COMMENTS

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I would like to report on work by J.A. Dawe and myself concerning the possibility of fundamental error in the Cepheid PLC relation. On the theoretical side, we point out that the assumption of a fundamental mass-luminosity relationship is not consistent with the possible existence of Cepheids in multiple crossings of the instability strip. Although star formation theories can be developed to justify an expectation that all Cepheids are in a single crossing, this is not satisfactory from the observational viewpoint, and it is important to ensure that the empirical PLC relation is consistent with such theories.

In their recent work, apparently confirming the expectation that all Cepheids are in a single crossing, M.W. Feast and his colleagues have determined a colour coefficient $\beta \sim 2.70$ assuming the instability strip is intrinsically of greater dispersion than any uncertainty in the colours remaining after correction for differential absorption. This assumption is in fact false and appears to be based on the mistaken idea that the intrinsic Cepheid line in (B-V) - (V-I)/(V-I) space can be defined with infinite precision. Correcting for this error, we have shown that β is in the region ~ 0 and that the Galactic and Magellanic Cloud Cepheids are thus probably best described in terms of a P-L relation rather than a P-L-C relation. This result has been confirmed in numerical simulations by M.J. Stift.

With this result, there is a significant reduction of the Cepheid extragalactic distance scale, bringing it more in line with the LMC and SMC moduli using Graham's RR Lyrae apparent magnitudes and an M_V based on solar neighbourhood statistical parallax studies. This new found consistency adds weight to the view that $H_o \sim 100$ kms^{-1} mpc^{-1}. The result further highlights an apparent discrepancy between metal weak globular cluster horizontal branch and field halo RR Lyrae absolute magnitudes, which can be attributed to a greater mean age of field halo stars ($\sim$20Byr), but not without enhancing the Hubble time - Galactic age inconsistency.

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