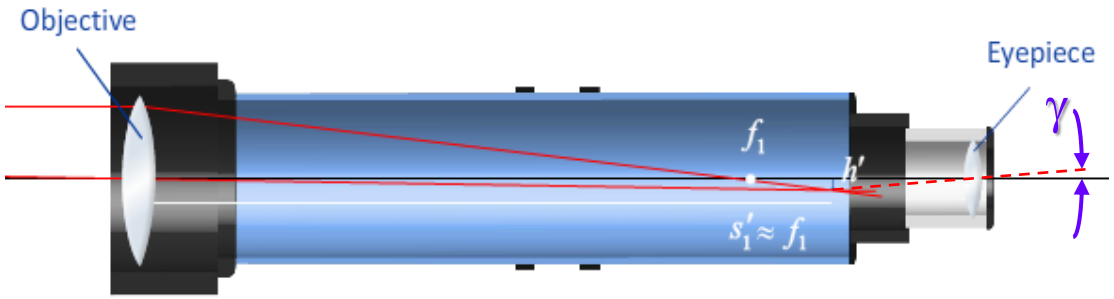
Angular Magnification: Telescope

How does this apply to things far away? E.g. the moon



- Your eye can focus rays that are parallel or slightly diverging
  - Assume for simplicity that the rays from the eyepiece are parallel

The math:

Objective: "1"

$$s_1' \approx f_1$$

$$M_1 = -\frac{s_1'}{s_1} = -\frac{f_1}{s_1}$$

Eyepiece: "2"

$$s_2 \approx f_2 \Rightarrow s_2' \to -\infty$$

$$M_2 = -\frac{s_2'}{s_2} = -\frac{s_2'}{f_2}$$

Geometry

$$\alpha \approx \frac{h'}{f_1}; \quad \gamma \approx \frac{h'}{f_2}; \quad M = \frac{\gamma}{\alpha} \approx \frac{f_1}{f_2}$$

$$M = M_1 M_2 = \frac{f_1}{f_2}\frac{s_2'}{s_1} \approx \frac{f_1}{f_2}$$