Distance Estimate for M33 Using Red Clump Stars

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The red clump stars have been considered as one of possible candidates of primary distance indicators in spite of several disadvantages. Two main disadvantages of red clump stars in estimating extragalactic distance are its faint brightness compared to other primary distance indicators and the large scatter about the mean magnitude. However, the large number of red clump stars obtained using the HST makes it possible to decrease the statistical error of measurement in estimating the distances of Local Group galaxies. The distances to resolved Local Group galaxies can be determined in a single step using the red clump stars as in the case of the tip of the red giant branch(TRGB).

M33 (NGC 598) is a face-on spiral galaxy in the Local Group. We have estimated the distance to M33 using the VI photometry of the red clump stars obtained from the HST archive data. Following the method of Stanek & Garnavich (1998, ApJL, 503, L131), we have estimated the distance to M33 to be $(m-M)_0 = 24.62 \pm 0.10$, corresponding to d = 837 kpc for the reddening of E(B-V) = 0.10. This result is in excellent agreement with the distances based on Cepheids and the tip of the red giant branch.