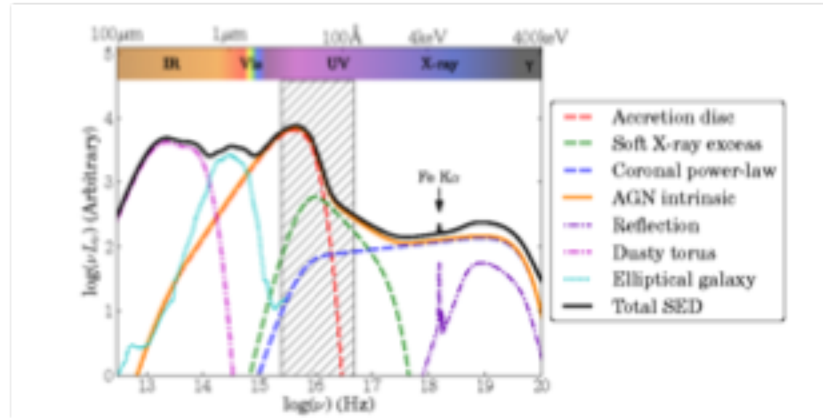
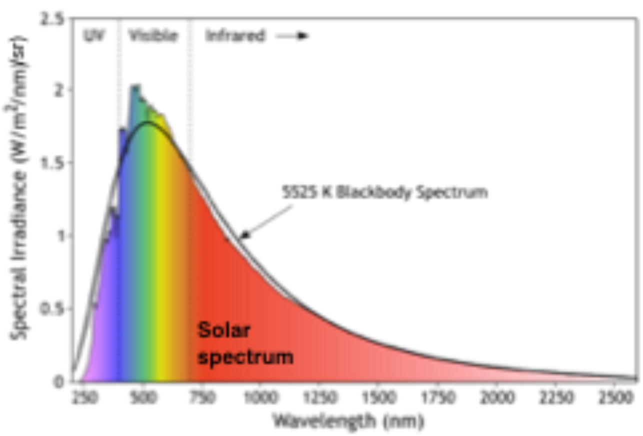
Today

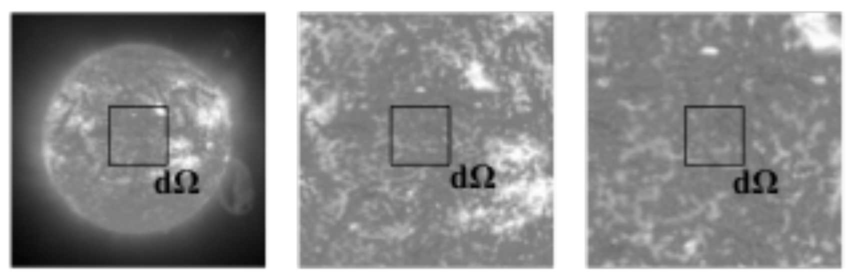
- Quantifying light from objects we can see
- How do we quantify the energy coming out of an object?
- How do we quantify the light we receive?
- Key words:
  - Energy/Power
  - Luminosity
  - Brightness vs. Intensity vs. Flux
  - "Spectral" Luminosity, Intensity, and Flux



Blackbody Spectrum



Specific Intensity



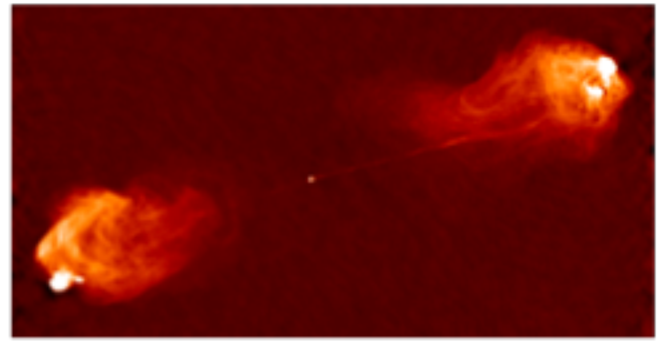
Far Closer Super close

Images from "Essential Radio Astronomy" (Condon & Ransom)

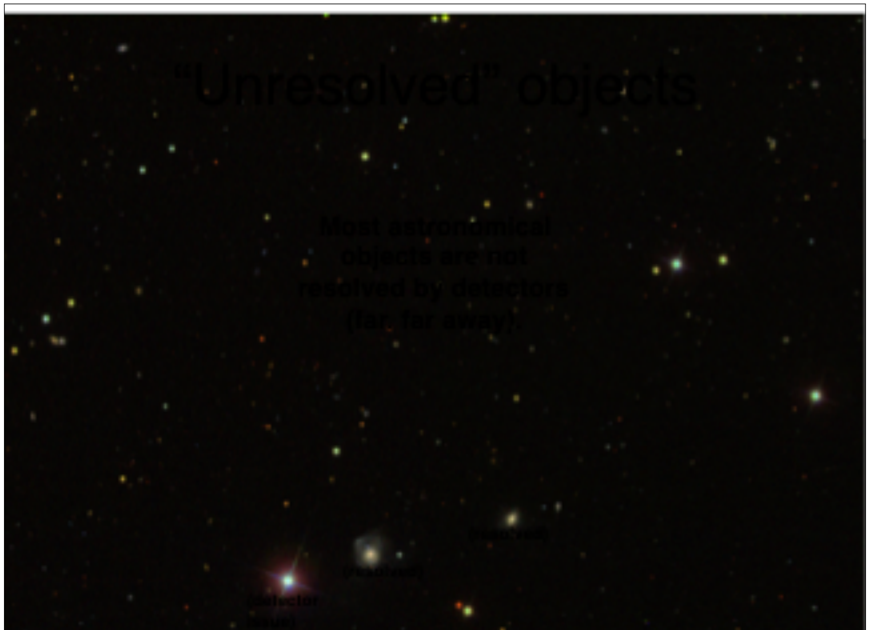
Flux

- Our human perception of “bright” or “intense” actually has more to do with **FLUX**.
- Total energy received from target (from whole source, not just $d\Omega$) has to do with **FLUX**.
- Brightness only valid/constant if source is *resolved*.

“Resolved” object

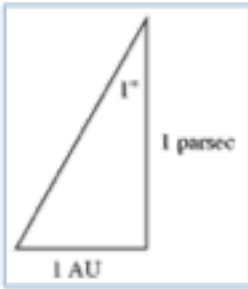


Radio galaxy Cygnus A
(6 GHz radio image)



Note: Distances and Sizes in Astronomy

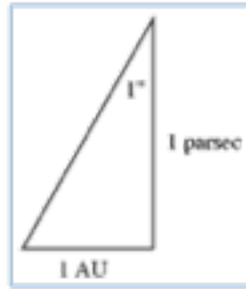
Parsecs



Parsec:
The distance at which 1 AU appears to be 1 arcsecond large.

1 pc = 3.08 x 10^{16} m

Parsecs



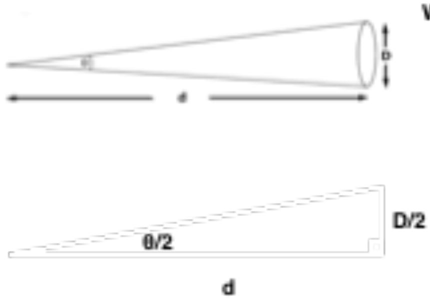
Parsec:
The distance at which 1 AU appears to be 1 arcsecond large.

1 pc = 3.08 x 10^{16} m

$$\tan(1'') = \frac{1\ \text{AU}}{1\ \text{pc}}$$

← Easy way to remember the conversion!

How big is my target?



We often care about the actual size of objects, not just the angular size. We can use trig in this case:

$\tan(\theta/2) = (D/2) / d$

For small angles,

$\tan(\theta/2) \sim \sin(\theta/2) \sim \theta/2$

So $\theta = D/d$