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PHYSICAL PARAMETERS OF RR LYRAE STARS IN THE GLOBULAR CLUSTER NGC 5466: THE OOSTERHOFF DICHOTOMY

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The highlights of CCD photometry of RR Lyrae stars in NGC 5466 are presented. The image subtraction method (Bramich et al. 2005) was used. The Fourier light curve decomposition, lead to an average [Fe/H]=−1.88±0.3 and a distance of 14.8±0.4 kpc for the cluster and to other physical parameters of astrophysical relevance for individual RR Lyrae stars. When a comparison of the mean physical parameters in globular clusters, analysed by the same technique, is performed, clear insights of the stellar evolution on the Horizontal Branch are obtained. The origin of the Oosterhoff dichotomy is clearly of evolutionary nature, being age the determining factor.

The image subtraction method (Bramich et al. 2005) produces light curves of variable stars in crowded field of high quality. The Fourier light curve decomposition technique provides accurate physical parameters for RR Lyrae star, details of the approach can be found in Arellano Ferro et al. (2006). The results for the RRab and RRc stars of NGC 5466 are given in Table 1.

TABLE 1

MEAN PHYSICAL PARAMETERS FOR THE RRc AND STARS RRab

Parameter	RRc	RRab
[Fe/H]	−1.962±0.275	−1.790±0.338
$\log(L/L_{\odot})$	1.783±0.044	1.645±0.018
T_{eff}	7157.7±102.1	6303.6±105.7
$M/M_{\odot}$	0.695±0.100	
$\log(Y)$	0.250±0.014	

The above values can be compared with those obtained by the same technique from the RR Lyrae stars in other globular clusters. Fig. 1 show the correlations between the physical parameters and the iron abundance for RRc and RRab stars respectively. In the figures the OoI and OoII type clusters are distinguished. OoII type clusters are less metallic and their RR Lyrae stars are cooler, more luminous and more massive. This supports the general scheme that the OoII type clusters are older and their RR Lyrae stars more evolved, displaying as a consequence longer periods. The straight lines in Fig. 1 correspond to the following equations:

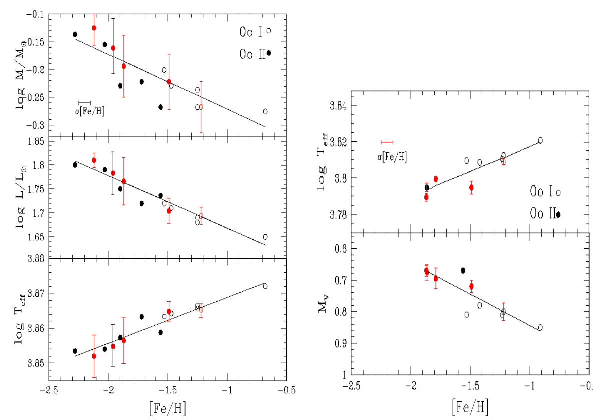

Fig. 1. Trends of physical parameters from RRc and RRab stars in OoI and OoII type clusters.

For RRc stars:

$$log(M/M_{\odot}) = -(0.098 \pm 0.020)[Fe/H] - (0.369 \pm 0.033) \quad (1)$$

$$logT_{eff} = +(0.013 \pm 0.001)[Fe/H] + (3.882 \pm 0.002) \quad (2)$$

$$log(L/L_{\odot} = -(0.109 \pm 0.012)[Fe/H] - (1.559 \pm 0.020) \quad (3)$$

For RRab stars:

$$logT_{eff} = +(0.027 \pm 0.005)[Fe/H] + (3.845 \pm 0.007) \quad (4)$$

$$M_V = +(0.198 \pm 0.035)[Fe/H] + (1.042 \pm 0.052) \quad (5)$$

During this investigation we found 12 new variables, 8 RRc stars and 4 eclipsing binaries and shall be reported elsewhere.

REFERENCES

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