

A Legacy Calibration of the Tip of the Red Giant Branch Distance Scale as Constrained by the Hubble Space Telescope Implications for the Hubble Constant

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The zero point calibration of the extragalactic distance scale is degenerate with any subsequent derivation of the Hubble constant (H_0). Thus, it is imperative that calibration accuracy is continually improved for stellar standard candles. The optimal method for doing so is to closely match the observing conditions and underlying astrophysical environments between the calibration observations and those used to probe further distances, thereby constructing an optimally self-consistent distance ladder. This ideal, like-with-like calibration scenario is finally achieved for the Tip of the Red Giant Branch (TRGB) distance scale with brand new Hubble Space Telescope (HST) imaging of the stellar halo of the megamaser host galaxy NGC 4258 (PI Hoyt). By matching the observing conditions and local stellar environment to HST TRGB imaging of supernova host galaxies, systematic uncertainties in the TRGB calibration of H_0 have been reduced to negligible levels, leaving the maser distance to NGC 4258 as the dominant systematic uncertainty (1.5%) in the error budget. This new, high-accuracy calibration will serve as the lasting standard for HST-based, TRGB distances determined from the stellar halos of L^* galaxies, and thus for calibrating direct measurements of H_0 .

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