

# TOOLS OF ASTRONOMY

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Chapter 1 Section 2 Pages 8-13

## Odds and Ends

- Celebrate!!!!!!
- Earth or earth?
- Senses Lab

# Telescope

- **Telescope:**

- Instrument that gathers electromagnetic radiation from objects and concentrates it for better observation.
- There are two basic types of telescopes: Optical and Non-Optical.

# Optical Telescopes

- Most **common**
- Used to study **visible light** (ROY G BIV) from objects in the universe.
- Collects visible light and focuses it to a **focal** point for closer **observation**.
- The bigger the **objective** lens, the more **light** the telescope can gather.

# Mauna Kea Observatories (MKO) -Visible Light

- <http://www.ifa.hawaii.edu/mko/>



# 2 Types

- Refracting—
  - Uses a **lens**
  - 2 Disadvantages:
    - Images **Distorted (cannot be focused perfectly)**
    - Size is **limited** – Becomes too large , too heavy
- Reflecting—
  - Uses a **mirror**
  - 2 Advantages:
    - Mirrors can be **very large**
    - Can gather more **light**

# Non-Optical Telescopes

- Detects radiation not seen by the human eye
- Reveals more information about the object
- Place in space to get above Earth's atmosphere and avoid pollution.
- Types:
  - X-Ray
  - Infrared
  - UV
  - Radio
  - Gamma Ray

## Very Large Array – Radio

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<http://www.vla.nrao.edu/>

- The Very Large [Array](#) (or VLA), is the largest radio telescope in the world, and is made up of a group of 27 dishes, each being 25 meters (82 feet) in diameter, located near Socorro, New Mexico. The antennas located on each dish are synchronized together into a control room, where each small picture produced by the separate antennas is compiled into one large picture. This way of using many dishes and combining their picture produces the same result as an extremely large dish would produce.

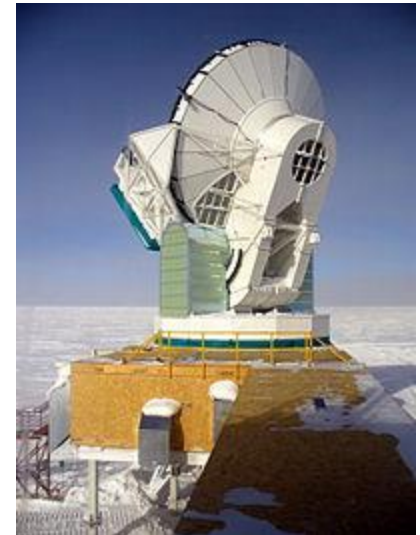


# VLA



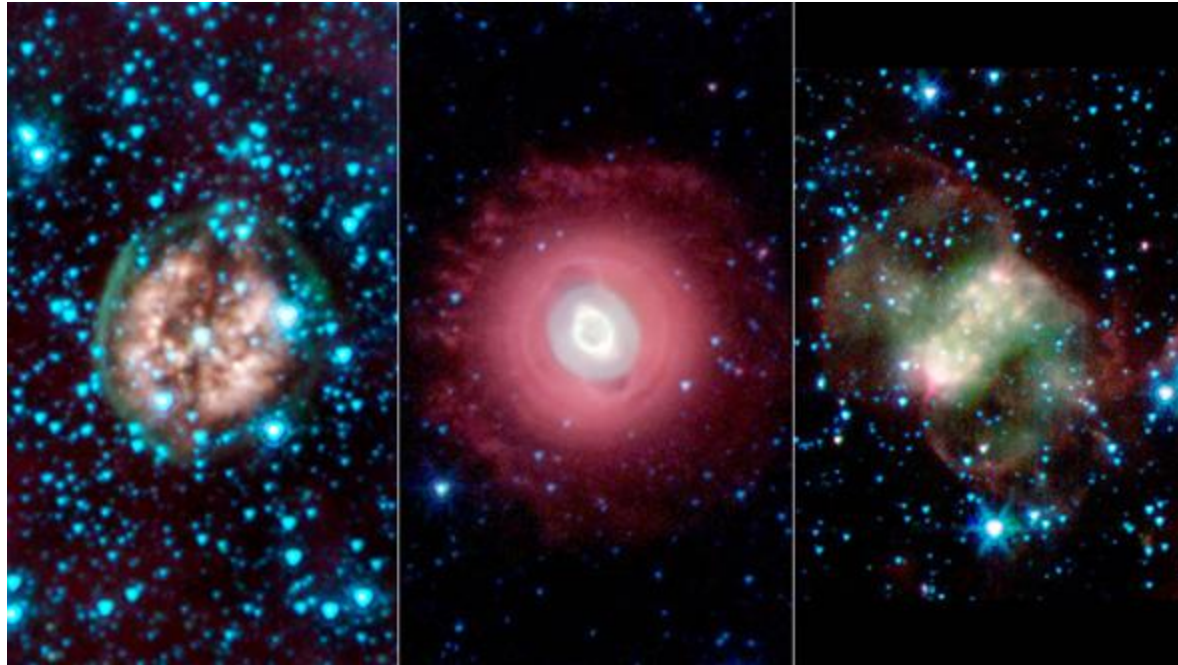
# South Pole Telescope - Microwave

- [http://en.wikipedia.org/wiki/South\\_Pole\\_Telescope](http://en.wikipedia.org/wiki/South_Pole_Telescope)
- **The South Pole Telescope (SPT)** is a 10 [metre](#) (394 [in](#)) diameter telescope located at the [Amundsen-Scott South Pole Station](#), Antarctica. The telescope is designed for observations in the [microwave](#), [millimeter-wave](#), and [submillimeter-wave](#) regions of the electromagnetic spectrum, with the particular design goal of measuring the faint, diffuse emission from the [Cosmic Microwave Background](#) (CMB).<sup>[1]</sup>



# Spitzer Space Telescope - Infrared

- [http://www.spitzer.caltech.edu/virtual\\_museum.html#/telescope/0](http://www.spitzer.caltech.edu/virtual_museum.html#/telescope/0)



# INFRARED VIDEO

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Discuss and turn in Notecard Summary

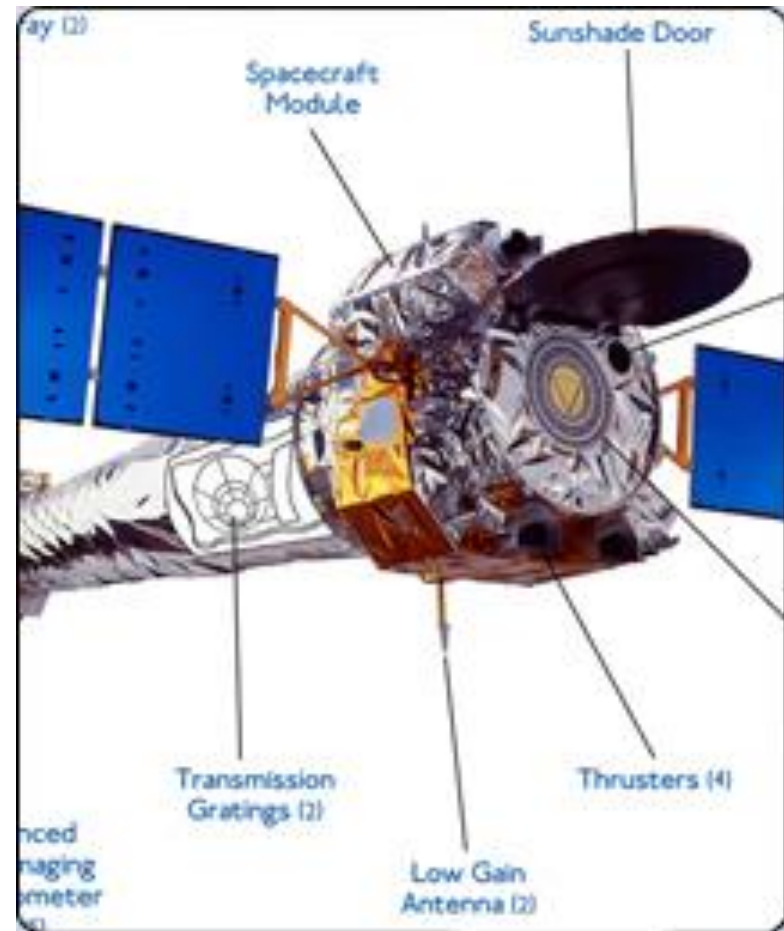
# Solar and Heliospheric Observatory - SOHO - -Ultra Violet

- <http://sohowww.nascom.nasa.gov/>



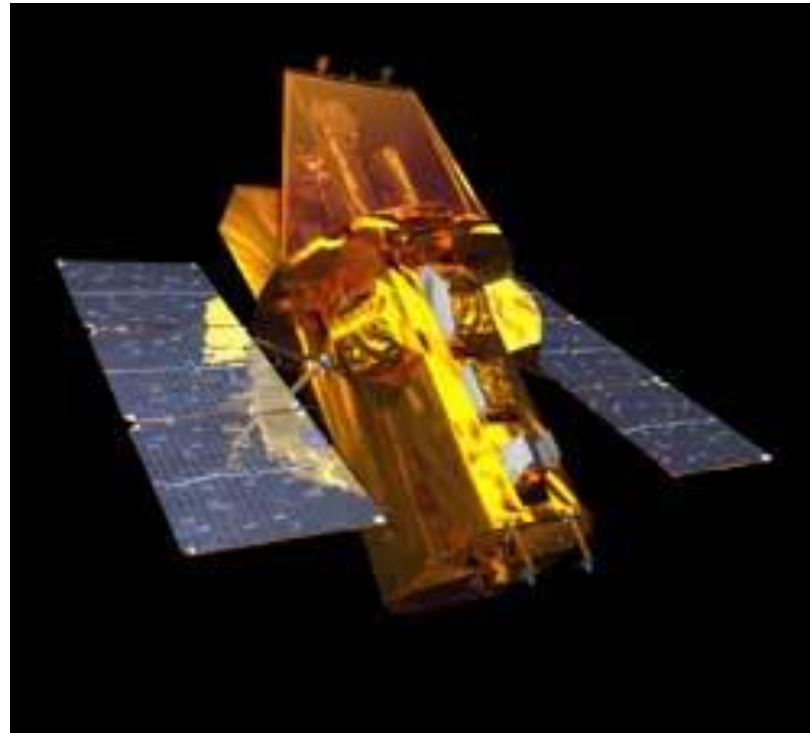
# Chandra - X-Rays

- <http://chandra.harvard.edu/>



# Gamma Rays

- <http://swift.gsfc.nasa.gov/>



# Electromagnetic Spectrum

- All the frequencies or wavelengths of electromagnetic radiation.
- Humans can detect only Visible Light with their eyes.
  - Red → longest      Blue → shortest
- Earth's atmosphere blocks most invisible radiation from objects in space.
- Atmosphere serves as a protective shield around Earth.



WAVE

DEMONSTRATION

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# VENN DIAGRAM

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Discuss and turn in.

# WORD ART

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Turn In.

LS #7 –

# THE INCREDIBLE HULK

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Begin: Due Friday, November 26