# THE POSITION OF THE SUN IN THE HR DIAGRAM

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## ABSTRACT

Since the absolute magnitude of the Sun is known accurately and the solar spectrum defines spectral type G2 V, it would appear that the position of the Sun in the HR diagram is well established. However, the color of the Sun and its metallicity relative to other stars remains controversial. It is known from theory that stellar groups of differing composition will have different main sequences.

The observed difference in the strength of the metallic lines in Coma stars relative to Hyades stars is caused by a systematic difference in [Fe/H] of less than 0.2 dex or 50%. Photographs and quantitative measures of the systematic differences between the Hyades and Coma spectra are presented. Visual comparison and quantitative analysis of the solar spectrum relative to Hyades and Coma spectra reveal that the Sun is metal rich similar to the Hyades stars rather than of normal disk metallicity as represented by Coma stars. Evidence is presented showing that the color and spectral line strengths of the Sun are more similar to stars classified G3 and G4 in the literature than G2. If the Hyades modulus is $y = 3^{m}.25$, the (B-V) color of the Sun must be $0^{m}.65$ or redder for the Sun to be on or above the Hyades main sequence.



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DISCUSSION

*HARDORP:* In searching for stars whose ultraviolet absorption features match those of the Sun, I found the same as Dr. Barry: all matching stars have (B-V) = $+0\overset{m}{.}66$. More details can be found in a paper in the Poster-Session of this symposium, page 423.

*BELL:* I think it would be interesting if you were to plot similar diagrams of solar line strength versus $H_\beta$ since, as you pointed out, the solar colors do depend quite sensitively on the adopted solar hydrogen line strength.

*BARRY:* The relation between ΣH hydrogen line strength index and $H_\beta$ for Hyades and Coma cluster F stars has been published (Astrophys. J. **212**, 462, 1977). The correlation is quite tight. However, the $H_\beta$ index is not useful for stars cooler than GO because of the weakening of $H_\beta$ and the strengthening of the nearby metallic lines with decreasing temperature. The solar (U-B) color reported here is not sensitive to the measured hydrogen line strength ΣH. The (B-V) color is only mildly sensitive. The colors are sensitive to the amount of line blanketing in the solar spectrum relative to other G dwarfs. If our determination that the Sun has no ultraviolet excess is assumed correct, the correlation between ultraviolet excess and the residuals in the data of those workers who found a "bluer" Sun may be used to correct their results for blanketing effects such that they are brought into agreement with the majority of workers who have found a redder Sun. Considering the results of all previous workers and our own, we find mean values of $(B-V)_{Sun} = 0\overset{m}{.}667$ and $(U-B)_{Sun} = 0\overset{m}{.}18$.

*BELL:* I would like to ask how you obtained the solar spectrum?

*BARRY:* The solar results are based on two spectra of moonlight and two spectra of a satellite of Saturn. They are widened 1 mm and have a resolution of 2 Ångstroms.

*CRAWFORD:* I think you should really use (R-I) as your abscissa. The β vs. (R-I) relations are very good for late F and early G type stars, and are essentially independent of blanketing. Good (R-I) would be better than ΣH, β, (B-V), etc.

*BARRY:* I tried that with published values of (R-I), and found so much "noise" that I couldn't separate the Hyades from Coma. Crawford has new values of (R-I), and with these I might get better results.