Luminosity vs. Surface Temperature
The Hertzsprung-Russell (H-R) Diagram

NOTE: Here we use our knowledge of the Surface Temperature and Luminosity of stars to begin to search for a possible relationship between these two important quantities.

Ejnar Hertzsprung and Henry Norris Russell (circa 1910) were the first to plot and interpret a graph of stellar luminosity vs. stellar surface temperature. Their data included all of those stars for which parallax measurements had been painstakingly made up to that date (thus allowing the calculation of luminosity from the computed “parallax distance”). This plotting procedure is similar to what would be done in any branch of science when an attempt is being made to understand how objects work; i.e. plot one measured intrinsic quantity against another in the hopes that an equation can be found that will predict any observed mathematical relationship between the two quantities.

For the classic H-R Diagram shown below, we will always use the same x-axis and y-axis scales:

- y-axis: \( \log_{10} L \) ranges from \( 10^{-4} \) to \( 10^4 \) in units of solar luminosities
- x-axis: \( \log_{10} T \) ranges from ~2,000 to 20,000 in units of degrees Kelvin

This initial version of the H-R diagram shows the initial names associated with various regions of the graph where most of the stars are found to lie.