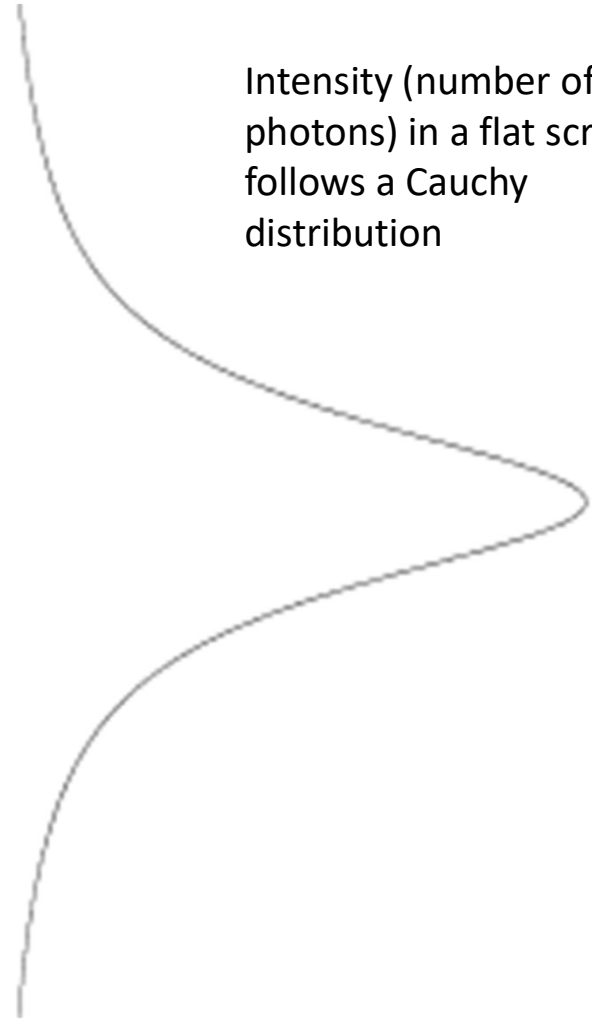
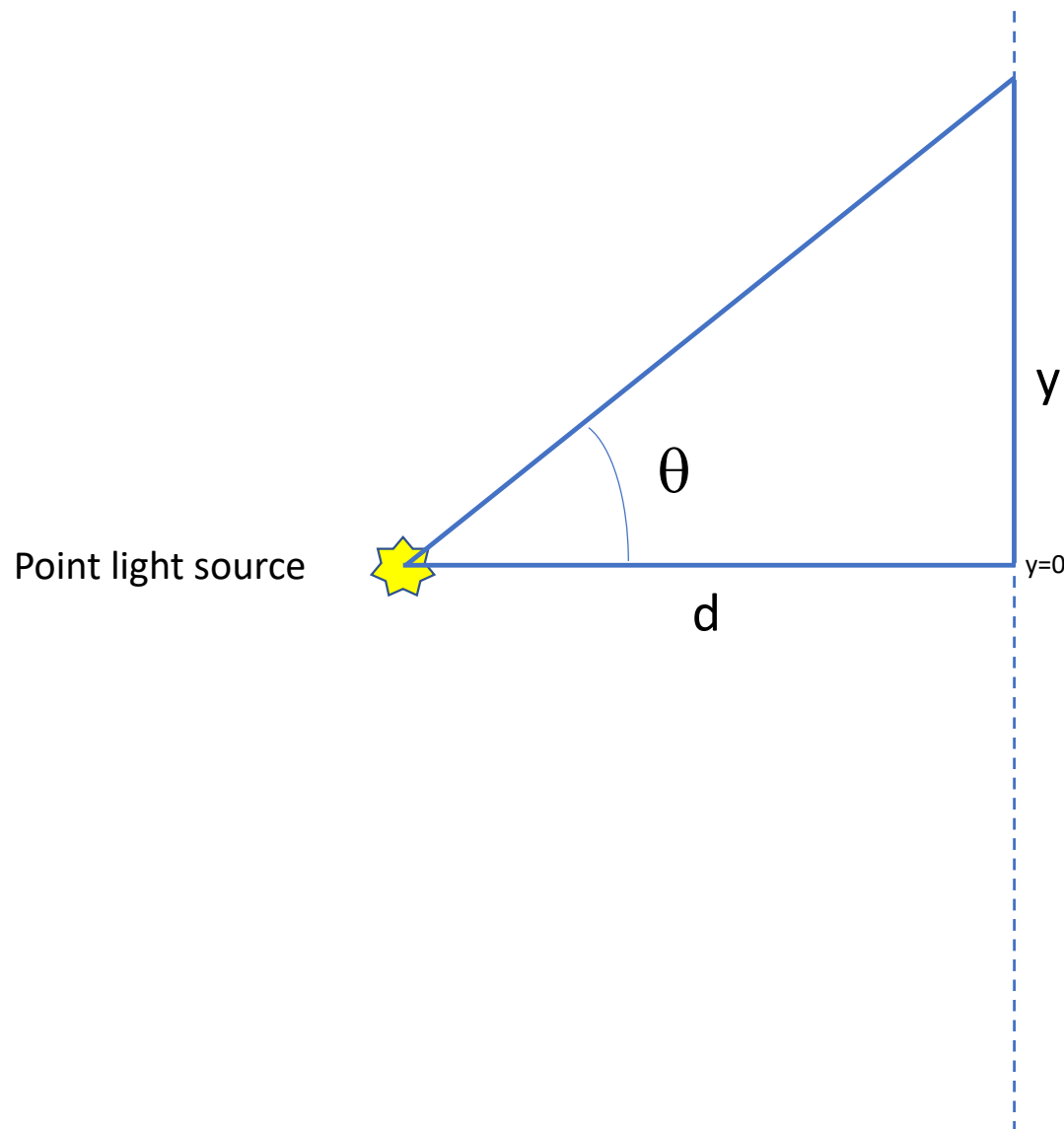


Point light source



Intensity (number of photons) in a flat screen follows a Cauchy distribution





The angular distribution of the photons in  $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$  is uniform:

$$f(\theta) = \frac{d\theta}{\pi}$$

We have:

$$\tan(\theta) = \frac{y}{d} \rightarrow \theta = \text{atan}\left(\frac{y}{d}\right)$$

Thus we can derive the PDF of  $y$ :

$$g(y) = \left| \frac{d\theta}{dy} \right| f(\theta) = \frac{1}{d\pi(1 + (\frac{y}{d})^2)}$$

Which is a Cauchy distribution