Stellar Temperature & Luminosity
Student Page

Purpose

Use Wien's Law to determine the temperature of a star, and the Luminosity-Radius-Temperature relation to determine a star's luminosity.

Before you Begin

1. If the peak in the black body curve of a star is at a longer wavelength than the peak wavelength for our Sun, how does the surface temperature of that star compare to our Sun's surface temperature?

2. Which of the following events will have the largest effect on a star's brightness — doubling its surface temperature or decreasing its radius by 50%?

A.J.J.A.R. Programs Required

Wien's Law
Luminosity-Radius-Temperature Relation

Instructions

For the program "Wien's Law"
Determine the temperature using Wien's Law (Temperature = 0.0029/λ) where λ is in meters. If λ is in nanometers (nm), then the formula Temperature = 2.9 x 106/λ should be used. Temperature is always in degrees Kelvin.

For the program "Luminosity-Radius-Temperature Relation"
Input the correct luminosity for the given values of radius and temperature. Temperature, radius and luminosity are given in terms of the Sun's. In this case the relation $L=R^2T^4$ can be used.

Stellar Temperature & Luminosity
Teacher Page

Purpose

Use Wien's Law to determine the temperature of a star, and the Luminosity-Radius-Temperature relation to determine a star's luminosity.

Answers to Before you Begin

1. A star with a longer peak wavelength than our Sun's will have a lower surface temperature.
2. Doubling a star's temperature will have the greatest effect on a star's brightness.

A.J.J.A.R. Programs Required

Wien's Law
Luminosity-Radius-Temperature Relation

Additional Internet References

Blackbody Radiation Exercises
http://csep10.phys.utk.edu/astr162/lect/light/wien.html

Overview of Wien's Law
http://astrosun.tn.cornell.edu/courses/astro201/wiens_law.htm