

ONE MICRON PHOTOMETRY OF OMEGA CENTAURI GIANTS

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The globular cluster ω Centauri is known to be chemically inhomogeneous, a property that reveals itself via a wide giant branch in the V, B-V color-magnitude diagram (Cannon and Stobie 1973). Typically a color range of $\Delta(B-V) = 0.3 - 0.4$ exists among giants with $V < 13$. However, in the red R, R-I (Norris and Bessell 1975, Bessell and Norris 1976), and I, V-I (Lloyd Evans 1977) diagrams a much tighter giant branch is seen. This has led to the suggestion (e.g. Bessell and Norris 1976) that molecular absorption in the bandpass of the B filter has significantly reddened the B-V color, and thereby produced an anomalously wide giant branch.

In order to further investigate the width of the giant branch in the near-infrared CMD, photometry has been obtained near 1μ for a sample of 29 ω Cen red giants. A filter having a central wavelength of $10,175 \text{ \AA}$ was used in conjunction with a standard V filter and an extended red response InGaAsP tube (Bessell 1979). Observations were made with the 1.0 and 0.6 m telescopes of the Siding Spring Observatory, during May, June, and July of 1979. A $V-1\mu$ color was measured, and reduced to an instrumental system defined by the observations obtained during the June run.

The V, $V-1\mu$ CMD is presented in Fig. 1. Also shown is the corresponding V, B-V diagram, the photometry being taken from Cannon and Stobie (1973), and the ROA catalog (Woolley 1966); corrections found by Cannon and Stobie being applied to the latter data. The two diagrams are morphologically similar. Color residuals relative to blue envelopes having the equations $V-1\mu = 4.20 - 0.3V$ and $B-V = 4.90 - 0.3V$ were determined, and are plotted against each other in Fig. 2b. Similarly, $\delta(R-I)$ residuals were measured relative to a linear least squares fit to the R, R-I giant branch defined by those stars observed by Bessell and Norris (1976). Plots of $\delta(V-1\mu)$ versus $\delta(R-I)$, and an analogous infrared residual $R(V-K)$ from Persson et al. (1980), are shown in Figs. 2c,a. Some of the bluest stars in these diagrams, having $\delta(B-V) < 0.05$, may be asymptotic branch giants.

These figures clearly demonstrate that ω Cen exhibits an

intrinsically wide giant branch. The $\delta(V-1\mu)$ residual correlates well with residuals in other colors. In particular it should be noted that a correlation exists between the $V-1\mu$ and $R-I$ residuals. This demonstrates that although the dispersion in $R-I$ may be small, it is nonetheless real. The tight correlations between $V-1\mu$, $B-V$, and $V-K$ residuals indicate that either the $B-V$ color is not being significantly affected by CN and CH molecular band blocking, or else such absorption correlates closely with other heavy element line blanketing.

REFERENCES

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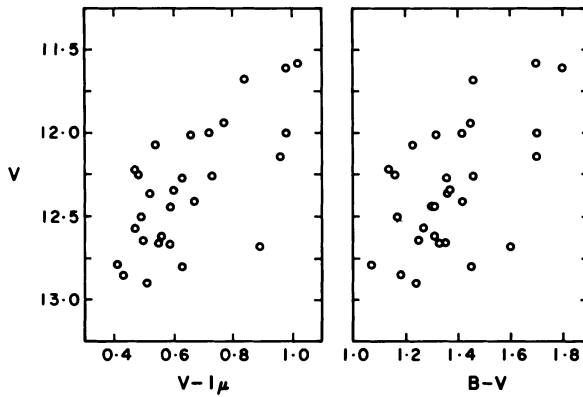


Fig. 1

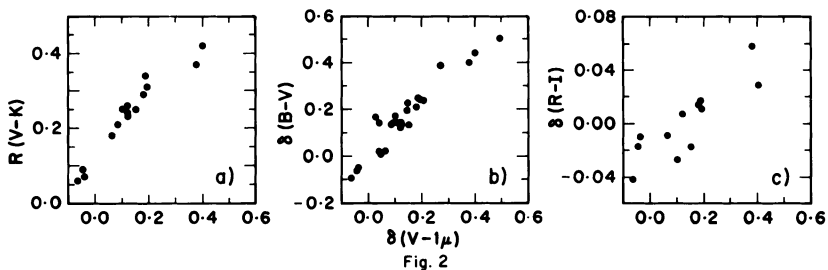


Fig. 2

Fig. 1. The V , $V-1\mu$ and V , $B-V$ color-magnitude diagrams.

Fig. 2. Color residuals, measured with respect to reference lines in three different color-magnitude diagrams, are plotted against the $\delta(V-1\mu)$ residual for giants with $11.8 < V < 13.0$.