

Infrared Period-Luminosity Relations of RR Lyraes in M5 and M15

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Abstract

We have carried out K band photometric observations of RR Lyrae stars in two globular clusters which both have large populations of RR Lyraes but different characteristics: the moderately metal-rich cluster M5 ($[Fe/H] = -1.40$) and the metal-poor one M15 ($[Fe/H] = -2.15$). The purpose is to accurately calibrate the linear relationship between RR Lyrae infrared (K) absolute magnitudes and their periods that has been confirmed by recent Baade-Wesselink type studies of RR Lyraes and IR photometry of cluster variables. A total of 47 RR Lyraes in M15 was observed and each has more than 8 measures on the average, which allows the accurate determination of a mean K magnitude for each star. In M5 44 stars have been observed with each RR Lyrae having 4 measurements. Our preliminary results show that the RR Lyrae infrared period-luminosity relations for the two clusters have roughly the same slope, despite the fact that they have a large metallicity difference. This suggests that the metallicity effect on the $\langle M_K \rangle$ - $\log P$ relation is indeed small as one would expect. The M5 and M15 RR Lyrae IR photometry gives a reliable determination for the slope of the infrared period-luminosity relation because of the large number of stars measured. A well-calibrated $\langle M_K \rangle$ - $\log P$ relation will be very useful in distance determinations to heavily reddened star regions such as the Galactic center and globular clusters in the Galactic bulge.

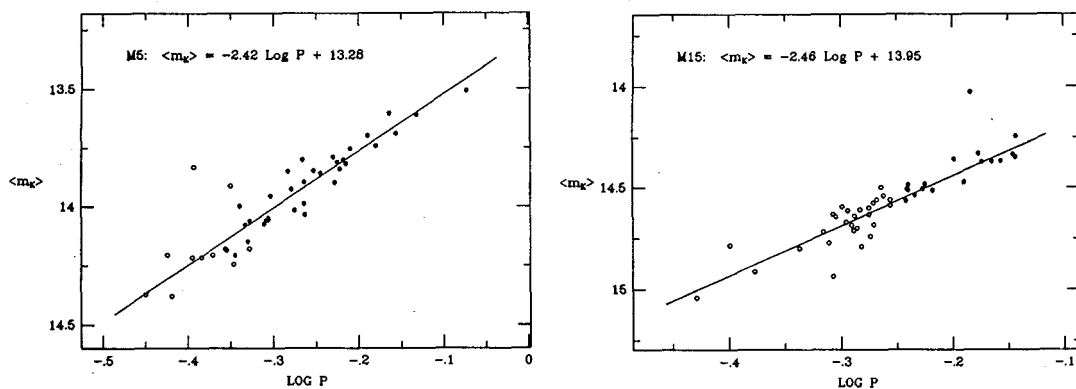


Figure 1 $\langle m_K \rangle$ vs. $\log P$ for RR Lyrae stars in M5 and M15. Filled circles are ab-type variables, while open circles represent c-type stars. The solid lines are linear least-squares fit to the data.