THE FIX OF THE HUBBLE CONSTANT

We begin with a long quote from a recent NASA press release.[1]

The Hubble Space Telescope Key Project Team today announced that it has completed efforts to measure precise distances to far-flung galaxies, an essential ingredient needed to determine the age, size and fate of the universe.

"Before Hubble, astronomers could not decide if the universe was 10 billion or 20 billion years old," said team leader Wendy Freedman of the Observatories of the Carnegie Institution of Washington. "The size scale of the universe had a range so vast that it didn't allow astronomers to confront with any certainty many of the most basic questions about the origin and eventual fate of the cosmos. After all these years, we are finally entering an era of precision cosmology. Now we can more reliably address the broader picture of the universe's origin, evolution and destiny."

The team's precise measurements are the key to learning about the universe's rate of expansion, called Hubble's constant. Measuring Hubble's constant was one of the three major goals for NASA's Hubble Space Telescope when it was launched in 1990.

For the past 70 years astronomers have sought a precise measurement of Hubble's constant, ever since astronomer Edwin Hubble realized that galaxies were rushing away from each other at a rate proportional to their distance, i.e. the farther away, the faster the recession. For many years, right up until the launch of the Hubble telescope -- the range of measured values for the expansion rate was from 50 to 100 kilometers per second per megaparsec (a megaparsec, or mpc, is 3.26 million light years).

The team measured Hubble's constant at 70 km/sec/mpc, with an uncertainty of 10 percent. This means that a galaxy appears to be moving 160,000 miles per hour faster for every 3.3 million light-years away from Earth.

"The truth is out there, and we will find it," said Dr. Robert Kirshner

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1. Savage, D., N. Neal, & R. Villard, 1999. "Hubble Completes Eight-Year Effort To Measure Expanding Universe," May 25 NASA press release no. 99-65. The text of the press release is here reproduced *in toto*.

of Harvard University. "We used to disagree by a factor of two; now we are just as passionate about ten percent. A factor of two is like being unsure if you have one foot or two. Ten percent is like arguing about one toe. It's a big step forward." Added Robert Kennicutt of the University of Arizona, a co-leader of the team: "Things are beginning to add up. The factor-of-two controversy is over."

The team used the Hubble telescope to observe 18 galaxies out to 65 million light-years. They discovered almost 800 Cepheid variable stars, a special class of pulsating star used for accurate distance measurement. Although Cepheids are rare, they provide a very reliable "standard candle" for estimating intergalactic distances. The team used the stars to calibrate many different methods for measuring distances.

"Our results are a legacy from the Hubble telescope that will be used in a variety of future research," said Jeremy Mould of the Australian National University, also a co-leader of the team. "It's exciting to see the different methods of measuring galaxy distances converge, calibrated by the Hubble Space Telescope."

Combining Hubble's constant measurement with estimates for the density of the universe, the team determined that the universe is approximately 12 billion years old -- similar to the oldest stars. This discovery clears up a nagging paradox that arose from previous age estimates. The researchers emphasize that the age estimate holds true if the universe is below the so-called *critical density* where it is delicately balanced between expanding forever or collapsing. Alternatively, the universe is pervaded by a mysterious *dark force* pushing the galaxies farther apart, in which case the Hubble measurements point to an even older universe.

The universe's age is calculated using the expansion rate from precise distance measurements, and the calculated age is refined based on whether the universe appears to be accelerating or decelerating, given the amount of matter observed in space. A rapid expansion rate indicates the universe did not require as much time to reach its present size, and so it is younger than if it were expanding more slowly.

The Hubble Space Telescope Key Project Team is an international group of 27 astronomers from 13 different U.S. and international institutions. The Space Telescope Science Institute is operated by the Association of Universities for Research in Astronomy, Inc. for NASA, under contract with NASA's Goddard Space Flight Center, Greenbelt, MD.

Analysis

The above is the entire text of a NASA press release announcing the results of an international program to fix the Hubble constant at an evolutionarily acceptable value. There are a couple of misrepresentations in the text, such as declaring a value based on a sample of 18 objects "reliable," but the most glaring is the range of values held for the Hubble constant in the last 70 years. The first measurements were in excess of 350 km/sec/Mpc, but over the last four decades the value has fluctuated from a low of 25 km/sec/Mpc to a high of 125 km/sec/Mpc. For some time in the seventies, the University of Chicago dictated that the value be set at 35 km/sec/Mpc and enforced that by banning papers with a higher value from their prestigious *Astrophysical Journal*.

The press release makes clear that different techniques give different ages for the universe (that is, they give different values for the expansion rate or "age") so that some of them show the oldest stars to be older than the universe. If one maintains the superstition of evolution, it is necessary for several billions of years to pass to form the elements which make up the oldest starts. Hence, the universe should be older than the oldest stars by several billion years. That was the paradox with the "old" methods, that the stars seemed to be older than the universe from which they evolved.

Now one could reasonably conclude from this paradox that the difference in age between the oldest stars and the universe itself is so little that one cannot distinguish the difference today, which is to say that the billions of years difference is merely statistical noise about a common age. And this is precisely what the Hubble Space Telescope Key Project Team has concluded. They readjusted the distance and redshift data until they "converged" on a common value, and at a Hubble constant value of H_0 = 70 km/sec/Mpc, the universe appears as old as its oldest stars. All that's needed then is to rework the nuclear production rates (the rate at which atomic elements are created in the big bang) so that these "oldest" stars can then form within the first billion years (10% above) with the "expected" initial composition to allow them to age to the point we observe. Expect the inflationary model of the expanding universe to figure prominently in this analysis. At present, not enough heavy elements (beyond hydrogen and helium) are created in the big bang without an initial generation of supermassive stars which all exploded to produce the heavy elements implicit in the observed stars. Except for the elements, all trace of this initial supermassive generation of stars has disappeared (some think that quasars are a second generation of this type of supermassive star).

The bottom line is still this, science really cannot tell the difference in age between stars and the universe. This still fits within the Bible which states that the difference in age is at most four days.

Geocentric Issues

There is a more fundamental issue regarding the Hubble constant which needs to be addressed but has been placed on the back burner by the astronomical community. That question is "To what degree is the observed expansion rate cosmic, and not local?" In other words, when one draws a graph whose vertical axis is Doppler shift (red shift, the speed the galaxy exhibits toward or away from earth) and whose horizontal axis is the distance to the galaxy, and plots the data for these 18 galaxies, one gets roughly a straight line. But the slope of the line, which is the Hubble constant or expansion rate, is only determined for the 65 million light years (mly) mentioned in the press release. Would the slope be the same if we went out, say, a billion light years? Since we can't observe Cepheid variable stars any beyond the 65 mly, can we really extrapolate that value out to 12 billion light years? After all, the data spans only a half a percent of the total. Local concentrations of galaxies can influence the expansion measured Doppler shifts. So the research is by no means conclusive since it is based on a very small, select sample.

Finally, note that the Hubble constant is inherently geocentric. True, the alleged motions of the earth about the sun, and of the sun about the center of the Milky Way, have been removed, but that does not change the fact that this value is determined from earth. Astronomers take it on faith that if they were removed to any other galaxy in the universe, that there, too, the local Hubble constant would be the same in all directions as we see here on earth. Since we can't go to a distant galaxy to test that, it is taken on faith, pure and simple. Only dishonest scientists would claim it a fact. So we conclude that the general nature of the Hubble constant is geocentric, albeit not strictly geocentric. That is, all distant objects in the universe appear to be receding from earth.