ASTROPHYSICS

Size of Universe Studied

➤ THE UNIVERSE is much bigger than scientists thought as little as 15 years ago, Dr. Ira S. Bowen, director of Mt. Wilson and Palomar Observatories, said. It is billions of light years in size as seen from the earth, exactly how big even astronomers can not yet say.

The amount of space and matter the world's largest telescope, the giant 200-inch atop Mt. Palomar, can see is so great that how the universe is put together should soon be known.

The 200-inch Hale telescope can photograph objects billions of light years away, Dr. Bowen told trustees and friends of Carnegie Institution at a meeting in Washington, D. C. Carnegie operates Mt. Wilson and Palomar Observatories jointly with the California Institute of Technology, Pasadena.

Before the 200-inch went into operation, the most distant objects in the heavens were thought to be only hundreds of millions of light years away. A light year is six million million miles. The universe is now measured in billions of light years, Dr. Bowen said, due to the great seeing power of the 200-inch and to increases in the distance scale.

The most distant object yet found, known as 3C-147, is so far away that astronomers hesitate to give its distance in light years. They prefer to say that it has a measured red shift of 54.5%, the highest known.

Measuring the red shift of a star's light is the method used to tell the distance of an object. Red shift is a displacement of the spectral lines that is caused by the rushing outward of the distant galaxies However, 3C-147 is so remote that scientists are not sure the usual relationship holds.

Of "far greater importance" than the increase in distance, Dr. Bowen said, is the fact that by extending observations to a large fraction of the radius of the universe, "we have reached the region where it should be possible" to determine the structure of the cosmos.

There are now three theoretical models of the nature of the universe:

1. The universe is expanding or "exploding."

2. The universe is pulsating, expanding and contracting rhythmically.

3. The universe is in a "steady state," continuously renewing itself through the creation of new matter.

• Science News Letter, 85:340 May 30, 1964

GEOPHYSICS

Life on Mars Hard to See

➤ FINDING LIFE on Mars, if there is any, would be difficult for an astronaut because any life forms would be in a layer only a few ten-thousandths of an inch thick.

This is the view of Dr. Gerard P. Kuiper of the University of Ariozna, Tucson, one of the world's top experts on planets in the solar system.

Dr. Kuiper also said any forms of life would have to have pigments to protect them from the sun's ultraviolet light, which is much stronger on Mars than on earth because the red planet has much less atmosphere than the earth.

The Martian atmosphere has much more carbon dioxide than was previously thought, Dr. Hyron Spinrad of the University of California, Berkeley, said. Dr. Guido Munch of Mt. Wilson and Palomar Observatories, Dr. Lewis Kaplan of California Institute of Technology's Jet Propulsion Laboratory, Pasadena, and Dr. Spinrad have measured the carbon dioxide content of the Martian atmosphere. (See SNL, 85:7, Feb. 15, 1964.)

They also found that although the Martian "air" is predominantly nitrogen, there is less nitrogen there than previously thought.

Dr. J. W. Chamberlain of Kitt Peak National Observatory, Tucson, said that he uses an electronic computer to calculate the composition of the upper atmosphere of Mars.

The Mariner space probe scheduled for launch late this fall would fly by Mars, Dr. Chamberlain noted. It is expected to make an ultraviolet scan of the planet in an effort to detect molecular oxygen in the high atmosphere. Such oxygen occurs when carbon dioxide breaks up due to sunlight. It does not mean oxygen exists at the planet's surface.

If the scan shows the distribution of molecular oxygen with height, he said, that will give a direct measure of the temperature distribution in the Martian atmosphere.

Drs. Kuiper, Spinrad and Chamberlain outlined their views on Mars to newsmen following presentation of their scientific papers at the closing sessions of the American Geophysical Union meeting in Washington, D. C.

The study was reported in Astrophysical Journal, 139:1, 1964.

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PHYSICS

Artificial Raindrops Created in Wind Tunnel

➤ DROPS OF WATER, floating on an updraft of air in a vertical wind tunnel, react like raindrops in clouds.

Scientists at the missile and space systems division of Douglas Aircraft Company, Santa Monica, Calif., are studying such artificial raindrops, measuring the electric charges that are generated when the drops move about and either combine into larger drops or dissipate into small ones.

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Questions

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ASTROPHYSICS—What is the most distant object yet found in the sky? p. 340.

BIOCHEMISTRY—What new drug may soon be used to control high blood pressure? p. 345.

PSYCHIATRY—What are the characteristics of problem soldiers? p. 342.

PUBLIC HEALTH—Only what primate other than human can develop hepatitis? p. 344.

TECHNOLOGY—What new machine has been developed to help children learn to read? p. 350.

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