

# Optics and Telescopes

- Telescopes: basic ideas.
- Refraction vs reflection.
  - Ray diagrams
- Characterising optics and telescopes.

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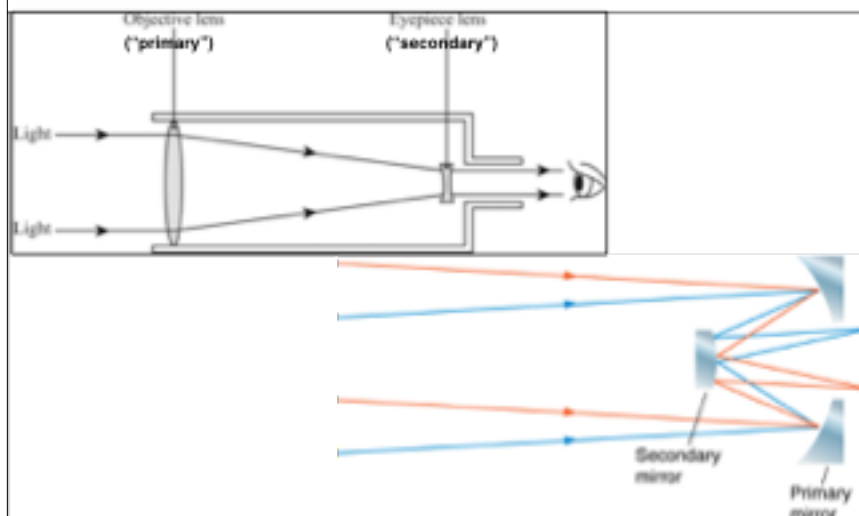
# Terminology

- "Telescope"
  - Shielding/ protection.
  - Light-directing apparatus.
  - Detector.



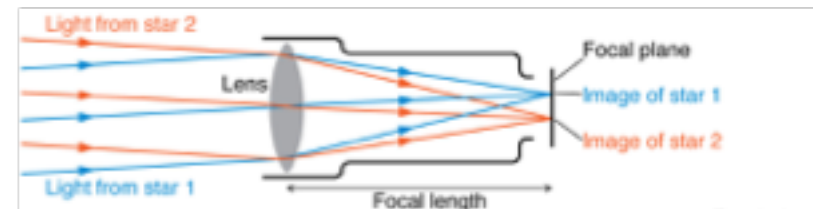
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# Telescope Optics



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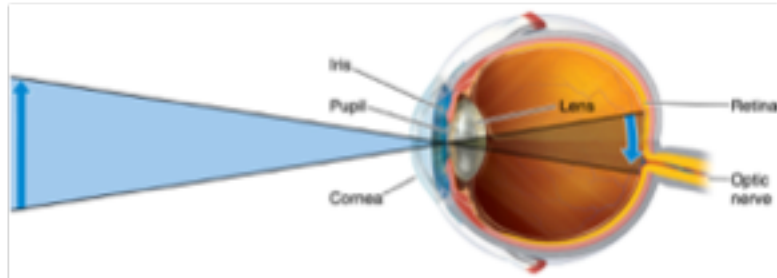
# Imaging on the Focal Plane



- Everything is upside down and backwards!

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## The Human Eye



- The eye is a self-actuating refracting telescope!
- Images form upside-down on your retina.
- Your brain interprets the image.

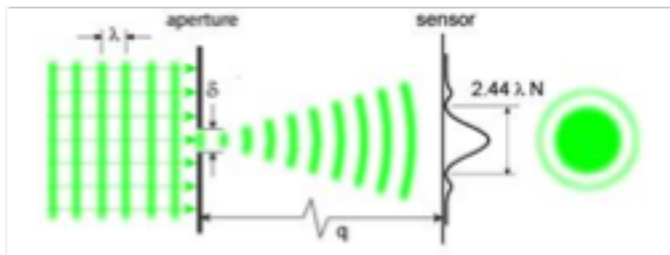
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## What we want from a telescope

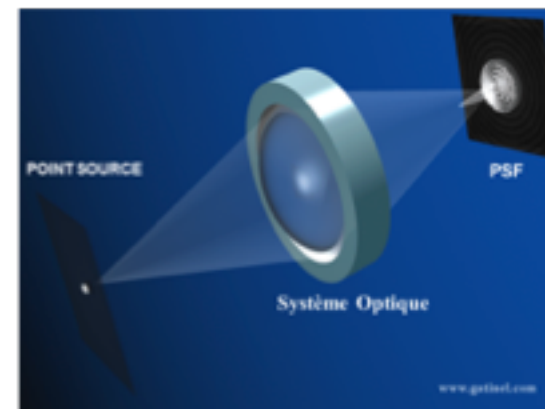
- Sensitivity boost (collect more light).
- Better resolution.
- Keep them a sensible cost (smaller, fewer materials).
- Magnification (for non-professional purposes).

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## Airy Disc

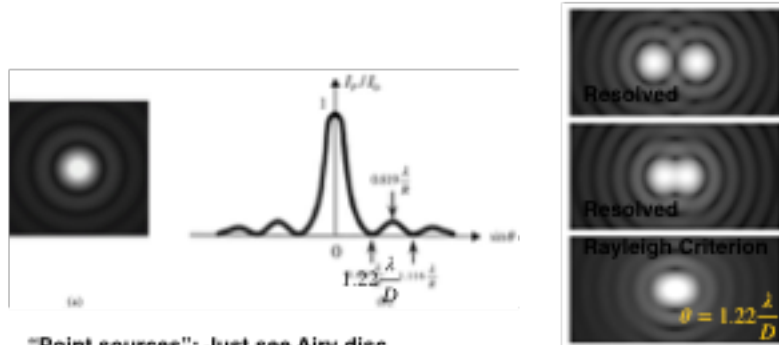


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## Resolving Two Objects

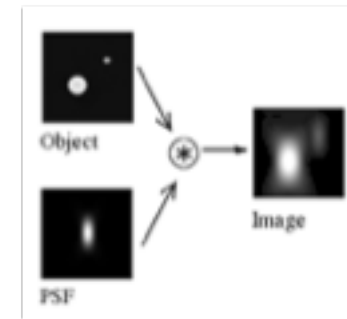


"Point sources": Just see Airy disc.

"Resolved sources": Larger angular scale than  $1.22 \lambda/D$

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## "Point Spread Function"



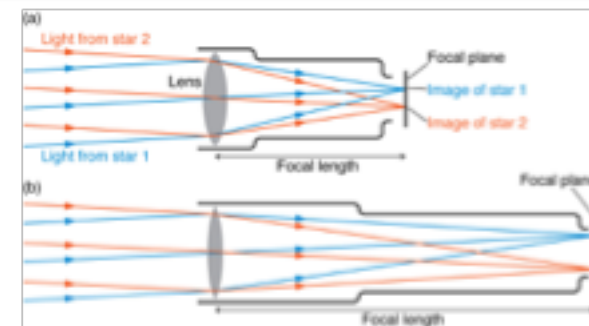
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## What we want from a telescope

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## Magnification



- Longer  $f$  = larger image, more magnification.
- Long focal length required – huge telescopes!
- **Note:** You don't get extra light with extra magnification!

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