PHYS 4270 / 5390 – Astronomical Techniques Practical Stellar Photometry

Due: (upload by) Thurs 1 October at 2:00 pm

1. There are four filter transmission curves provided in separate text files on the course website for the Cousins-Bessel *U, B, V* and *R* filters. Each file consists of two columns of data: (1) the wavelength in nm and (2) the transmission through the filter at that wavelength expressed as a percentage.
   1. All students: For each of the filters, calculate the peak wavelength, λo (nm), Δλ the FWHM of the filter (nm), and λe (nm) the effective wavelength of the filter. (Be sure to include the definitions of each in your answer.)
   2. PHYS 5390 students: The file “StdStar\_flambda\_0p5nm.txt” on the website is a two-column text file. The leftmost column gives the wavelength in nm, while the rightmost column gives the relative flux in *f*λ units for this standard star. Given the following colours for this star, compute the photometric constants for (*U-B*), (*B-V*) and (*V-R*):

|  |  |
| --- | --- |
| Colour | Magnitudes |
| *U – B* | -1.30 |
| *B – V* | -0,23 |
| *V – R* | -0.18 |

1. Do questions 13, 14 and 15 from Chapter 1 (p. 13) of your notes. The data to be used in each question are provided in both Excel formats and a plain text format.

Marks will be awarded for the correct answer, *but marks will also be awarded for neatness and clarity of presentation*. Slapping a few numbers down on a page with a slope and intercept are of little value, even though they may be correct. In order to demonstrate you really know what is going on, you will need to describe each of your steps, letting the reader know your train of thought as you developed your solution. In the event that some calculations are repetitive, there is a need only to show one calculation completely. (No need to go overboard here, of course, but the tendency of most students is to go “underboard”!)

In this assignment, you may be challenged with “discrepant” data. (Science is, in part, an art and here is where the “art” part comes in.) It is *insufficient* to simply ignore data you do not feel are “good.” You need to develop a clear, quantitative reason for ignoring any data points. (While there are no perfect guidelines for ignoring data, one should only ignore a few percent of your data, and should decide beforehand a rule for ignoring data; e.g., more than n-sigma.)

The course website has some basic tutorials on using Excel, including simple plotting. Since you will likely be using Excel (or its equivalent) for many solutions this year, it would be good to review these tutorials. One last remark (for what it’s worth): “data” is plural; “dataum” is singular.