FROM STARS

re ver, important and yet ar interchangeably as the line ion is based on treatment. 🖚 🗷 🕮 on the surface of a sum rgy emitted by this small true mermendicular to die simbii≥ r, about the tormal. That a a e left of the normal in Figure he energy, some detection mus rizce. In przetice, you zuman 😎 no area. In Figure 🗓 s the solid angle subtenues 🛪 rite only point on the surfur point at the vertex of in a lime. compared to this outer so the

into the cone depends of 📖 octain a larger fraction : uma s the range of wave.engin m (made io measure light of 🗷 et single detector dan medicim t is for this reason we build w telescopes. A large candomis Ey, the projected size of 44-. Tris. imagine you are view the E23 deno, you are mering 🛶onuli size. As filiciteixe... 🕦

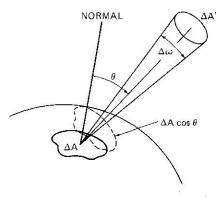


Figure J.1. Geometry used to define flux and intensity.

Free appears smaller and smaller until at $\theta = 90^{\circ}$ the apparent area is zero. Likewise, as θ increases, the apparent brightness decreases until at $\theta = 90^{\circ}$ it reaches zero. The projected area is $\Delta A \cos \theta$.

Combining all of the above ideas, it can be said that the energy emitted ΔE) in a time interval (Δt) into the cone is proportional to the size of the some $(\Delta\omega)$, the wavelength interval $(\Delta\lambda)$, and the projected surface area (ΔA) $\cos \theta$). Symbolically,

$$\frac{\Delta E}{\Delta t} \propto (\Delta A \cos \theta) \, \Delta \lambda \Delta \omega. \tag{J.1}$$

The "constant of proportionality" must contain the information that describes the radiation emerging from the star through its surface. Its value is set by the physical conditions in the star's atmosphere such as temperature, pressure, and gravity. This quantity, called the specific intensity, I_{λ} , is defined by rearranging Equation J.1 and taking the limit as Δt , $\Delta \omega$, $\Delta \lambda$, and ΔA go to zero. Then

$$I_{\lambda} \equiv \lim_{\begin{subarray}{c} \Delta t \to 0 \\ \Delta \omega \to 0 \\ \Delta \lambda \to 0 \\ \Delta A \to 0 \end{subarray}} \frac{\Delta E_{\lambda}}{\Delta t \Delta A \cos \theta} \Delta \omega \Delta \lambda \ . \tag{J.2}$$

$$I_{\lambda} = \frac{d\mathbf{E}_{\lambda}}{dt \, dA \cos \theta \, d\omega d\lambda} \,. \tag{J.3}$$