

# Telescopes 2

10/19/2009

# Opening Discussion

- Have you seen anything astronomy related in the news?
- What did we talk about last class?
- Doppler demo.
- Grades from rooms?

# Impact of the Atmosphere

- Light pollution
  - Human made light scatters around the atmosphere just like sunlight.
- Turbulence
  - Air bends light. This makes stars twinkle.
  - Adaptive optics techniques can minimize this.
- Non-transmission
  - Some wavelengths just don't get through.

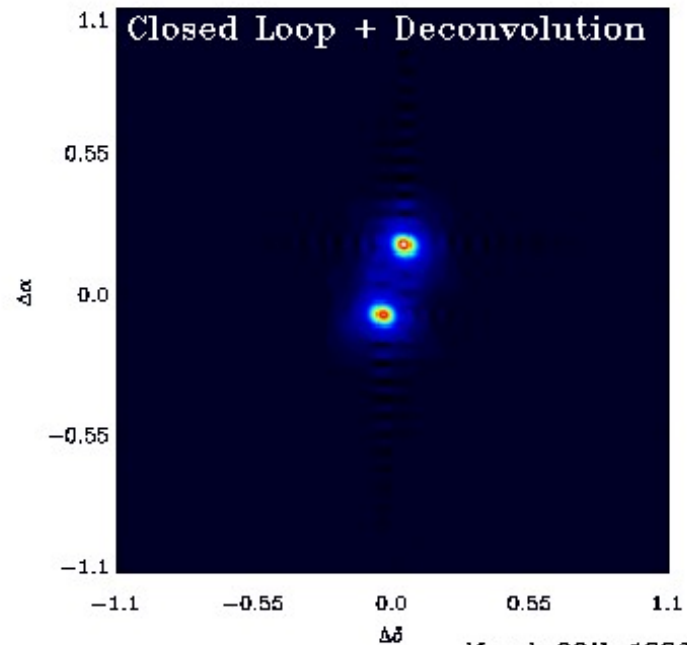
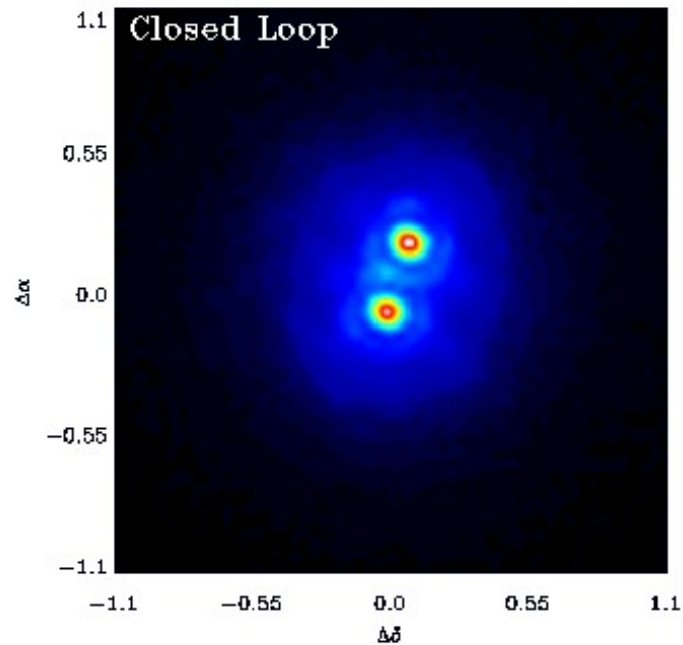
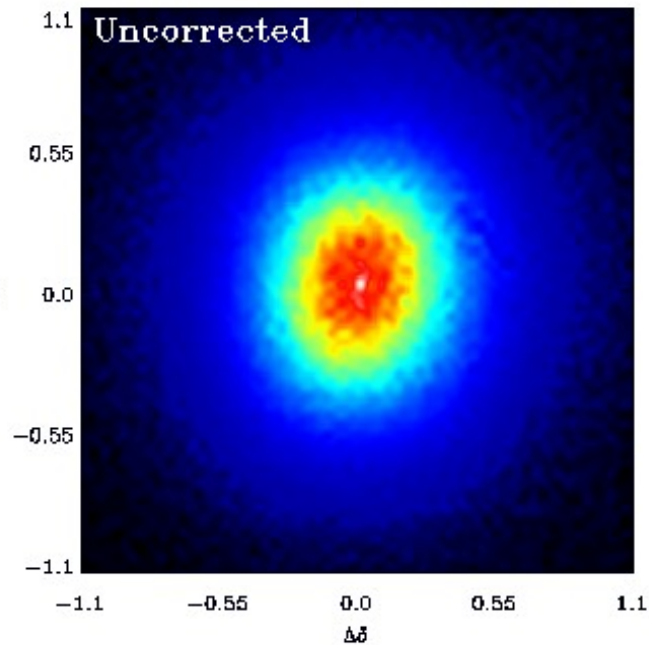
# Adaptive Optics

## *CFHT Adaptive Optics Bonnette & Monica*

Double star, separation=0.276"  
Seeing=0.7" @ 0.5mic

Magnitude=10.7  
Strehl Ratio=30%

H band, Integration=40 sec  
Maximum likelihood



March 29th 1996

# Telescopes in Space

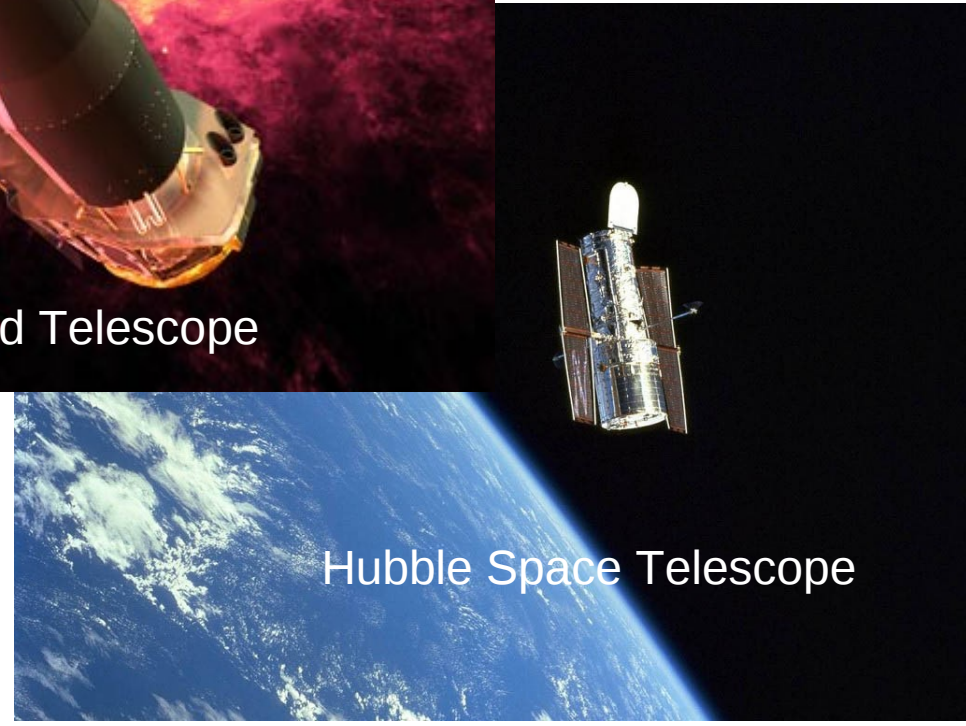
- To get past the problems of the atmosphere we occasionally put telescopes into space.



Spitzer Infrared Telescope



Chandra X-ray Telescope



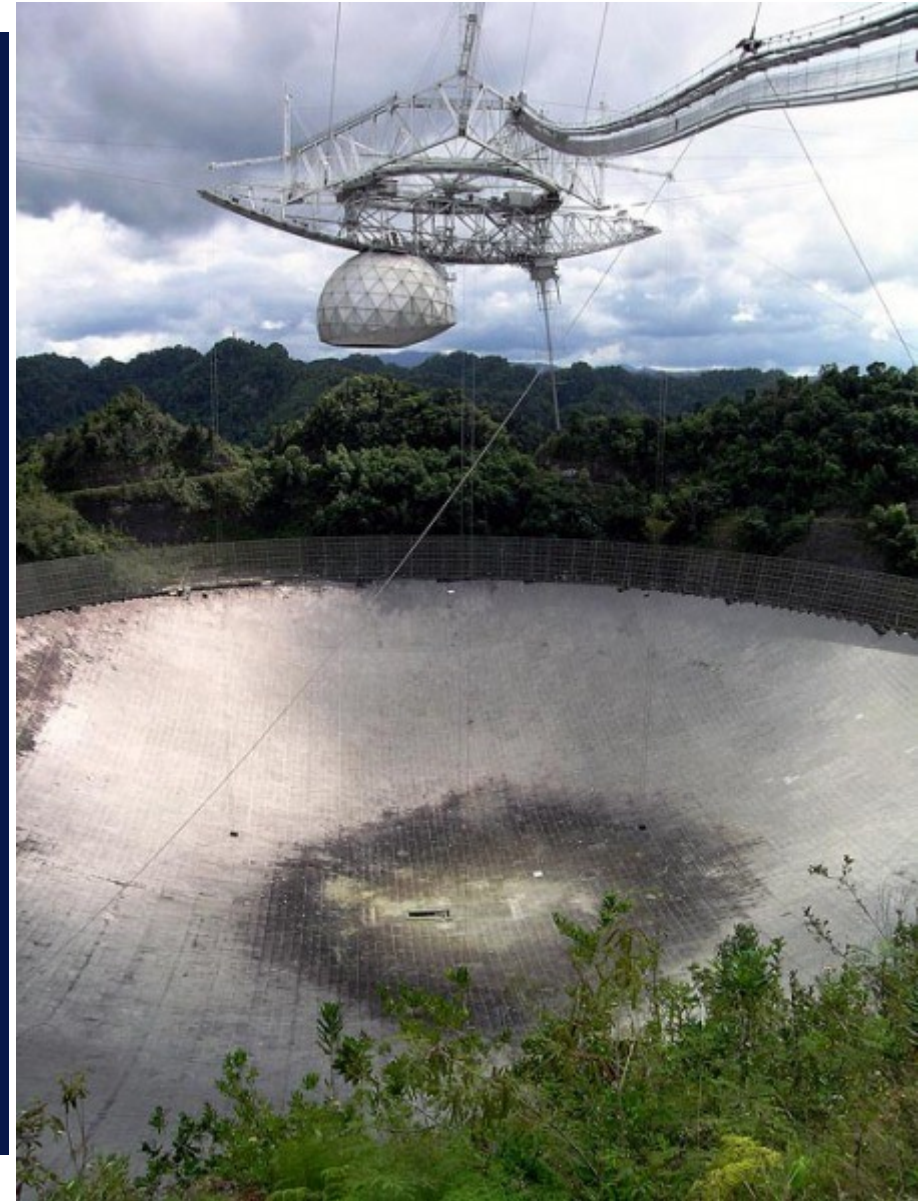
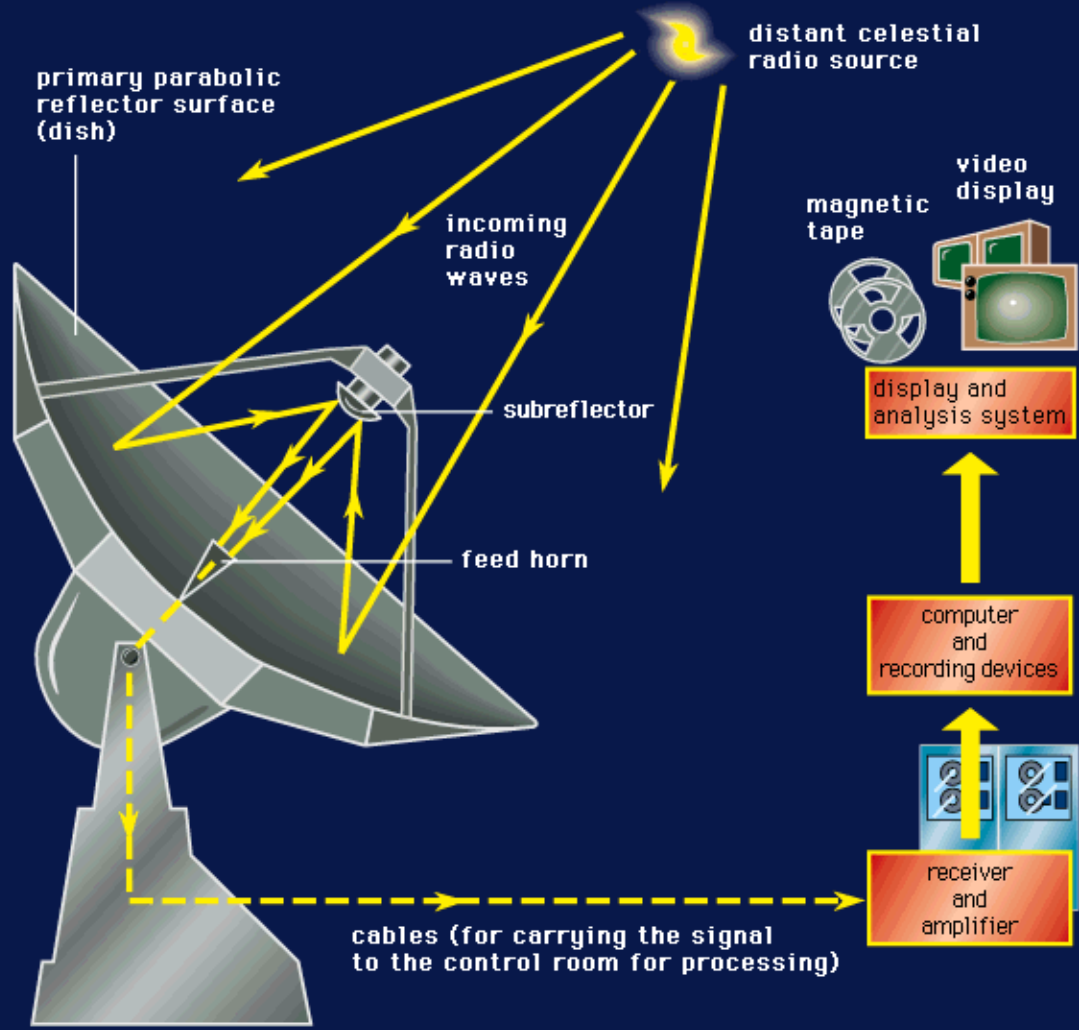
Hubble Space Telescope

# Telescopes for Non-Visible Light

- Visible light isn't the only wavelength of light that we use in astronomy.
- We build telescopes to observe other parts of the spectrum as well.
- With the exception of radio and some near-IR, these have to go into space.

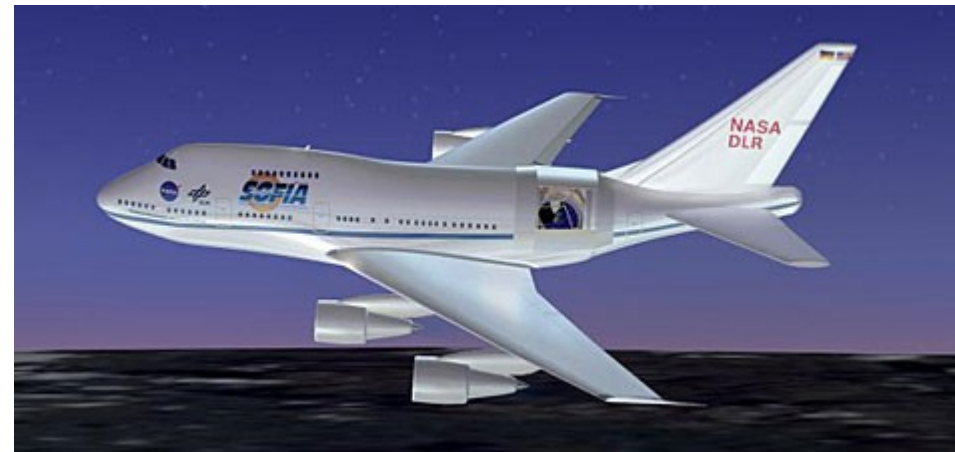


# Radio Telescopes



# Infrared Telescopes

- Can be built just like visible light telescopes.
- Near-IR can be done on mountain top telescopes.
- SOFIA is an IR telescope on a plane.
- Spitzer did far-IR. Needed to be chilled.



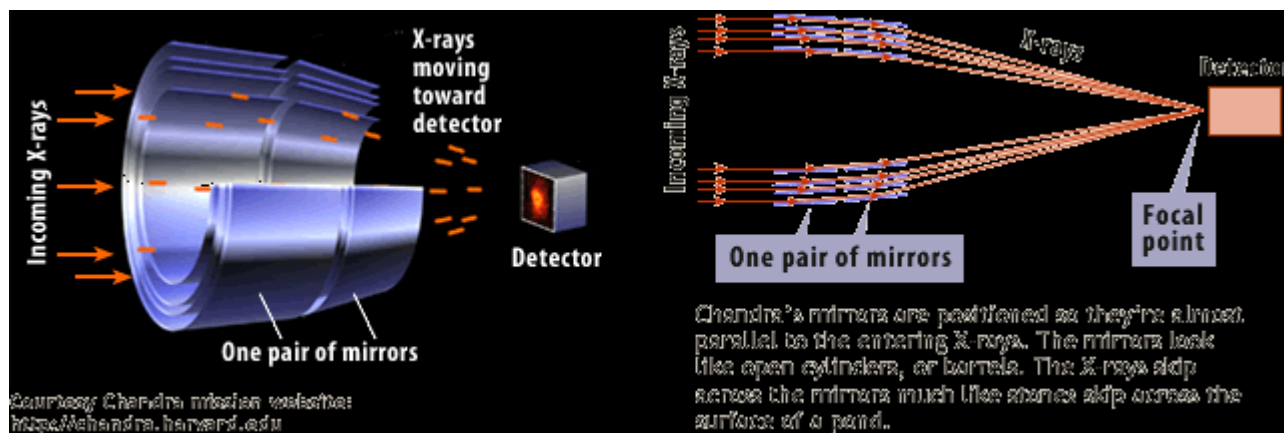


# UV Telescopes

- Most of this can be done with optical type instrumentation, but none can be done from ground.
- Several space UV telescopes have been launched.
  - FUSE – does UV spectrometry
  - GALEX – is doing a UV survey of the whole sky
  - Hubble

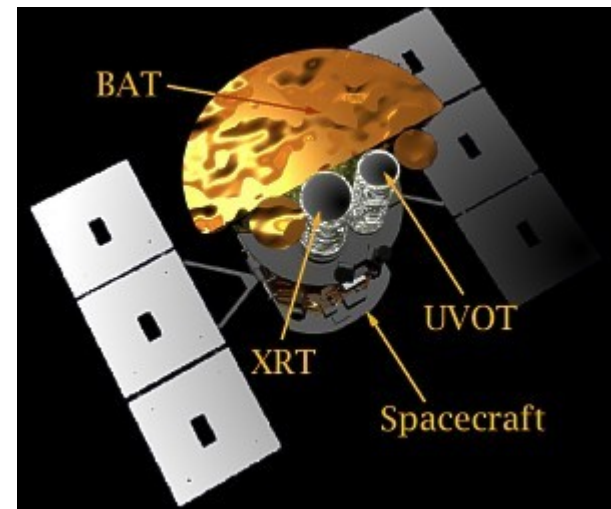
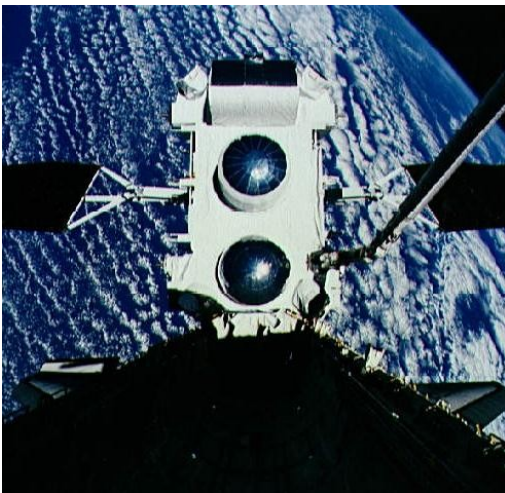
# X-ray Telescopes

- Because these go through most materials, they are very hard to focus.
- Use grazing incidence mirrors to focus them.
- Require telescope to be in space.



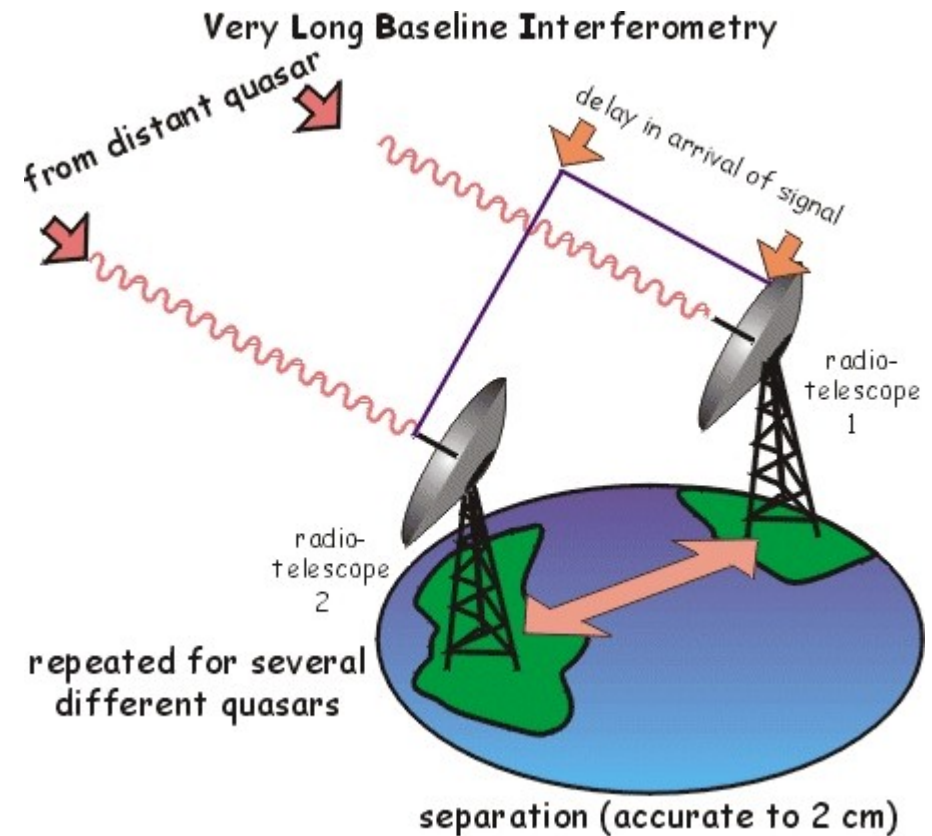
# Gamma-Ray Telescopes

- Virtually impossible to focus because they penetrate materials.
- Telescopes just try to pinpoint where they come from.
- Swift telescope also has x-ray and visible instruments for gamma ray bursts.



# Interferometry

- Interferometry is a technique to combine signals from multiple telescopes to boost angular resolution.



# Minute Essay

- Do you have any questions?
- Second midterm next class.
- Review session in Halsell (hopefully HAS 228) beginning at 3:30pm.
- Public talk tomorrow night at 7:30pm here for EC.