

class, temperature and metal abundance for each star. Definitive membership status is available for virtually the entire sample and mean metal abundances for an average of twelve member giants per cluster are determined to an accuracy of 0.2 dex. For the five clusters in common with the recent spectroscopic study by Friel & Janes (1992, A&A, in press), agreement is generally good, although our metallicities are ~ 0.1 dex lower, on average. Two of the other four clusters, NGC 2324 and NGC 2660, are found to be surprisingly metal-poor, with $[\text{Fe}/\text{H}] \sim -1$. A third cluster, NGC 3960, has a galactocentric distance of only 8 kpc but a metallicity of ~ -0.7 . Such clusters indicate substantial scatter actually exists in the tight relation found by Friel & Janes between the metallicity of an open cluster and its current galactocentric distance. The outer disk clusters have a metallicity at a given age that is much more like that of their LMC counterparts than that of solar neighborhood disk field stars or clusters. These latter two populations appear to have distinct age-metallicity distributions, with the solar neighborhood open clusters more metal-poor by ~ 0.15 dex than local disk field stars of the same age, except for the oldest clusters. An offset in metallicity scales is the most likely explanation for this effect. This paper will appear in the November issue of the *Astronomical Journal*.

ABUNDANCES FROM HIGH DISPERSION SPECTRA OF METAL-POOR GLOBULAR CLUSTER GIANTS

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We have determined abundances for a variety of important elements, including O, Na, Mg, Si, Ti, and Fe, for 1 – 3 giants in each of the extremely metal-poor globular clusters M68, M30, M55, M15 and NGC 6397, and in the moderately metal-poor clusters NGC 4833, NGC 6144, and NGC 6752. The data are derived from high resolution, high signal/noise ratio echelle spectra obtained with the CTIO 4-m. The low end of the metallicity scale for globular clusters is now well established. The α elements are enhanced with respect to Fe, in agree-

ment with other cluster and halo field star analyses. However, about 1/4 of the cluster giants are not enhanced in O. Most of these stars show $\text{H}\alpha$ wings in emission. The new accurate chemical compositions enable us to improve on age estimates derived from main-sequence photometry. The relatively low O and Fe abundances we derive indicate that the ages cannot be reduced below ~ 15 Gyr.

PHOTOELECTRIC PHOTOMETRY OF BLUE STRAGGLERS IN SOUTHERN OPEN CLUSTERS

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Forty eight blue stragglers in intermediate to old-age open clusters have been studied by means of *UBV* photoelectric photometry. One of them in NGC 2354 has been discovered to be variable; its light curve shows the typical features of a close binary. The period is 0.6388 days and the amplitude of the principal minimum is 0.36 mag. We present a preliminary analysis of the light curve by means of the Wilson-Devinney code, which defines a near-contact configuration. Among the remaining observed blue stragglers seven are classified as possible variables, and forty as non-variables.

TiO BANDS IN EARLY TYPE GALAXIES

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We have calculated TiO and total spectra, in steps of 0.02 Å, using the code by Barbuy (1989, Ap&SS, 157, 111) in the red and near-infrared regions. The employed model atmospheres are interpolated in the grids of models by Bell et al. (1976, A&AS, 23, 37) and by B. Gustafsson (p.c.). The photospheric parameters used are: $T_{\text{eff}} = 4000, 4500, 5000, 5500$ K; $\log g = 0.0, 1.0, 2.0, 3.0, 4.0, 4.5, 5.0$; and $[\text{M}/\text{H}] = -3.0, -2.0, -1.0, 0.0, +0.5$ dex.

The intensity of TiO bands (α , γ and γ prime Systems), at $\lambda\lambda 614.5 - 627.5$ nm, are dependent on metallicity and effective temperature, and become stronger in cool metal-rich stars. There is no dependence on gravity. The absorption of C_2 (Swan Systems) is very weak in these spectral regions, and that of CN (Red Systems) presents similar behaviour to TiO.

We have computed a grid of synthetic spectra at $\lambda\lambda 614.0 - 648.0$ nm and $\lambda\lambda 705.0 - 728.0$ nm for 10

different stages of evolution observed in NGC 6553 for the solar metallicity.

We have fitted two convolved composite spectra to the globular cluster G1, Bica (1988, A&A, 195, 76), spectrum. The G1 spectrum represents a sum of the spectra of the galactic globular clusters NGC 6528 (50%), NGC 6440 (40%) and NGC 6553 (10%). The fit of our composite spectra to the G1 integrated spectrum is not very clear because of the low resolution of the spectra. The fit to NGC 4936 is satisfactory, the corresponding velocity dispersion of this elliptical galaxy is 170 km s^{-1} .

The calculations and reductions were carried out with the VAX 8530 of the IAG-USP. Financial support by FAPESP is acknowledged.

A NEW DDO CALIBRATION OF EFFECTIVE TEMPERATURE FOR EVOLVED LATE-TYPE STARS

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The necessity is shown of establishing a new DDO calibration of effective temperature for evolved G and K stars. After a previous careful selection of objects according to different criteria and reddening corrections, the DDO two-color diagrams are redefined with normal lines for dwarfs, giants, and supergiants. Mean values of the DDO indices for every spectral type and luminosity class are derived. It is shown that the DDO system allows us to assign MK types to late-type stars with an error of less than a spectral subclass and half a luminosity class, even to objects with abnormal cyanogen content. Using the Bell & Gustafsson (1989, MNRAS, 236, 653) scale as a reference—determined for G and K stars through the infrared flux method and synthetic infrared colors—a new DDO calibration of effective temperature is presented. This calibration reproduces satisfactorily the infrared scale, whereas the original Osborn's scale underestimates by about 170 K the temperatures of the K giants.

A CATALOGUE OF NEARBY WIDE BINARY AND MULTIPLE STARS

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No modern catalogue of wide binary and multiple systems (WBMS) exists for the region of the solar vicinity (stars nearer than $\sim 22 \text{ pc}$) that includes up-

dated information on their membership to moving clusters and age classification. With the aim of filling this gap, and also because of its importance in the investigation of the dynamical evolution of double and multiple systems, we have compiled a WBMS list extracted from the catalogue of nearby stars of Gliese et al., as well as from Luyten's LDS and NLTT.

By comparing the transverse velocities of WBMS with those expected for members of the Hyades and Sirius superclusters, possible membership of some WBMS to these superclusters has been established.

With regard to age classification, we have classified as *probably young systems* (PYS) those systems with one component satisfying at least one of various criteria of youth (such as being a flare star, showing H α emission, being a probable member of a moving cluster younger than the sun, etc.). A system that is not a PYS has been classified as *probably old* (POS).

At this writing, the catalogue contains 301 binaries and 31 systems of higher multiplicity with semi-major axes larger than 25 AU, but these numbers could vary slightly in the final version—to be published soon—if, meanwhile, new last-minute information becomes available.

GLOBULAR CLUSTER SYSTEMS IN ELLIPTICAL GALAXIES

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We are carrying out a study of globular cluster systems of elliptical galaxies placed in different positions within clusters of galaxies, with the aim of comparing the observations with the results obtained with numerical simulations (Muzzio et al. 1984, ApJ, 285, 7; Rabolli, 1990, MNRAS, 244, 322).

We present four elliptical galaxies in the Fornax cluster ($d = 22.9 \text{ Mpc}$): NGC 1379 and NGC 1399, which are known to have abundant globular cluster systems (Harris, 1988, IAU Symp. 126, 237), and NGC 1351 and NGC 1427, which are located at larger distances from the core of the cluster.

We used the ESO Faint Object Spectrograph and Camera (EFOSC) attached to the ESO 3.6-m telescope, La Silla, Chile. All the fields were observed in three colours (B , V and R) and the total integration time was 60 min per field and colour.

We determine the luminosity function of globular clusters. Taking into account an average luminosity function of faint galaxies we find a clear turnover for NGC 1399 at $m(B) = 24.8 \text{ mag}$, $m(V) = 24.0 \text{ mag}$, and $m(R) = 23.4 \text{ mag}$.