

SPECTRAL ANOMALIES IN THE HYADES AND PLEIADES AND IN FIELD STARS WITH ACTIVE CHROMOSPHERES

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ABSTRACT. Widened photographic image-tube spectra at  $50 \text{ \AA mm}^{-1}$  dispersion have been obtained for a large number of late-type field dwarfs and giants with well-determined atmospheric parameters and for 35 Hyades dwarfs and 31 Pleiades dwarfs. The spectra have a resolution of  $2.5 \text{ \AA}$  and cover the wavelength range  $\lambda\lambda 3400\text{--}4500 \text{ \AA}$ . A new quantitative three-dimensional spectral classification system is derived for late-type stars and is calibrated using the sample of field dwarfs and giants with known atmospheric parameters. Diagnostic indices are defined by comparing the counts in the bottoms of two neighboring absorption lines or by comparing the counts in two neighboring pseudocontinuum peaks.

It is found that the Hyades and Pleiades dwarfs and field dwarfs with strong Ca II H and K emission reversals exhibit well-defined anomalies in their diagnostic indices when compared with normal field dwarfs. These results are summarized in Rose (1984). In LaBonte and Rose (1984), it is shown, from spectra of solar magnetic plages, that all spectral and photometric peculiarities of the Hyades discovered to date, including the original "Hyades anomaly" (Crawford 1969; Strömberg et al. 1982), are manifestations of plage activity.

REFERENCES

- Crawford, D. L. 1969, in Theory and Observation of Normal Stellar Atmospheres, O. Gingerich, ed. (MIT Press, Cambridge), p. 72.
- LaBonte, B. J. and Rose, J. A.: 1984, in preparation for Pub. Astron. Soc. Pacific.
- Rose, J. A.: 1984, Astron. J., 89, 1238.
- Strömberg, B., Olsen, E. H. and Gustafsson, B.: 1982, Pub. Astron. Soc. Pacific 94, 5.

## DISCUSSION

GARRISON: In classification, we no longer rely on Fe/H ratios, as you have for all three of your indices. May I suggest that you add 4250/4254/4260 to your criteria since it is relatively free of abundance effects and is sensitive to temperature? It should be within your resolution possibilities.

ROSE: The Hyades and Pleiades show anomalies in a number of spectral indices that are not Fe/H ratios. Only two diagrams were exhibited in the poster paper; the rest are discussed in Rose (1984 *Astron. J.*, 89, 1238 ). The 4250/4254/4260 lines that you refer to would be interesting to try; however they are near the resolution limit of my spectra and do not appear to be sensitive over the entire spectral range that I have considered.

GUSTAFSSON: How are your indices affected by stellar rotation? Have you looked for such effects, empirically and/or theoretically using synthetic spectra?

ROSE: I have artificially broadened the stellar spectra to simulate the effects of stellar rotation and of degradation in resolution of the observing equipment. For a Gaussian broadening with FWHM < 100 km/sec the effect is negligible. Only in extreme cases such as FK Comae ( $V_{\text{sin}i}$  100 km/sec) will stellar rotation affect the indices.