Chapter 14
The Milky Way Galaxy

Milky Way Galaxy
- Size and shape
- Parts
- Determining distance from variable stars
- Spiral Arms
- Dark Matter
- The Center

Figure 14.2A
Figure 14.2B
Figure 14.2C
William Herschel
How bright a star appears
How bright a star really is
How far away it is

If you know any two of these, you can easily calculate the third.

Henrietta Leavitt

The longer the period, the brighter it is.

If you know any two of these, you can easily calculate the third.
Period-Luminosity Relationship of Cepheid Variable stars allows them to be used to calculate distance.

Figure 14.1

Milky Way
Approx. 100 billion stars

Figure 14.2
If 99% of mass at center of the galaxy

If most mass in nuclear bulge
(this is what was expected)
The only way to explain this is:
1. The Milky Way is about 10X more massive than expected.
2. The mass is due to some unknown material in the halo
3. It is called “Dark Matter”

What is “Dark Matter”?  
1. Small particles smaller than atoms  
2. Massive cold astronomical bodies  
   • Planets  
   • Brown dwarfs  
   • Black holes
A supermassive black hole “lives” at the center of the Milky Way—millions of times more massive than a single star.