A POSSIBLE RECONCILLIATION AMONG DIFFERENT RR LYRAE ABSOLUTE MAGNITUDE CALIBRATIONS AND IMPLICATIONS FOR THE AGE-METALLICITY RELATION

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ABSTRACT. A semi-empirical scenario is suggested which tentatively accounts for the (otherwise conflicting) slopes of the several available RR Lyrae absolute magnitude calibrations. This scenario implies a very small dependence of cluster ages upon metallicity.

Discussion

Sandage (1990, *Ap. J.*, **350**, 603) has shown that the HB "thickness" $\Delta M_V(HB)$ at the RR Lyrae color level increases monotonically with metallicity. After removing his inadequate (for our purposes) data points for 47 Tuc and ω Cen, one may obtain the regression equation $\Delta M_V(HB) = 0.751 + 0.235$ [Fe/H]. The lower envelope (LE) and "evolutionary mean level" (EML) $M_V(HB)$ calibrations are related through the expression $\eta = [M_V(LE)$ - $M_V(EML)]$ / $\Delta M_V(HB)$. I estimate a mean concentration parameter $\eta = 38$ % for 7 clusters. From the above considerations, the slopes α and zero-points β of the LE and EML expressions will differ by ~ 0.1 and ~ 0.3, respectively, with the LE values being higher. Thus, if the EML theoretical calibration of Lee (1990, *Ap. J.*, **363**, 159) is correct ($\alpha_{EML} = 0.19$, $\beta_{EML} = 0.97$), one will have ($\alpha_{LE} \simeq 0.28$, $\beta_{LE} \simeq 1.26$). The slopes (which are easier to treat) of the available calibrations seem to be consistent with these results, within the existing uncertainties, with only one *clear* exception: the "RGB bump" analysis [Fusi Pecci *et al.* (1990), *Astr. Ap.*, **238**, 95]. The results thereby obtained can, however, be questioned in terms of consistency arguments [see Catelan (1991, *Astr. Ap.*, submitted) for details and also an analysis of SHB predictions].

Based upon the "ΔV method" of age calibration, one can see that the above considerations lead to a unified scenario where globular cluster ages vary by only ~ 1 Gyr for a [Fe/H] variation as large as 1 dex, with important implications for our understanding of the formation of the galaxy.

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