**Intensity Cheat-Sheet**

- **Units, Definitions, Examples**

Small surface $dS$, centered on point $P$.

- Photons are constantly flowing through $dS$, in all directions (in, out, left, right, etc...).
- That means some energy is being transported through $dS$.

$$ F = \frac{dE}{dS \, dt} $$

We call this (specific) flux in physics, this is often called flux density. **Units:** $\frac{W}{m^2}$

• Keep in mind that context matters: In this case you are thinking of transport as the Sun emitting radiation. But we can consider flux received by the telescope, etc.

If we care about wavelength distribution -

~ Spectral (Monochromatic)

$$ F = \frac{dE}{dS \, dtd\lambda} $$

**Units:** $\frac{W}{m^2 \cdot \AA}$

Ångstrom instead of µm on purpose, to emphasize different meaning of length.
Obviously, radiation field is different, but $F_\lambda$ is the same!

In first case, observers 1 & 2 both see moderate signal. In the second case, observer one sees strong signal, obs 2 sees no signal at all.

We need a new quantity!

$$I_\lambda = \frac{dE}{dS \cos \theta \, dt \, d\Omega}$$

Units: $W \, m^{-2} \, \text{Astrad}^{-1}$

Specific monochromatic intensity