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# Sky at Night

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# BULLETIN

## Hubble refines the Universe's expansion rate

The new measurement could help solve one of the biggest problems in cosmology

**Using over 30** years of observations, the Hubble Space Telescope has helped to create the most precise measure of the expansion of the Universe, known as the Hubble constant. The new value of 73km/sec/Mpc (kilometres per second per megaparsec) is now accurate to within one per cent, and means it would take the Universe 10 billion years to double in size.

"The Hubble constant is a very special number. It can be used to thread a needle from the past to the present for an end-to-end test of our understanding of the Universe," says Licia Verde, from the University of Barcelona, who took part in the study.

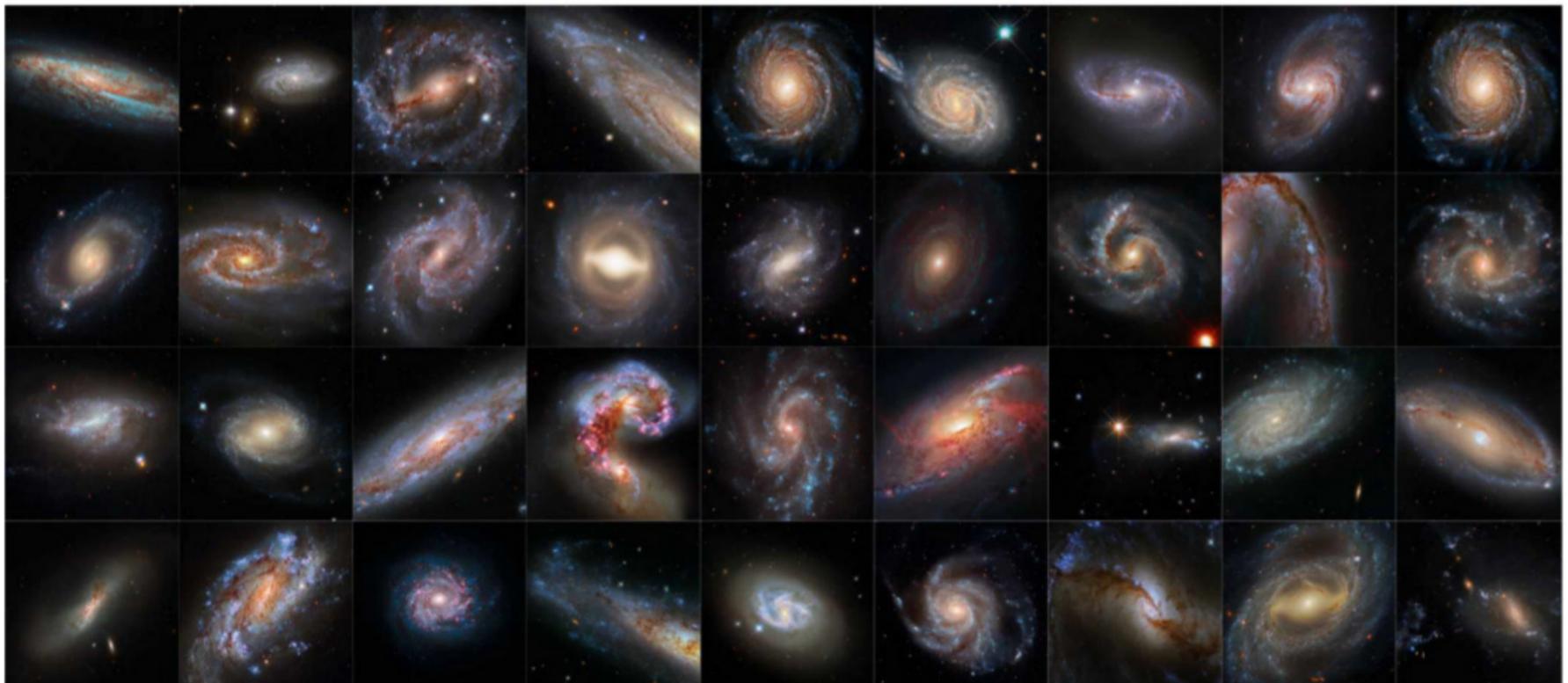
Astronomers have long been plagued by a serious issue when measuring the expansion rate of our Universe – it changes depending on whether you measure it with local objects, like supernovae in nearby galaxies, or the cosmic microwave

background (CMB), relic radiation from the very early Universe. Both measurements have been taken many different times by different teams, but have remained stubbornly mismatched.

The distant measurement from the CMB was initially far more precise, so to bridge the gap in our understanding a team of astronomers used Hubble data of supernovae to measure the nearby value to the same accuracy. As suitable supernova only occur roughly once a year, it has taken Hubble's entire lifespan so far to build up a catalogue of 42 examples.

"This is likely Hubble's magnum opus, because it would take another 30 years of Hubble's life to even double this sample size," says Adam Riess from the Space Telescope Science Institute, who lead the study.

<https://hubblesite.org>



▲ These 36 galaxies imaged by Hubble play host to both Cepheid variables and supernovae used to measure the Universe's expansion

### Comment

by Chris Lintott



This new result does nothing to relieve what's politely called the 'tension' between different methods of determining the expansion speed of the Universe. And in fact, it makes the disagreement worse.

After many years of scrutiny, it seems unlikely that cosmologists on either side of the divide have

made a mistake. Instead, we must be missing something. The fun solution is to change our cosmological model, invoking new physics. More likely, our understanding of the CMB, or more likely of how supernovae work, has something missing.

While theorists wrestle with the problem, new ground-based

surveys like that planned by the Vera Rubin Observatory, as well as ESA's Euclid mission, are on the way. The scientists behind them will be delighted to have Hubble leave them this puzzle to poke at.

**Chris Lintott co-presents  
*The Sky at Night***