RR LYRAE STARS AND THE SANDAGE PERIOD-SHIFT EFFECT EXAMINED USING IR-DERIVED TEMPERATURES

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Abstract. Mean temperatures for RR Lyrae stars in 7 globular clusters (M3, M4, M5, M15, M107, ω Cen and NGC 5466) have been determined using the optical-infrared colour <V>-<K> as a temperature indicator. Where <K> has been relatively well determined, from means of 3 or more observations, the scatter in relationships such as Log P′ vs log (temperature) and log (temperature) vs (blue amplitude) is significantly reduced when IR-derived temperatures are used instead of those derived from (B-V). Within the observational errors, the gradient in the log P′ vs log (temperature) diagram is the same for each cluster. Temperatures derived from <V>-<K> should also be less sensitive to metallicity differences than their optically derived counterparts. The Sandage Period-Shift Effect has therefore been re-examined using 6 of the 7 clusters (NGC 5466 was excluded because of too few data). A strong correlation between period-shift and metallicity is found; a smaller shift (but in the same sense) is also found for the temperature - amplitude relationship.

Although the absolute <V>-<K> to effective temperature scale is not yet well established (particularly for HB stars) the present results give consistently lower temperatures for the RR Lyrae stars than have previously been derived from the optical measurements. This shift in the temperature of the instability strip has interesting consequences for pulsation theory.