

Station Card: Telescope Resolution

Aperture and wavelength set diffraction limits

Dr. Anna Rosen

Name: _____ Section: _____

Date: _____

Station: _____ Group members: _____

Goal: Use the demo to make a claim supported by (1) at least one number/readout and (2) at least one sanity check.

Demo: /demos/telescope-resolution/

Artifact: a “can this telescope resolve it?” card.

Choose: - one telescope preset, - one wavelength (UV/Visible/Near-IR/Mid-IR/Radio), - one binary separation that is “marginal.”

Record: - the resolution (arcsec), - the resolved/marginal/unresolved status, - one sentence explaining *why* (link to λ and D , optionally atmosphere).

 Word bank + sanity checks

Word bank: - **Resolution (diffraction limit):** the smallest angular separation a telescope can distinguish. - **Aperture D :** bigger $D \rightarrow$ better (smaller) diffraction limit. -

Wavelength λ : longer $\lambda \rightarrow$ worse (larger) diffraction limit. - **Seeing (atmosphere):** turbulence can blur images beyond the diffraction limit; AO can partially correct.

Key relationship (diffraction-limited scaling):

$$\theta \propto \frac{\lambda}{D}$$

Sanity checks: - Increasing D should decrease the resolution number (better detail).
- Increasing λ should increase the resolution number (worse detail). - With “Include Atmosphere” on, the limit may stop improving unless AO is enabled.