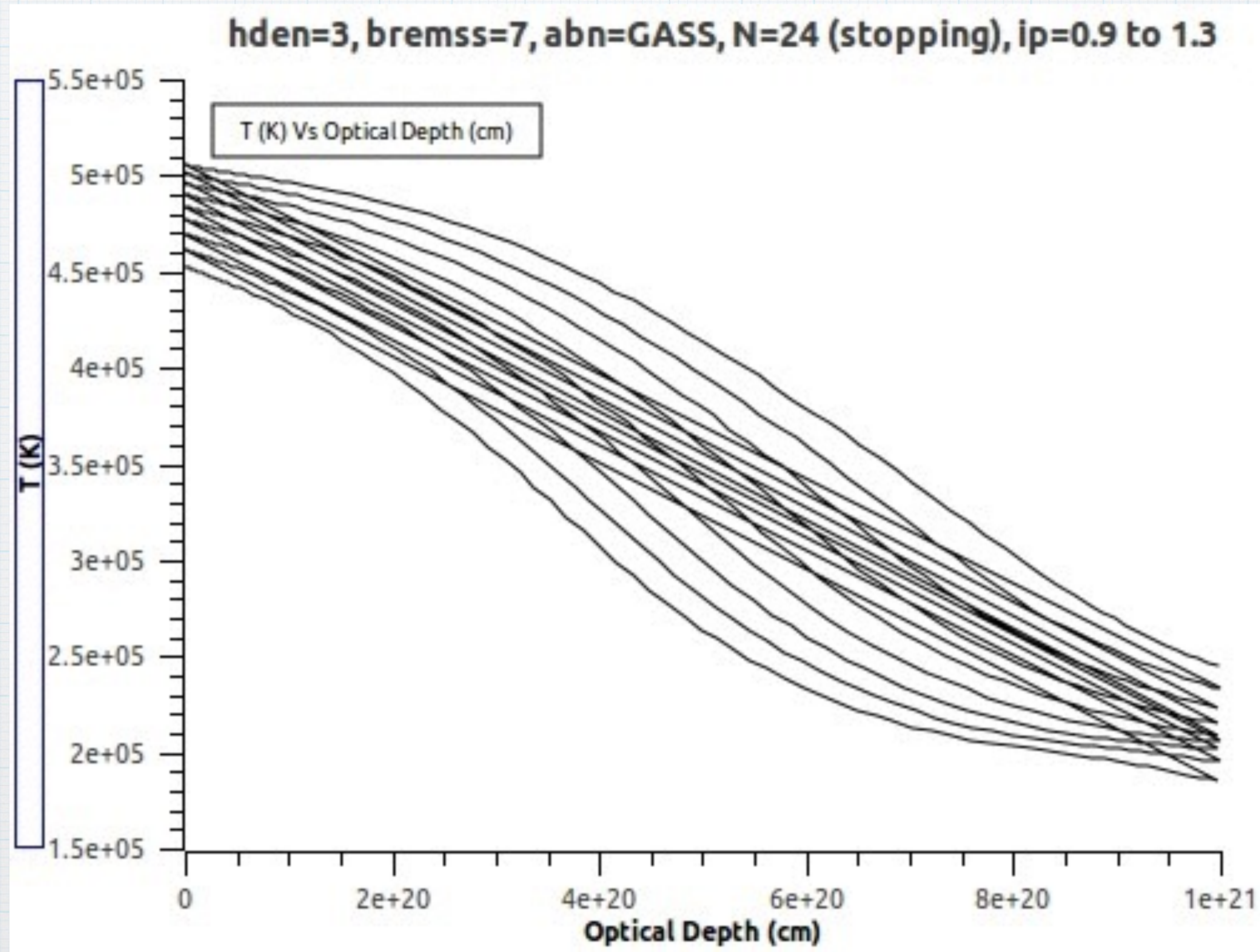


Variation with Ionization Parameter (U)



$$U \equiv \frac{Q(\text{H})}{4\pi r_0^2 n(\text{H}) c} \equiv \frac{\Phi(\text{H})}{n(\text{H}) c}$$

Temperature Vs Optical Depth at different U



Results and Discussion

- hden , Abundances and Geometry are not influencing parameters for our system.
- 'grid' works efficiently, 'optimize' made complications.
- Needs to work more, to have an estimate of ' $r_{\{0\}}$ ', or to fix ' $\text{nR}^{\{2\}}$ '.

Acknowledgment

- * Prof. Gary Ferland and CLOUDY team members
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- * IUCAA for providing the excellent local hospitality during our stay.

Thanks