Chapter 20. Fundamental Stellar Properties and the H-R Diagram

Note. In this section we discuss a fundamental chart used in the study of stars.

Note. The *absolute magnitude* is the magnitude a star would have if it were 10 parsecs away. This is in contrast to the observed *apparent magnitude*. If both of these are known for a star, then it distance can be calculated.

Note. If we plot the absolute magnitude versus the spectral class of many stars then we get the Hertzsprung-Russell (H-R) diagram:

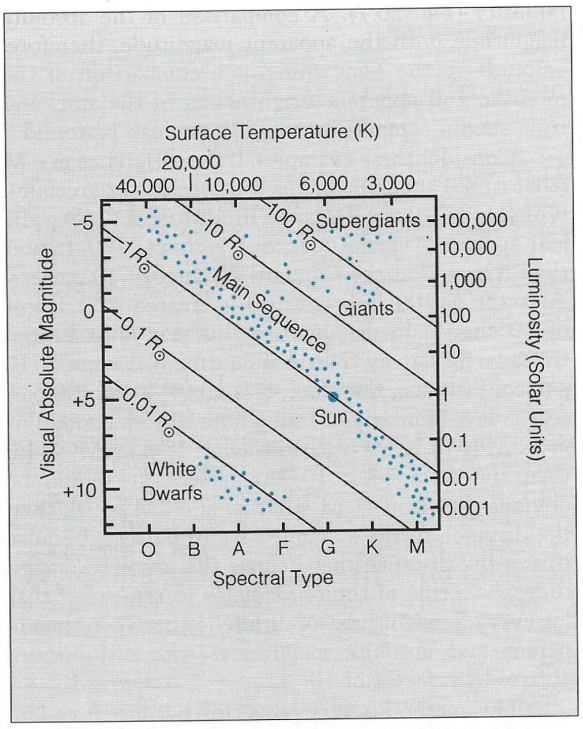

Figure 20.5. A Hertzsprung-Russell diagram

Note. Using the H-R diagram, if we can determine the spectral class of a star, then we can use this to determine its absolute magnitude. From this, the distance can be found. This is called *spectroscopic parallax*.

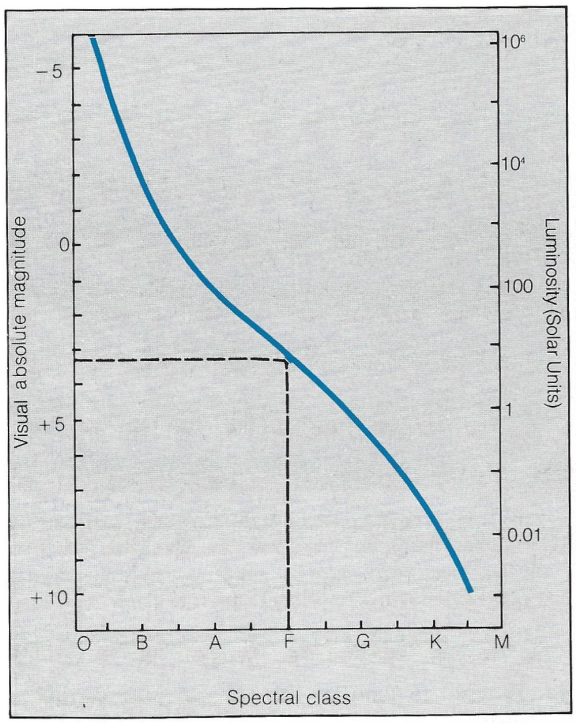

Figure 20.7. Spectroscopic parallax.

Note. Main sequence stars vary in size from 0.1 times the Sun's diameter (for M type stars) to 10 or 20 times the Sun's diameter (O and B type). Giants and supergiants may be 100 times the Sun's diameter. White dwarfs can be as small as 0.01 times the Sun's diameter.

Note. The only way to determine a stars mass is by observing its gravitational effect on another object. Most masses have therefore been determined from double stars. M stars on the main sequence are 0.05 times the Sun's mass, and O stars can be as big as 60 times the Sun's mass.

Note. The precise composition of a star is determined by making complicated model spectra and matching it to the star.

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