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New Determination of the Hubble Constant with Gaia EDR3, Further Evidence of Excess Expansion

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The Hubble constant remains one of the most important parameters in the cosmological model, setting the size and age scales of the Universe. Present uncertainties in the cosmological model including the nature of dark energy, the properties of neutrinos and the scale of departures from flat geometry can be constrained by measurements of the Hubble constant made to higher precision than was possible with the first generations of Hubble Telescope instruments. A streamlined distance ladder constructed from infrared observations of Cepheids and type Ia supernovae with ruthless attention paid to systematic now provide $<2\%$ precision and offer the means to do much better. By steadily improving the precision and accuracy of the Hubble constant, we now see evidence for significant deviations from the standard model, referred to as Lambda CDM, and thus the exciting chance, if true, of discovering new fundamental physics such as exotic dark energy, a new relativistic particle, or a small curvature to name a few possibilities. I will review recent and expected progress, most recently based on measurements from Gaia EDR3 released in December, 2020.

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