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ASTRONOMY

Universe billions of years old, astronomers' studies suggest

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It's easy to have your mind boggled by the scale of the universe. Galaxies hundreds of thousands of light-years across, made of hundreds of billions of suns, spread through an expanding universe 14 billion years old . . .

Astronomers' friends roll their eyes when they hear us tossing around numbers like these with careless ease. I vividly recall the charge jokingly leveled at me by my attorney: "You guys just make this stuff up, don't you?"

The story of the universe is strange and unexpected, but it isn't made up. It's the result of hundreds of years of work by thousands of astronomical detectives sifting through evidence to figure out what happened in the past.

A big part of this evidence is the size of the universe. It seems strange that we can measure the distances of galaxies millions or billions of light-years away. But we can map out the stars close to the sun with the same techniques surveyors use on Earth.

We can recognize the same kinds of stars through out the galaxy, and we can compare them with their nearby cousins to figure out how far away they are.

The brightest stars in our galaxy have counterparts in other galaxies.

This is how Edwin Hubble — for whom the Hubble Space Telescope is named — was able to prove that our Milky Way is not the only galaxy in the universe.

We've learned that there is nothing particularly unusual about our galaxy, either. Objects like it are spread throughout the universe.

We can study the nearest ones and get their measurements, then figure out how far away the distant ones have to be to look the way they do. Gradually, we map out the universe.

It takes light billions of years to cross the tracts of intergalactic space between Earth and the farthest known galaxies. This is evidence that we live in a universe that is billions of years old.

There are others, too. We understand the nuclear reactions that power stars, for example. This tells us that stars such as the sun live for billions of years. We see the remnants of dead stars in the galaxy, so the galaxy must be at least billions of years old.

The fact that there is evidence that points to the same conclusion gives astronomers confidence that they really are beginning to understand the universe.

If you want to learn more about this subject, you'll enjoy An Ancient Universe: How Astronomers Know the Vast Scale of Cosmic Time, a booklet published by the American Astronomical Society and the Astronomical Society of the Pacific.

It is available free online at http://www.aas.org/education/ancientuniverse.html.

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