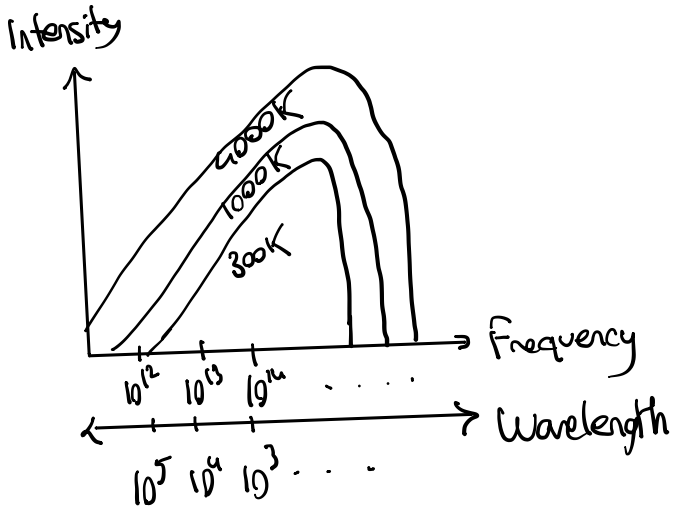
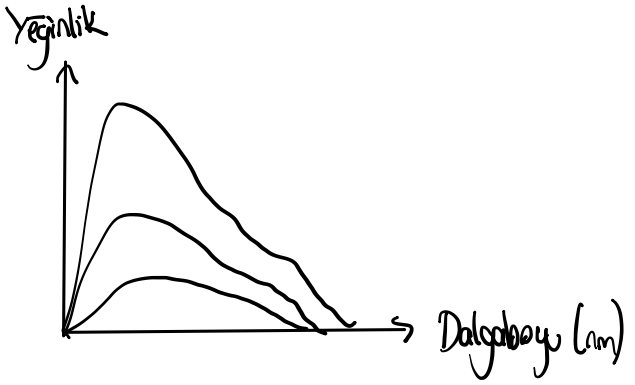
$$E \propto \frac{hc}{\lambda}$$

Karacisim Tayfı



$$E_\lambda(T) = \frac{2hc^2}{\lambda^5} \frac{1}{e^{\frac{hc}{\lambda KT}} - 1} \quad (W/m^2)$$



$$E = \sigma T^4$$

$$E = \int_0^\infty E_\lambda(T) d\lambda$$

$$\lambda_{max} = \frac{0,2898}{T}$$

Doppler

$$\frac{\text{görünür dalgaboyu}}{\text{gerçek dalgaboyu}} = \frac{\text{gerçek frekans}}{\text{görünür frekans}} = 1 + \frac{\text{resesyon hızı}}{\text{dalga süratı}}$$

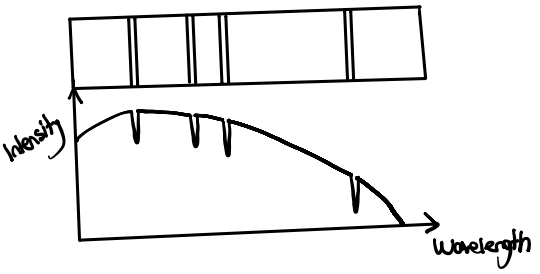
$$\frac{\text{dalgaboyundaki değişim}}{\text{gerçek dalgaboyu}}$$

$$\frac{\Delta\lambda}{\lambda} = \frac{v}{c} = z$$

Katı, sıvı, sıcak yoğun gaz → sürekli tayf

Sıcak az yoğun gaz → salma çizgili tayf

Soğuk ince gaz → soğurma tayfı



state değişiminde o enerjiye denk gelen ışının gözlenir.

$n=1$ → Lyman Series

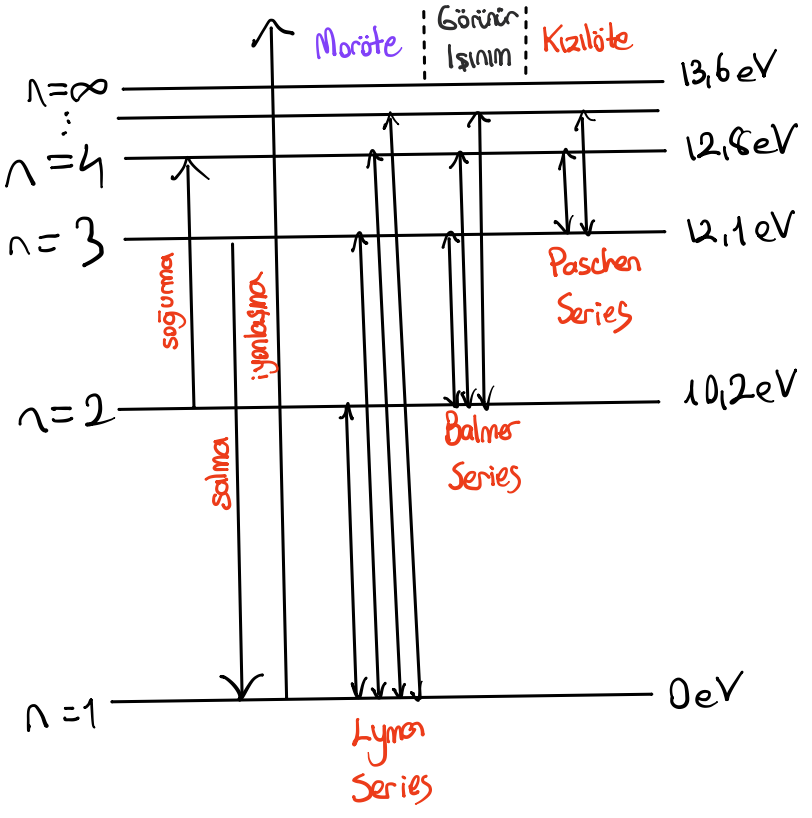
$n=2$ → Balmer Series

$$E_n = 13{,}6\left(1-\frac{1}{n^2}\right)$$

$$\frac{1}{\lambda(cm)} = R\left(\frac{1}{2^2}-\frac{1}{m^2}\right)$$ → Balmer stuff

R: Rydberg Sabiti

$m \geq 3$



$$\frac{1}{\lambda(cm)} = R\left(\frac{1}{n^2}-\frac{1}{m^2}\right)$$

$n = 1, 2, 3 \ldots$

$m = n+1, n+2, n+3 \ldots$

$$\Delta E = E_m - E_n = \frac{hc}{\lambda}$$

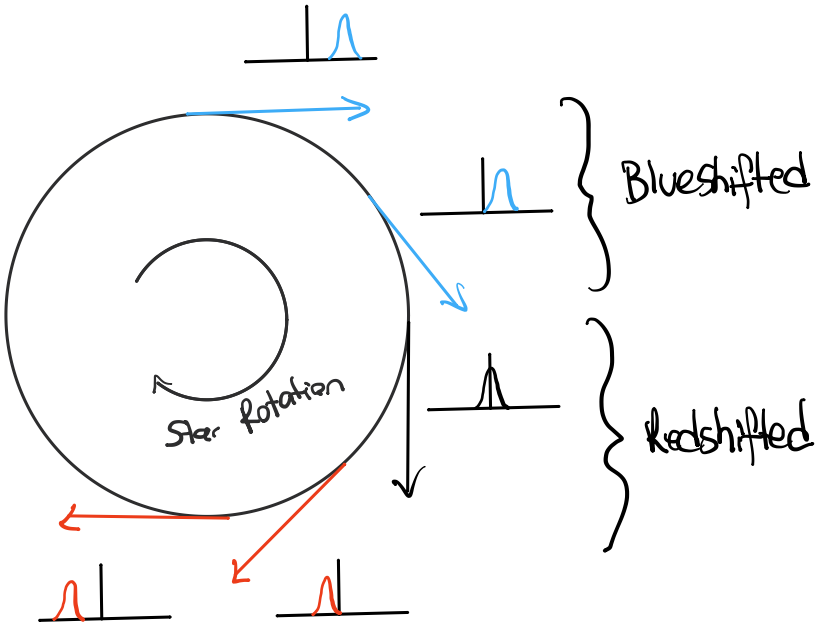
Foton enerjisi : $E = hf$

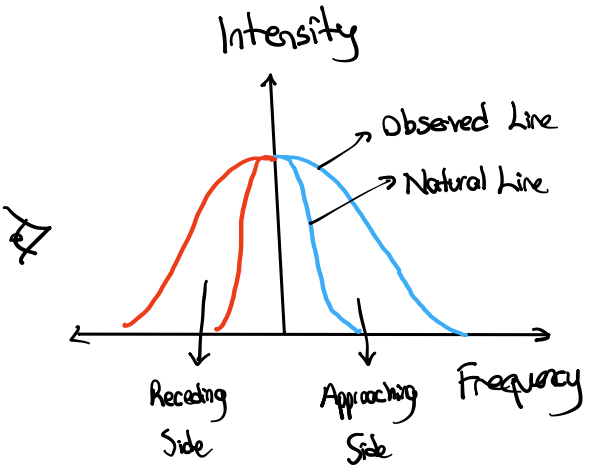
Elektron geçişleri → morötesi

Titreşimsel geçişler → kızılötesi

Dönmesel geçişler → radyo

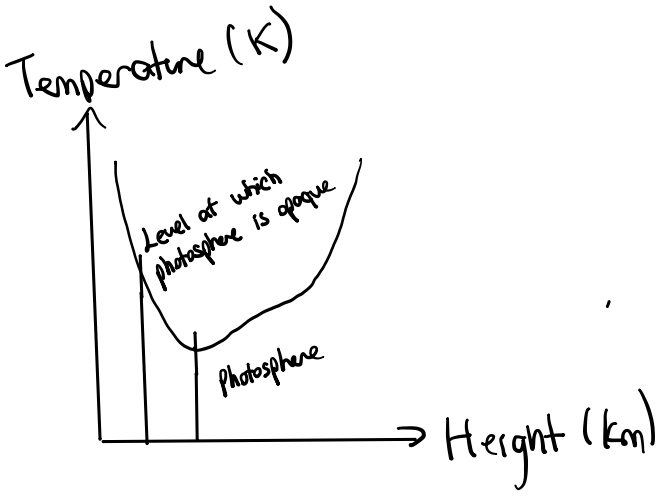
Spectral Information Derived from Starlight	
Observed Spectral Characteristic	Information Provided
Peak frequency or wavelength (continuous spectra)	Temperature (Wien's law)
Lines present	Composition, temperature
Line intensities	Composition, temperature
Line width	Temperature, Density, Magnetic field Turbulance Rotation Speed
Doppler Shift	Line-of-sight velocity

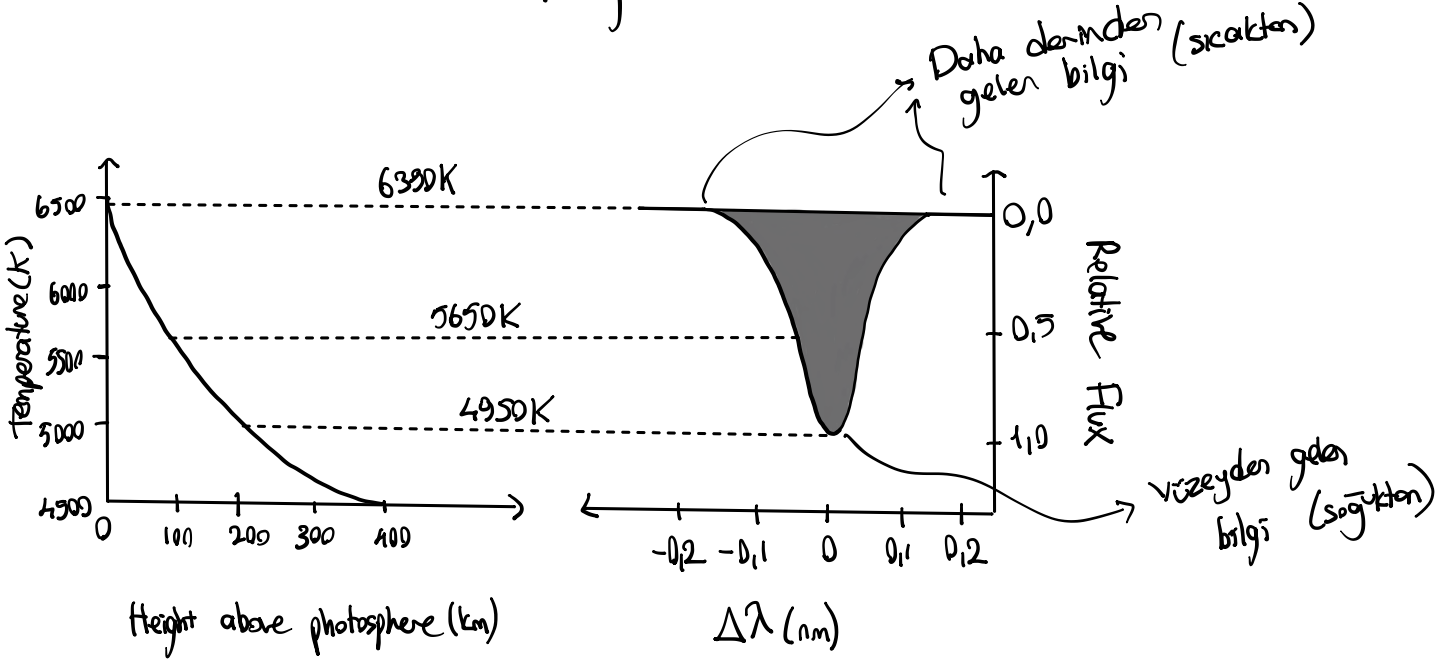


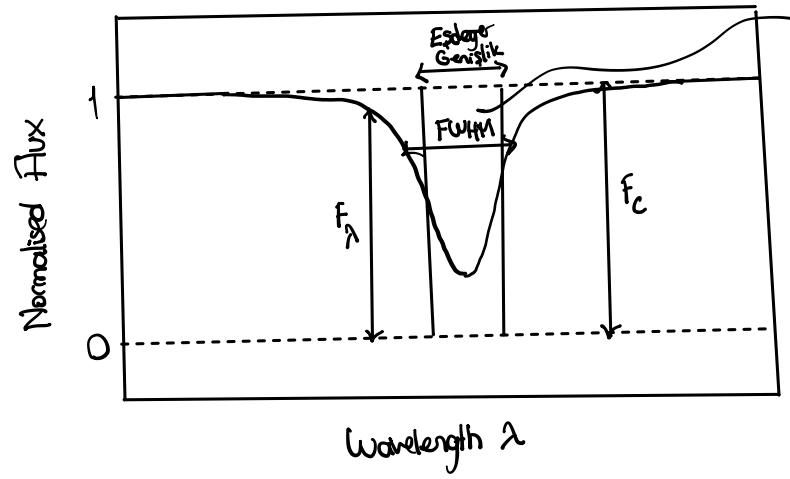


Sıcak gazın karakteristik bir sürekli tayfı vardır.

Soğuk, ince gaz ile perdelenen sürekli tayf karakteristik bir soğurma tayfı verir.

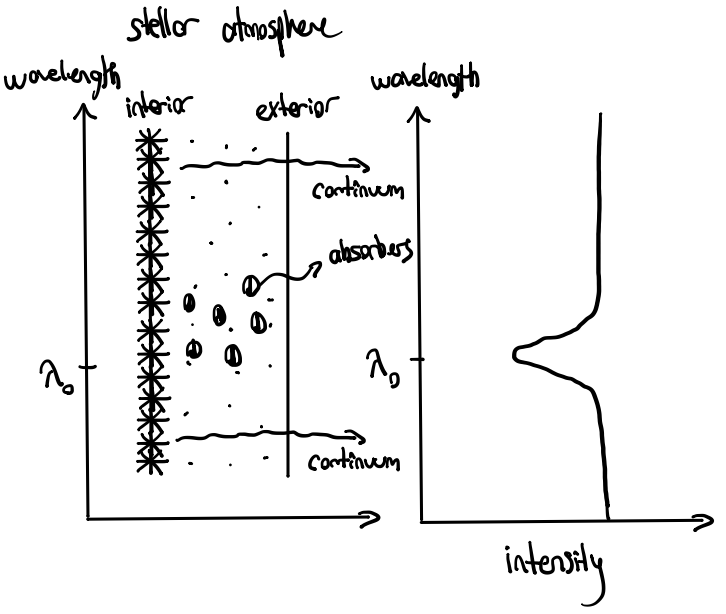


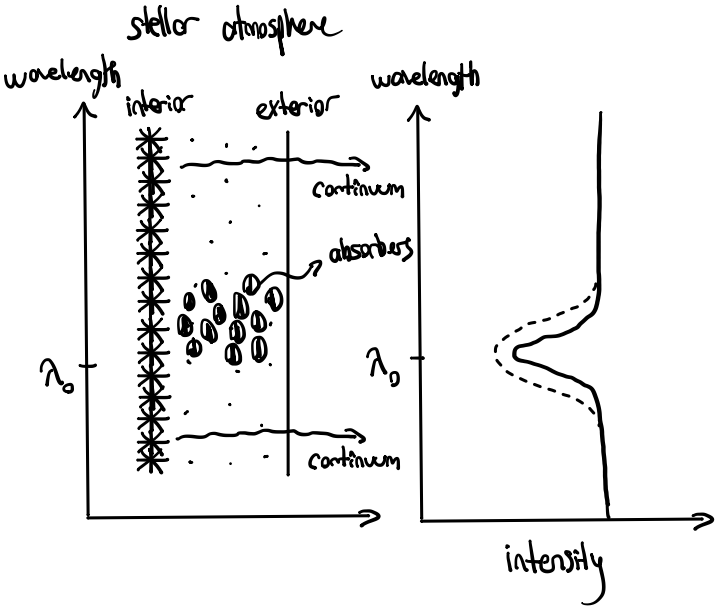




Full Width Half Maximum

$$W = \int \frac{F_c - F_\lambda}{F_c} d\lambda$$





Eğri neden genişler?

Doğal Genişleme

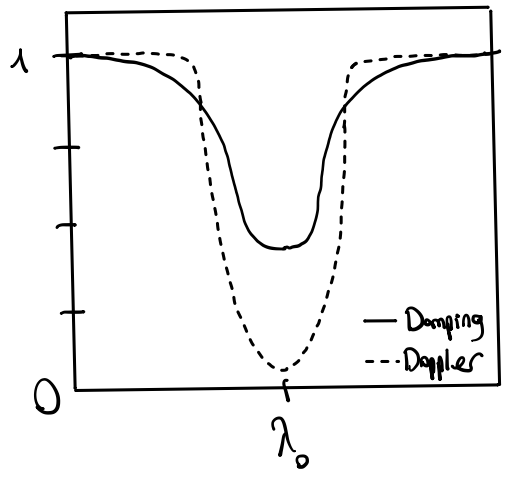
- Heisenberg etkisi : $\Delta E \simeq \frac{h}{\Delta t}$ (zayıf bir etki)

Doppler Genişleme

- $v = \sqrt{\frac{2kT}{m}}$, $\Delta\lambda = \frac{2\lambda^2}{c}\sqrt{\frac{2kT}{m}}$ (doğadaki 1000 kat etkili)

Basınç Genişleme (Uzaktalarda)

- $\Delta\lambda \simeq \frac{\lambda^2}{\pi c}\frac{1}{\Delta t}$



Damping (Basınç) Kanatlara, Doppler merkezlere daha çok etki eder.

Damping Broadening + Doppler Broadening = Voigt Profile

$X + Y + Z = 1$

↓ ↓ ↓

Hidrojen Helyum Diğer

Örneğin; Solar $Z = 0,0134$

$$\frac{[O]}{[H]} = \log\left(\frac{N_O}{N_H}\right) + 12$$

$$\frac{[Fe]}{[H]} = \log\left(\frac{N_{Fe}}{N_H}\right)_{star} - \log\left(\frac{N_{Fe}}{N_H}\right)_{sun}$$