Metallicities for Double Mode RR Lyrae in the Large Magellanic Cloud

A. Bragaglia[1], R.G. Gratton[2], E. Carretta[2],
G. Clementini[1], L. Di Fabrizio[1], M. Marconi[3]
(1) Osservatorio Astronomico di Bologna – Email: angela, gisella @bo.astro.it
(2) Osservatorio Astronomico di Padova – Email: gratton, carretta @pd.astro.it
(3) Osservatorio Astronomico di Capodimonte – Email: marcella@na.astro.it
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ABSTRACT

Metallicities for six double mode RR Lyrae's (RRd's) in the Large Magellanic Cloud have been estimated using the ΔS method. The derived [Fe/H] values are in the range [Fe/H] = –1.09 to –1.78 (or –0.95 to 1.58, adopting a different calibration of [Fe/H] vs ΔS). Two stars in our sample are at the very metal rich limit of all RRd's for which metal abundance has been estimated, either by direct measure (for field objects) or on the basis of the hosting system (for objects in globular clusters or external galaxies). These metal abundances, coupled with mass determinations from pulsational models and the Petersen diagram, are used to compare the mass-metallicity distribution of field and cluster RR Lyrae variables. We find that field and cluster RRd's seem to follow the same mass-metallicity distribution, within the observational errors, strengthening the case for uniformity of properties between field and cluster variables At odds to what is usually assumed, we find no significative difference in mass for RR Lyrae's in globular clusters of different metallicity and Oosterhoff types, or there may even be a difference contrary to the commonly accepted one, depending on the metallicity scale adopted to derive masses. This "unusual" result for the mass-metallicity relation is probably due, at least in part, to the inclusion of updated opacity tables in the computation of metal-dependent pulsation models.

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