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158TH AAS MEETING, CALGARY, ALBERTA

1630-1730 (A201)

Society Business Meeting

1 JULY 1981
WEDNESDAY MORNING
Invited Paper: 0830-0920 (MacEwan Hall)

18.00 Chemical Composition of Globular Cluster Stars.
C. PILACHOWSKI, KPHO

Session 18: 0930-1200 (A201)

Globular Clusters; Late-type Stars

18.01 Luminosity Functions in Globular Clusters, E. W. GREEN, Univ. of Texas. Final results are presented from a study of the bolometric luminosity functions (LF's) of bright giants in 17 galactic globular clusters. Comparison of the observed LF's with theoretical ones indicates 1) there is marginal support for a higher value of Y = 0.30, rather than 0.20, from the position and size of the "bump" on the giant branch; and 2) the clusters nearest the galactic center appear to be deficient in stars at the red giant tip, relative to well-studied clusters at approximately the sun's galactocentric distance. The difference between the two groups is significant at a 5 to 6σ level. The effect does not correlate with metallicity, and is shown to be independent of small number statistics, presence of field stars, or possible radial gradients. Under the assumption that all HB's have M0 = 0.6, possible variations in either the numbers of AGB stars, numbers of first ROB stars, or in the MS initial mass function, are insufficient to explain the observed differences.

The inescapable conclusion is that at least some globular clusters near the galactic center must have HB's that are brighter than those of "typical" clusters near the sun, by several tenths of a magnitude or more. This result is in direct contradiction with the predictions from RR Lyrae stars in NGC 6171 and NGC 6723. Evidence for and against two possible causes of a more luminous HB -- namely, higher Y and a larger Mcore (due to faster rotation?) -- is discussed.

18.02 Simultaneous Ehlell Spectroscopy of 15 or more Giants in Globular Clusters using an Aperture Plate, R.C. FRIEDRICH, Lockheed FALH, G.A. PILACHOWSKI, D.W. WILLIAMS, KPHO.

We have substituted an aperture plate for the slit jaws and keyer in the focal plane of the 4m echelle spectrograph at KPHO to enable simultaneous echelle spectroscopy of as many as 30 objects situated within 4' on the sky. Bores of 200 microns diameter are drilled in the aperture plate in exactly the positions of the focal plane images of the stars whose spectra are to be recorded; the spectra are imaged in the normal way onto the detector, producing a corresponding pattern of spectra. To avoid overlap, an interference filter of 70 - 100 Å FWHM is used to limit the observations to one echelle order. The cross-dispersion grating is replaced by a highly-reflecting flat to maximize transmission.

The technique is extremely well suited to studies of globular clusters which require high-resolution information over a 70 Å region. We have been assigned 4m time on May 21 - 25, 1981, to apply the technique to determine overall metallicities, oxygen-to-iron ratios, and radial velocities in a total of 50 giants in M 5, M 13, and M 71. The results of that effort will be discussed.

18.03 A Comment on the Metal Abundance of the Globular Cluster M71, R.A. BELL, R. OF MB and B. GUSTAFSSON, Upsala -- Cohen's recent analysis of echelle spectra of four red giants in the globular cluster M71 gave an iron abundance of [Fe/H] = -1.3. This disagrees strongly with the previously accepted value, which was mainly based on photometric data, and raises questions on the interpretation of the photometry. We have investigated the problem de novo by applying synthetic colors to the question of interpreting the available photometry and by re-discussing the echelle data. An overall metal abundance of [M/H] = -0.8 is suggested. Some suggestions for additional observations which may clarify the situation further are made.

Reference

18.04 Spectrophotometry of Carbon Stars in Local Group Galaxies and in the Magellanic Stream.
H. RICHER, U.B.C., B. WESTERUM, Upsala.

Spectrophotometry of eight carbon stars in the Local Group galaxies Fornax, Sculptor, SMC, LMC, and a carbon star possibly associated with the Magellanic Stream has been secured with the IDS system at the ESO 3.6 meter telescope. Molecular band strength indices derived from the spectra show good agreement among all the stars and are similar to Galactic carbon stars except for the two stars in Fornax which have anomalously strong CN bands for their C2 band strengths. One Sculptor carbon star was found to be 13C rich. Radial velocities of these carbon stars show good agreement with published values for those in Fornax and the Magellanic Clouds, but the radial velocity of the Sculptor galaxy is revised to +40 km sec^-1 from a published value of +198 km sec^-1. The carbon star

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