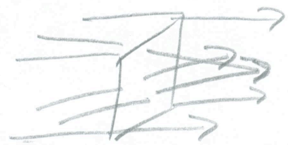
Flux: "radiant flux" total amount of energy passing through a surface or region per unit time

Φ $\left[\frac{J}{s}\right]$ or $[W]$

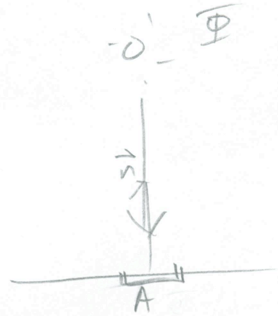


Irradiance: area density of flux

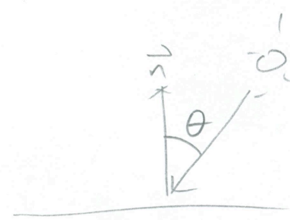
$$E = \frac{\Phi}{A} \left[\frac{W}{m^2}\right]$$

☆ this is what a camera measures!! irradiance at the sensing plane

Lambert's Law area density of flux decreases proportional to the cosine of the angle between the source and receiver:

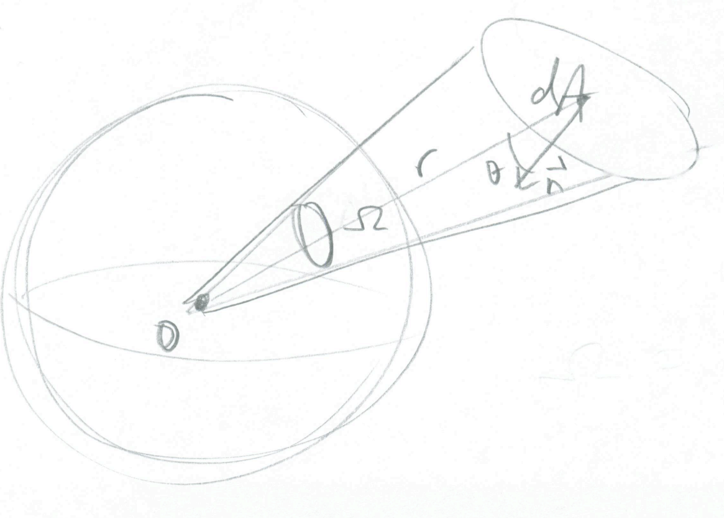


$$E = \frac{\Phi}{A}$$



$$E = \frac{\Phi}{A} \cdot \cos\theta$$

Solid angle:



$$\Omega = \frac{dA}{r^2} \cos\theta$$

as seen from point O, the solid angle of a surface region dA is proportional to $\cos\theta$ and inversely proportional to r^2 and is measured in steridians

there are 4π steridians across a sphere

Intensity flux density per solid angle

$$I = \frac{d\Phi}{d\omega}$$ only meaningful for point sources

Radiance most fundamental quantity because all other quantities can be computed from it and remains constant along rays through empty space

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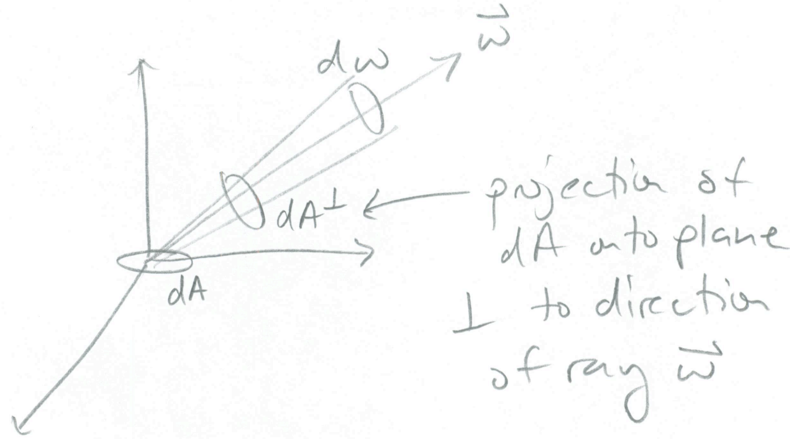
$$L = \frac{d\Phi}{d\omega\, dA^{\perp}}$$



next page derives a fundamental equation that connects radiance moving through a real scene with the irradiance formed on the imaging plane