

1 Sixteenth August

Some questions to ponder:

1.1 Stars

- Source of their luminosity
- How big are they- radius/mass
- What are they made of?
- How long do they live
- How do they change over time
- What happens when they stop shining

Luminosity: Amount of light **received**

1.2 Black Body radiation

Planck's spectrum:

$$B_\nu(\nu, T) = \frac{2h\nu^3}{c^2} \frac{1}{e^{h\nu/k_bT} - 1}$$

Leptons have conservation laws (Lepton conservation in HEP). No such law for photons.

Wien's displacement law has different peaks depending on the formula used for B i.e. whether you use B_ν or B_λ

Colors observed are determined in terms of RGB. **Color** is the ratio of flux densities of two different wavelengths.

$$S_\nu = B_\nu \cdot \Omega$$

where Ω is the solid angle

TODO: See HR diagrams

1.3 Some relationships

Luminosity $\propto M^3$ for $M > 10M_{sun}$

$\propto M^4$ for $M > 0.5M_{sun}$

1.4 Spectral Lines

Provides information on:

- Chemical composition
- Column density (Amount of substance in LOS)
- Gas temperature and pressure - Ratio of peaks gives temperature
- Velocity structure
- Ionization states