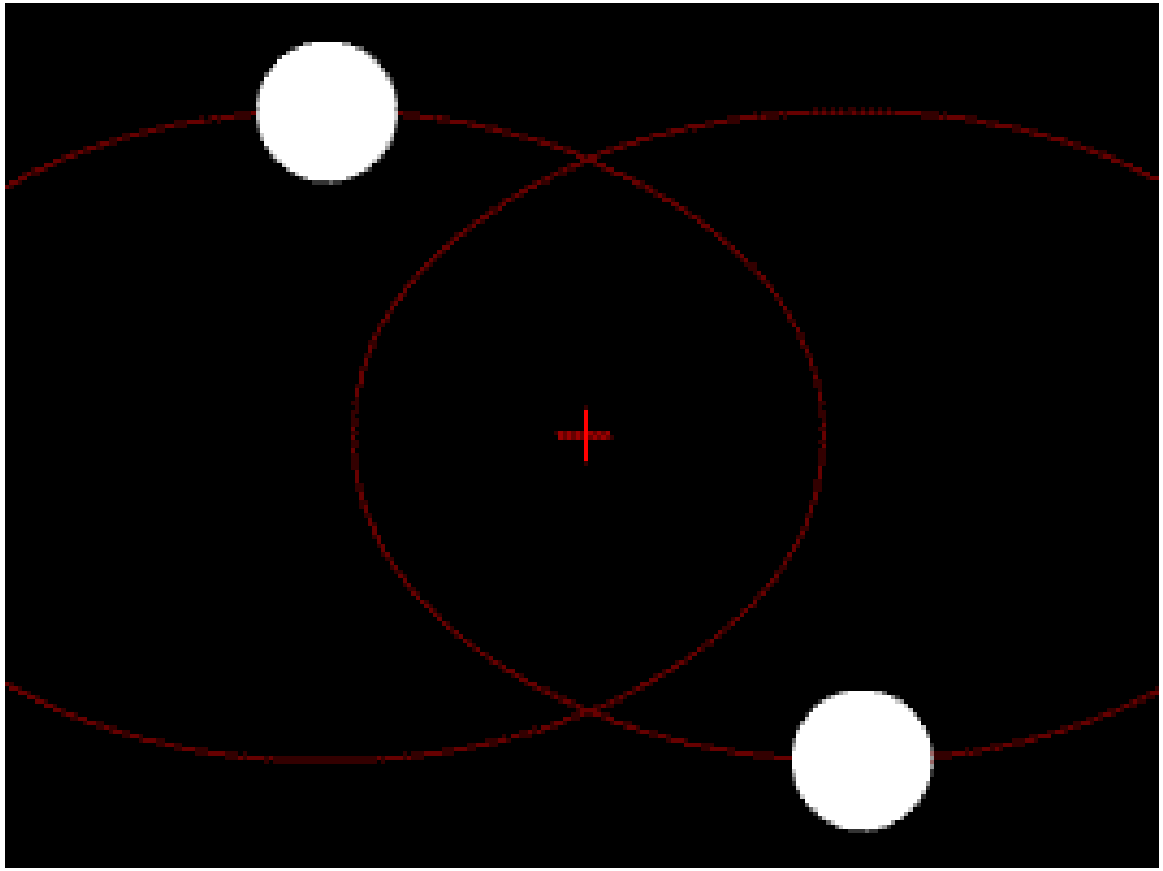

Binary Stars



A binary star system consists of two stars held in gravitational orbit around a common center of mass. The brighter star is called the primary while the dimmer star is known as the companion. The first binary orbit was computed in 1827 by Felix Savary. Since the we have found over 100,000 pairs but have only documented the orbits of a few thousand.

Binary stars are important sources of information

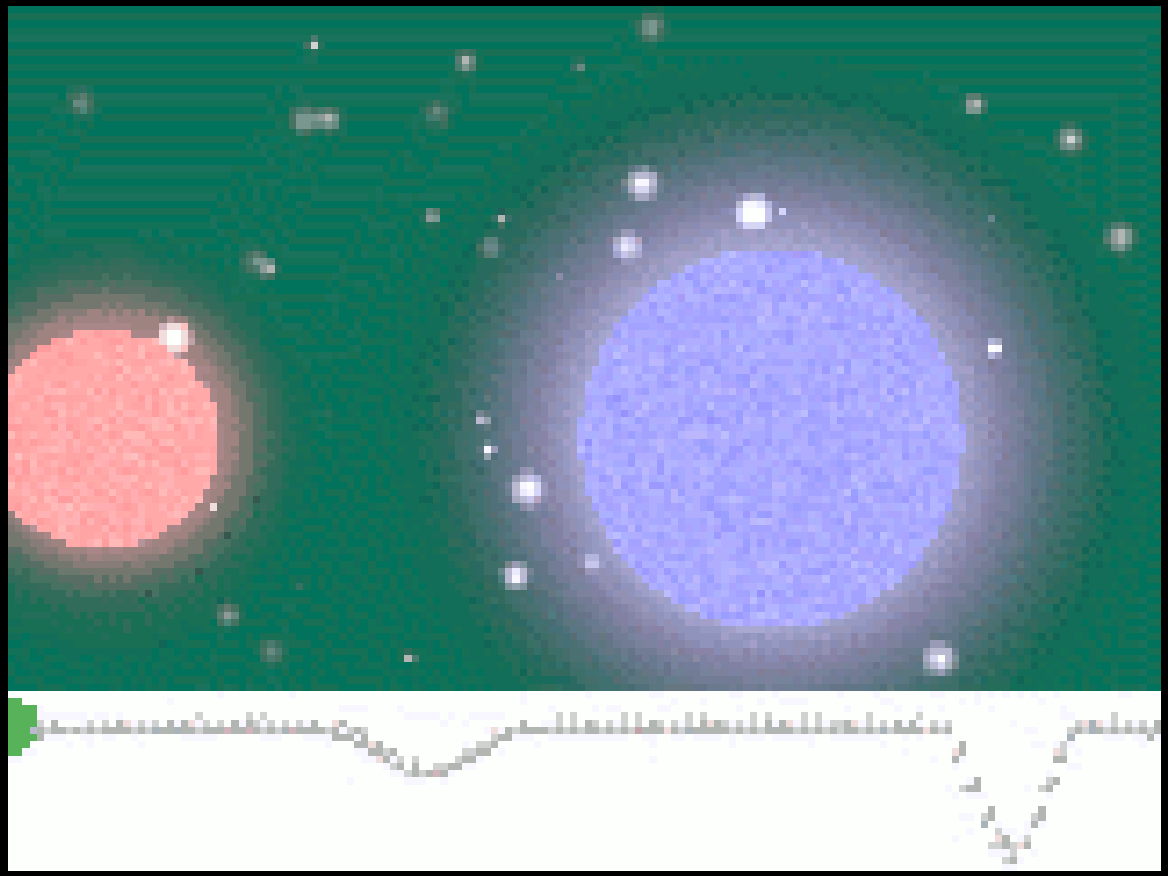
1/3 of the star systems in the Milky Way are binary. These stars provide astronomers with a way to determine the mass of other distant stars. Relations can be found between temperature, radius, and density to determine the mass. This information can be used when comparing component stars or non binaries. Mass-luminosity relationships are also examined.

Some names of famous binaries include Algol, Sirius, and Cygnus x-1.

Some orbital periods can be as long as millennia, so many orbits are uncertain. Our evidence comes from the Doppler effect on emitted light. If two binary systems come in contact, gravitational forces could disrupt both systems, resulting in runaway stars.

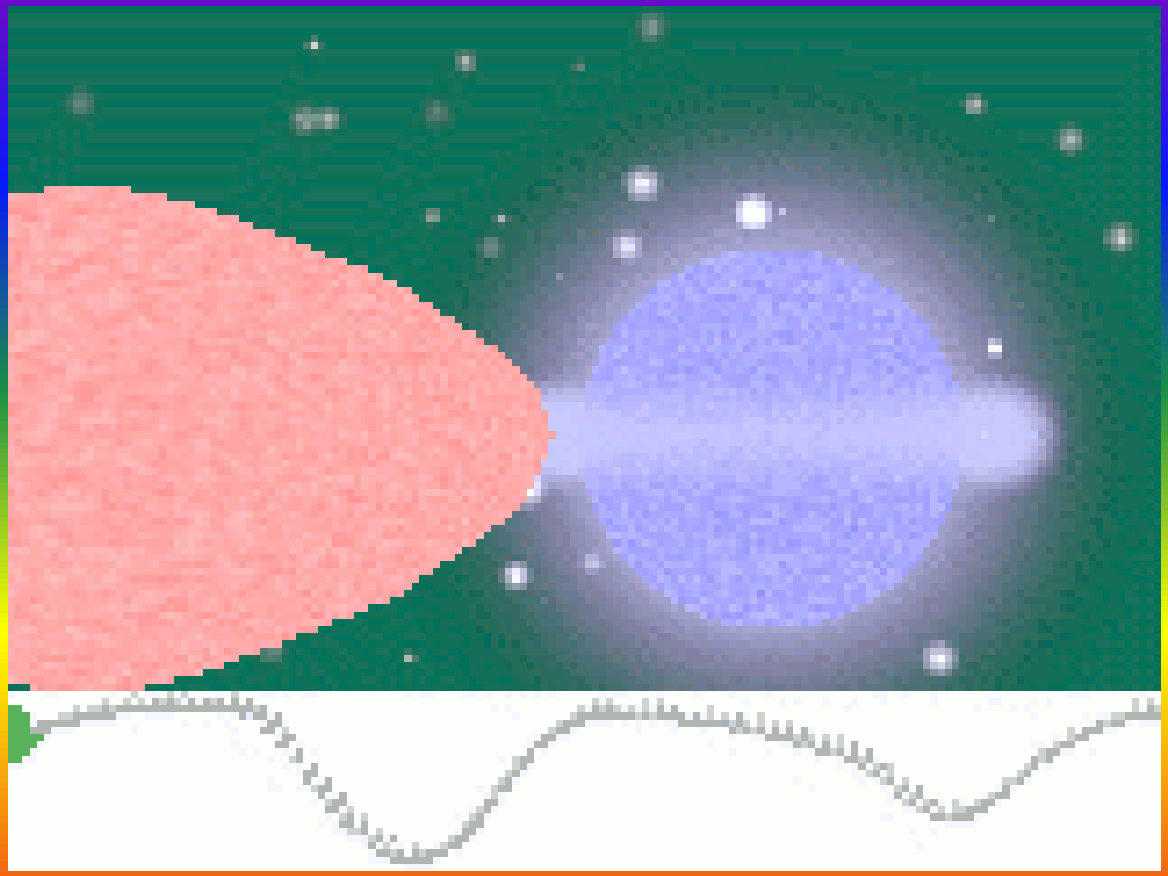
Binaries are not formed from their individual gravitational pull.

A single gravitating body cannot capture another. 3 objects would be required, with the third being rejected to result in a binary system. Rather, most binaries are formed in the fragmentation of the molecular cloud during the formation of protostars. Binaries are common in the nuclei of planetary nebulae. The stars are all thought to form at the same time while the massive stars evolve quicker.



Eclipsing Binaries

Eclipsing Binaries such as Algol undergo mutual eclipses. The light curve shows periodic drops in intensity. If one star is bigger, you will see a total eclipse. If one star is smaller you will see an annual eclipse. These stars have been used to provide distance estimations to the Andromeda and the Triangulum galaxies.



Mass Transfer

Mass transfer is the flow of gasses between close neighboring stars.

Food For Thought

Much of the information we have gathered about objects in the universe was derived from data provided by our observations of binary star systems.