# GOLAY STELLAR BOXES IN THE STRÖMGREN FOUR-COLOR SYSTEM

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Hauck and Mermilliod (1978) have compiled a new catalogue of approximately 20,000 observations in the Strömgren four-color system. Using the facilities of the Stellar Data Center in Strasbourg, Egret and I have revised the computer program that dereddens the indices to take into account recent revisions made by Crawford (1978) in the routines for handling B stars. Then, following the method of Golay (1978), we have constructed stellar boxes in the four-color system.

The observed four-color indices are transformed to Strömgren's bracket quantities and the stars are then separated into B, A intermediate, A and F groups according to relations given by Strömgren (1966, 67) involving [u-b] , [m] , and β. Dereddening formulae for B stars (Crawford 1978), A intermediate (Claria 1974), A and F stars (Crawford 1975ab) allow one to arrive at the intrinsic colors for all normal, Population I, luminosity class V - III stars. Certain stars are rejected; for example if $(b-y)_o$ is $< -0.04$ (peculiar star), if $c_o > 1.19$ or $\delta c_o > 0.28$ (evolved star), if $(b-y)_o$ is positive and $\beta < 2.614$ (G star). The details can be found in Philip, Miller, and Relyea (1976) in which, out of an original 8237 stars, 5183 had individual reddenings calculated. For these stars temperatures, gravities and absolute magnitudes were also calculated. With the data base now expanded to 20,000 stars we may expect well over 10,000 stars in the new dereddened catalogue.

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We first experimented with Golay's concept of stellar boxes by looking up the four-color indices for stars in Geneva system stellar boxes. It turned out that these stars defined a stellar box in the four-color system also. We wrote a program to form stellar boxes in the four-color system, but using the dereddened data. The first computer printout arrived just the day I left Strasbourg, so I can give only a preliminary impression of the results. The four-color boxes were populated by more stars than in the Geneva system. There are two reasons for this; first, there are more observations in the four-color system at the present time than in the Geneva system, and second, since we are dealing with dereddened indices our boxes are not spread out over many different values of the reddened indices. In our catalogue, when we compare a stellar box with a corresponding MK spectral type there will be many more stars with which to make the comparison.

The $H\beta$ index is carried along with the four-color indices, but the $\beta$ index was not used to define the stellar box. The boxes were defined by transforming the (b-y), $c_1$, and $m_1$ indices back to b, v, and u magnitudes, assuming $y = 10^m$. Stars whose b and v mag. differed by no more than 0.01 mag. from the central star in the box and whose u mag. differed by no more than 0.02 mag. were defined to be in the same stellar box. In many of the four-color boxes, although many of the $\beta$ indices were very close to one another, there were stars with quite different values of $\beta$. We need to follow the lead of the Jascheks and find spectral types for the stars in a stellar box and then see what correlations develop with the $\beta$ index.

The concept of stellar boxes is a valuable one and I think that its application in another photometric system will yield very interesting results. I am indebted to Dr. Hauck and Dr. Golay who arranged my visit to Geneva Observatory and to Dr. Florsch and Dr. Jaschek who arranged my stay at the Observatory of Strasbourg and the Stellar Data Center, which made all this work possible.

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DISCUSSION

Coyne: Jaschek has spoken of a preference not to deredden before placing stars in a photometric box. You have dereddened and, therefore, placed more stars in a given photometric box. What is preferable?

Philip: At the present time there are no published dereddening routines available for the Geneva System, therefore in that system stellar boxes can be formed only from the observed indices. In the four-color system it is possible to deredden the indices to obtain the intrinsic colors of stars. Thus stars which, for example, are moved out of their original stellar box by 0.1 magnitude through interstellar reddening can be moved back into their original box. As long as one is dealing with stars in areas of normal reddening and as long as the reddening value is not too high, this process works well.

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