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JWST Weighs in on the Hubble Tension

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We present high-definition observations with the James Webb Space Telescope of Cepheid variables used to calibrate the luminosity of Type Ia Supernovae and the Hubble constant. The superior resolution of JWST negates crowding noise, the largest source of variance in the NIR Cepheid Period-Luminosity relations (Leavitt laws) measured with HST. Together with the use of two-epochs to constrain Cepheid phases and three filters to remove reddening, we reduce the dispersion in the Cepheid PL relations by a factor of 2.5. We find no significant difference in the mean distance measurements determined from HST and JWST, with a formal difference of -0.01 ± 0.03 mag. This result is independent of zeropoints and analysis variants including metallicity dependence, local crowding, choice of filters, and slope of the relations. We can reject the hypothesis of unrecognized crowding of Cepheid photometry from HST that grows with distance as the cause of the “Hubble Tension” at 8.2 sigma, i.e., greater confidence than that of the Hubble Tension itself. We conclude that errors in Cepheid measurements across the distance ladder are not the source of the decade-long Hubble Tension.

Presenter: RIESS, Adam (John Hopkins University)