

## Activity 1: Temperatures and stellar spectra

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In this first activity, we introduce the measurement of stellar temperatures using Wein's displacement law and real, observed spectra taken from the Sloan Digital Sky Survey (SDSS). The activity aims at solidifying the understanding of what different wavelengths *mean* in the electromagnetic spectrum of light, and how these can be linked to obtain physical properties of stars.

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### Instructions

The data we show in Figures 1 and 2 is taken from the Sloan Digital Sky Survey (SDSS) Sky Server<sup>1</sup>. This is a server which hosts up-to-date data taken mainly from the 2.5m SDSS Telescope in Apache Point, New Mexico. On the one hand, Figure 1 shows *spectra* of real stars (that is, the amount of light from stars at different wavelengths), whereas Figure 2 shows the actual images of the stars as observed by the telescope; however, which star corresponds to which spectra is unknown. This will be one of the things *you* will have to figure out!

Activities:

1. Using Wein's displacement law ( $\lambda_{\max}T = b$ , where  $b = 2.89777 \times 10^{-3} \text{ m K}$ , where  $m$  is meters and  $K$  is kelvins), calculate the temperature of each of the stars using the spectra in Figure 2. Compare them to the temperature of the (surface of the) Sun ( $T = 5,778 \text{ K}$ ) — which are hotter than the Sun and which are cooler?
2. By looking at their spectra, try to match the spectra in Figure 1 to the stars in Figure 2. Can you relate color to temperature? How?

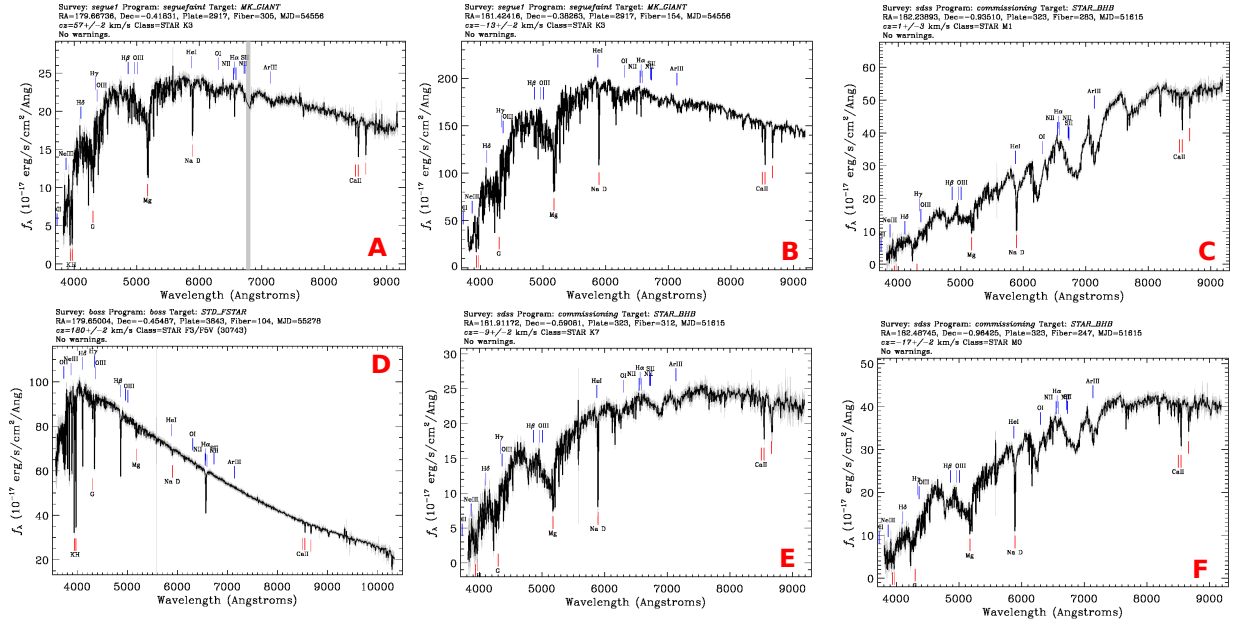


Figure 1: Set of real stellar spectra for the activity. Data taken from the SDSS.

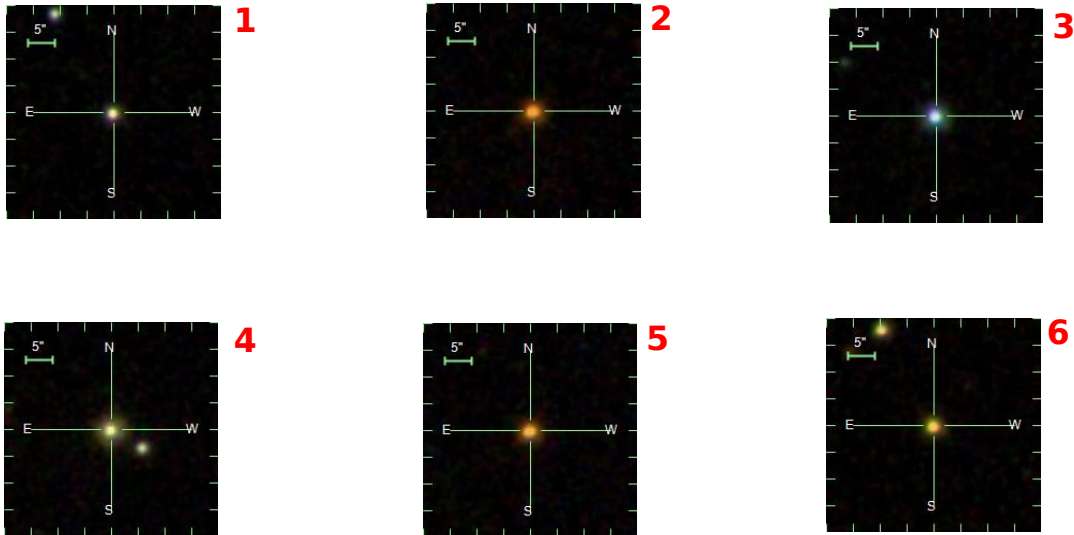


Figure 2: Set of stars for which the spectra in Figure 1 was taken. Data also taken from the SDSS.