$$\text{Flux from star} \qquad F_* \qquad \left(\frac{\text{photons}}{\text{cm}^2 * \text{second}}\right)$$

$$\text{Number of photons from star} \qquad N_* \quad = \quad F_* \; \pi R_{\text{scope}}^2 \; t$$

$$\text{Number of photons from background} \qquad N_b \quad = \quad F_b \; \pi R_{\text{scope}}^2 \; t$$

$$\text{Signal to noise ratio} \qquad \frac{S}{N} \quad \simeq \quad \frac{N_*}{\sqrt{N_b}}$$

$$\frac{F_{*,\text{Coma}}}{F_{*,\text{Fornax}}} \quad = \quad 10^{-0.2(3.8)} \quad \simeq \quad 0.17$$

$$F_{b,\text{Coma}} \quad \simeq \quad F_{b,\text{Fornax}}$$

$$\frac{F_{*,\text{Fornax}} \; \pi R_{\text{HST}}^2 \; t}{\sqrt{F_{b,\text{Fornax}} \; \pi R_{\text{HST}}^2 \; t}} \quad = \quad \frac{(0.17 \, F_{*,\text{Fornax}}) \; \pi R^2 \; t}{\sqrt{F_{b,\text{Fornax}} \; \pi R^2 \; t}}$$

$$R_{\text{HST}} \quad = \quad 0.17 \, R$$