stars, taking into account more realistic line profiles and the effect of a large number of lines that are assumed to be distributed as a power law in line strength. We again find that perturbations of small spatial wavelength are extremely unstable, while those of long wavelength tend toward marginal stability. For the case of Doppler profiles the length scale bridging these two regimes is approximately the Sobolev length (the length over which the mean flow speed changes by a thermal speed). Perturbations are amplified by about 100 e-folds over relevant flow times, and so should quickly reach nonlinear amplitude. We discuss attempts to model this nonlinear evolution using a numerical hydrodynamics code.

We have also investigated the detailed nature of the linear instability, showing that it is convective in the stationary frame of the star, but is absolute in the comoving frame of the mean flow. An unexpected result is that the inward propagation of information relative to the mean flow occurs at speeds no larger than the sound speed, suggesting that the physically relevant critical point of the flow occurs at the sonic point, and not at the critical point of the OAK theory (Castor, Abbott and Klein 1975, Ap. J. 198, 157).

This research was supported in part by the Langley-Aubbt program of the Smithsonian Institution.


Abundances have been determined for a number of clusters in the Galaxy from Washington photometry and echelle spectroscopy. A (MgIIb+MgII) filter has been added to the Washington system to discriminate between cluster giants and foreground dwarfs. Additional membership information was obtained from medium and high resolution spectra. Eliminating non-members and combining abundance determinations, it is found that the mean cluster Washington metallicity agrees with the echelle [Fe/H] to within ~0.3 dex. Three classical "metal-rich" globulars, NGC 6392, M69 and M21, have [Fe/H]<-1, confirming the new metallicity scale. Three other globulars, NGC 362, M4 and M723, have similar [Fe/H]. Several old open clusters, including NGC 2421, 2158, 2506 and Malotte 66, lie in the range -0.65<[Fe/H]<-1.2. Thus, the metallicities of open and globular clusters overlap.

Most of these clusters show generally enhanced CN or CH abundances which may correlate with O enhancement. CN/O enhancements can account for some of the previous high metallicities derived for these clusters. Enhancements in Mg and Si also may be responsible. A good correlation is found between the temperature of the giant branch and the mean (Mg+Si+Fe) abundance. This abundance gives the best indication of "metallicity". A provocative trend is seen for clusters strongly enhanced in Mg and Si to inhabit the inner halo (K<7Kpc). The (C+Ti) abundance follows that of (Mg+Si), except for the most enhanced clusters.

No significant radial [Fe/H] gradient exists for globular clusters inside R_{20kpc}. A gradient of ~0.57 kpc^{-1} perpendicular to the plane is found for the open clusters. The radial disk gradient from open clusters is ~0.0720.04kpc^{-1}, after correcting for age effects and the z gradient.

23.17 In 109 Vir a Variable Star? D. S. Hayes, KPMO, and A. G. D. Phlip, VVO and Union Coll. - Taylor (1983, preprint; 1982 PASP 94, 663) reports the color of 109 Vir varies up to 0.05 mag in (b-y). One of us (A. G. D. P.) uses 109 Vir as a 4-color standard and has 40 measures over the years 1969, 70, 71 and 78. The rms deviations in (b-y), c1, and m2 are 0.006, 0.012 and 0.010, respectively. For each observation, (b-y) is plotted below. The hollow triangles represent KPMO and the solid triangles represent CTIO data. We also have scans from the HCO scanners at KPMO and CTIO (Philip and Hayes 1983, Ap. J. Suppl., in press) made during Feb. 1978 - Feb. 1980. For the colors (3400-6036) and (4036-6790) the rms deviations are 0.011 and 0.015 mag, respectively. For both sets of data, the rms errors are no more than the normal errors of observation. We see no evidence of variability in either set of data. The star may be subject to irregular episodes of variability, and should be monitored.

23.18 Do Blue Stragglers Mimic Normal (Pop I) OB Stars? R.P. Garrison, David Dunlap Obs., U. of Toronto, G.E. Albert, U.S. Naval Obs. - To test this hypothesis, 5 globular cluster UV-bright stars were observed with CFHT at classification dispersion. Of the 3 which have well-exposed spectra, none can be confused with normal population I stars.

23.19 The Temperatures of C and K Stars, R. F. Wing, Ohio State Univ., B. Gustafsson and K. Eriksen, Upsala Univ. - A new determination of the effective temperatures of stars of types C and K has been made from a model-atmosphere calibration of the eight-color narrow-band photometric system. Synthetic colors for the eight interference filters, which in C and K stars serve to measure CN bands and near-infrared continuum points, have been computed for a grid of dwarf, giant, and supergiant models in the range 4000-5500 K. Solar composition was assumed in the calculations except that the nitrogen abundance was varied to produce a range in CN strength at a given temperature and gravity. We find that the color temperatures obtained by fitting blackbody curves to the eight-color photometry are approximately 200 K lower than the effective temperatures. Most of this difference is caused by CN, although CH also contributes to it; the effect of atomic lines is very small.