

29:52 Exploration of the Solar System
Class Notes for March 10, 2008
Electromagnetic Radiation and Exploration of Venus

Last time we saw that, although Venus is very similar to the Earth in size and mass, we can't see the surface of the planet. However, in spite of this we know a great deal about Venus, and even have a detailed map of its surface. This has come about through 2 technologies.

1. Spacecraft landings on the surface
2. Radio astronomical and radar astronomical measurements of Venus. The reason for this is that radio waves go right through the clouds of Venus.

To fully appreciate what radio astronomy and radar astronomy have done for us, it helps to discuss *electromagnetic radiation*.

Electromagnetic radiation is the term used in physics for waves of electric and magnetic field that propagate through space. These waves can be parameterized in terms of *wavelength*, noted by λ (or more simply by w), the speed at which they propagate, c , and the frequency of the wave f . The frequency is how many crests pass the observer per second. See more involved explanation in Chapter 6 of the textbook.

One of the truly amazing features of electromagnetic waves is that a seemingly wide variety of phenomena, such as gamma rays, x-rays, ultraviolet light, visual light, infrared waves, microwaves, and radio waves, are all just electromagnetic waves with different wavelengths.

Visual light refers to electromagnetic waves that are detected by the human eye. They have wavelengths in the range 4×10^{-7} to 7×10^{-7} m. Radio waves with a wavelength of about 0.12 meters (12 centimeters) are radio waves which are used in airport radars.

Be sure and look at Figure 6.2 of the book, which illustrates the amazing variety of electromagnetic waves.

A *spectrum* is a graph of the intensity of light as a function of the wavelength.