Helium rich subdwarfs, in general, are very evolved stars. The surfaces of these stars have little or no hydrogen left in them. They are usually about half the mass of the Sun and between a tenth and a half its radius. Their surface temperatures range from about 30,000 Kelvin to 45,000 Kelvin. They are therefore much hotter than the Sun which has a surface temperature of 5,778 Kelvin. They are also much smaller and less massive than the Sun.

Methods:

The images on the left show the observed wavelength of a He I absorption line being measured. To get an accurate reading for the radial velocity, I used the program ELF to fit a parabola to a He I absorption line. The parabola could only be fitted to emission lines so the spectra had to be flipped to fit one. ELF gave the exact wavelength of the peak of the parabola, which gave an accurate reading for the observed wavelength and, therefore, the radial velocity. Using SIMBAD I got the right ascension and declination of each star and the date and time of each observation to calculate the heliocentric correction. This gave me the value of the heliocentric correction and allowed me to see if there had been a variation of radial velocity between observation large enough to constitute being in a binary system.

Conclusions & Evaluations:

This project successfully identified at least one star that was part of a binary star system with the possibility of one or two more. The star HE0111-1526 exhibited definite signs of being in a binary system. It showed a difference of 52.5 km/s in radial velocity between the two observations, as shown in the results table. The error for the radial velocity was calculated to be ±5.4 km/s for the first spectra and ±5.2 km/s for the second. The image on the left shows the results table for all ten stars analysed.

James Murphy, St Malacy’s College

The spectra of stars are not continuous. They exhibit absorption lines at well defined frequencies that correlate with the frequencies needed to excite electrons in one atom to another in various elements. The doppler effect is noticeable in these spectra because the exhibited absorption lines do not always appear at the frequency/wavelength that you would expect. They are instead, shifted slightly. If the source is approaching us, then the wavelength will decrease and the frequency will increase therefore the absorption line will shift toward the blue end of the electromagnetic spectrum. It will be blue shifted. Reciprocally, if the wavelength increases and the frequency decreases it will be Redshifted. Shown Left.