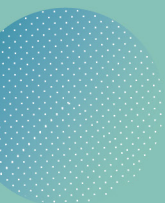




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The Dark Energy Survey Supernova Program: An updated measurement of the Hubble constant using the Inverse Distance Ladder

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Abstract

We measure the current expansion rate of the Universe, Hubble's constant H_0 , by calibrating the absolute magnitudes of supernovae to distances measured by Baryon Acoustic Oscillations. This 'inverse distance ladder' technique provides an alternative to calibrating supernovae using nearby absolute distance measurements, replacing the calibration with a high-redshift anchor. We use the recent release of 1829 supernovae from the Dark Energy Survey spanning $0.01 < z < 1.13$ anchored to the recent Baryon Acoustic Oscillation measurements from DESI spanning $0.30 < z_{\text{eff}} < 2.33$. To trace cosmology to $z=0$, we use the third-, fourth- and fifth-order cosmographic models, which, by design, are agnostic about the energy content and expansion history of the universe. With the inclusion of the higher-redshift DESI-BAO data, the third-order model is a poor fit to both data sets, with the fourth-order model being preferred by the Akaike Information Criterion. Using the fourth-order cosmographic model, we find $H_0 = 67.19^{+0.66}_{-0.64} \text{ km s}^{-1} \text{ Mpc}^{-1}$, in agreement with the value found by Planck without the need to assume Flat- Λ CDM. However the best-fitting expansion history differs from that of Planck, providing continued motivation to investigate these tensions.

