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ULTRAVIOLET PASSBANDS FOR A SPACE MULTICOLOR PHOTOMETRIC SYSTEM

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Abstract. The results of search for the optimal location of ultraviolet passbands for an extra-atmospheric photometric system are given. The addition of passbands near the well-known extinction bump at 218 nm to the photometric system makes it possible to determine interstellar extinction with greater precision than with the photometric system without UV passbands.

Key words: ISM: extinction – techniques: photometric

When choosing optimal ranges for a multicolor photometric system, the possibilities of earthbound astronomers are limited by the spectral transmittance of the Earth's atmosphere. The development of space technology enables astronomers to place their observational facilities beyond the atmosphere, and this opens new windows for photometric observations of celestial objects. The UV spectral range is of specific interest for studying interstellar reddening because it contains the pronounced bump in the interstellar extinction law at 218 nm, possible variations of which are important for the research of the interstellar medium and Galactic structure.

Optimal locations and widths of the passbands were investigated by means of synthetic photometry. Mean spectral energy distributions of stars of different types were taken from Sviderskienė (1988). Additionally, we used energy distributions in the spectra of real stars from Heck et al. (1984) and Kharitonov et al. (1988). The interstellar extinction law was taken from Fluks et al. (1994).

We came to the conclusion that one of the best systems for the determination of interstellar reddening is a three-color system with passbands at 190, 220 and 350 nm. Half-widths of the passbands may be taken, for example, equal to 20, 20 and 40 nm, respectively. The two-color diagram $F19 - F22$, $F22 - F35$ is displayed in Figure 1. The diagram shows that the reddening lines have large inclinations to the locus of intrinsic color indices in a wide range of spectral types, at least down to F5, thus, being useful for evaluation of interstellar reddening over a wide range of spectral types.

It is obvious that a greater color excess can be measured with less error. However, the basis of color index short of 218 nm band is limited by an abrupt decrease of intensity in energy distribution curves of stars later than F0. From the long wavelength side the limitation is the Balmer jump position.

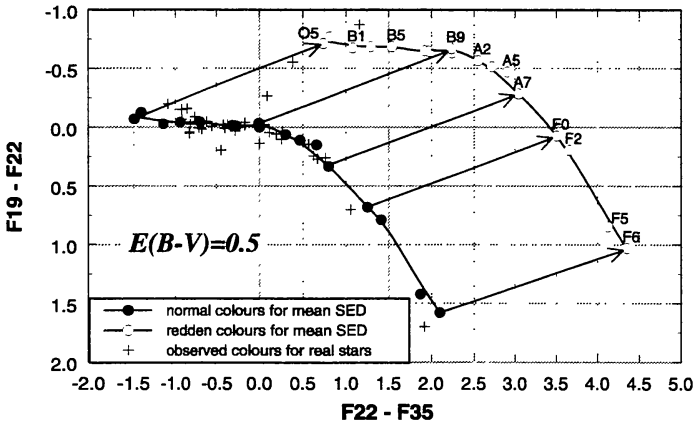

Fig. 1. Two-color diagram for the proposed photometric system.

In the Galaxy the number of A/F stars considerably exceeds the number of O/B stars. Thus, investigation of interstellar extinction can be done in almost all directions, even at higher Galactic latitudes where O/B stars are almost absent. Modern technologies can produce CCD chips sensitive to radiation in the UV range considered. Incorporation of the proposed UV passbands into a space photometric system should be of great importance for more complete determinations of interstellar reddening in the Galaxy.

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