

ASTRONOMY

Milky Way Found Larger

The stars astronomers have used to measure the size of the Milky Way are now reported to be farther away, with the result that the galaxy has "grown" to 1½ times its old size.

► THE MILKY WAY GALAXY, a gigantic "pinwheel" of stars in which the sun and earth are located, is half again as big as astronomers have thought.

Its size has not actually changed, but the stellar beacons astronomers use to gauge distances are found to be farther away.

This expansion of the Milky Way, reported to the American Astronomical Society meeting in Cambridge, Mass., by three University of Wisconsin astronomers, brings our galaxy's dimensions back close to the size proposed about 30 years ago by Dr. Harlow Shapley, retired director of Harvard College Observatory, Cambridge. Since then, it had shrunk but now it is bigger again.

The increase in the Milky Way's size follows by a few years the doubling of the distance scale to other galaxies, of which the universe has unnumbered billions. Because of this doubling of extra-galactic distances, the measurements within the Milky Way were re-examined.

According to the new determination, the sun is about 13 kiloparsecs from the galaxy's

center, not about eight, the usually accepted figure. A kiloparsec is the distance light traveling at 186,000 miles a second covers in 3,262 years. About 250 billion billion miles is the distance now suggested from the sun to the galaxy's center, a figure near that resulting from theoretical calculations made by Dr. Harold F. Weaver of the University of California's Leuschner Observatory.

The new distance comes from use of a new value for a number known as Oort's constant, reported to the meeting by Drs. A. E. Whitford, A. D. Code and J. D. Bahng of Washburn Observatory, Madison.

This constant was first proposed by the Dutch astronomer, Dr. J. H. Oort, to help describe galactic rotation. He also pointed out that the Milky Way probably does not rotate like a solid wheel.

Since a considerable part of the galaxy's mass is thought to be located near the center, the motions of stars in the Milky Way are somewhat like those of the planets around the sun: Venus moves faster than the earth and the earth outruns Mars. Similarly the stars closest to the galactic center complete one turn around it faster than the sun does.

Although the sun is located in one of the spiral arms of the Milky Way, making much of its structure undetectable in visible light, this effect can be observed. It is known as radial motion and is the star's apparent motion with reference to the sun and corrected from the earth's motion.

Included among the stellar beacons used to study radial motion and galactic rotation are the "B" stars, very brilliant hot stars of large masses, and the Cepheid variables, whose light regularly changes in brightness.

The three Wisconsin astronomers used photoelectric methods to obtain improved distances to these stars, then used these distances to find the new value for Oort's constant.

By this method, they traced the rate at which the Milky Way is rotating from a point two kiloparsecs outward from the sun to a point about five kiloparsecs inward from the sun toward the galaxy's center, using various galactic models. All showed a maximum velocity within two kiloparsecs of the sun.

Another way of studying the Milky Way's structure is by the radio waves sent out by the gas between the stars. The three astronomers found evidence that stars and interstellar gas do not rotate at exactly the same speed.

Astronomers believe the Milky Way resembles Andromeda, the only external galaxy which can be seen with the unaided eye. Because they can see the entire galaxy, the astronomers have a much better idea of Andromeda's structure than they do of the Milky Way's.

Science News Letter, May 18, 1957

SURGERY

Insert Heart Tubes On Two Sides

► HEART catheterization, the procedure where a small plastic tube is inserted in a vein and guided into the heart, has been successfully done on both sides of the heart at the same time, Dr. James A. Bougas, New England Deaconess Hospital, Boston, reported to the National Tuberculosis Association meeting in Kansas City, Mo.

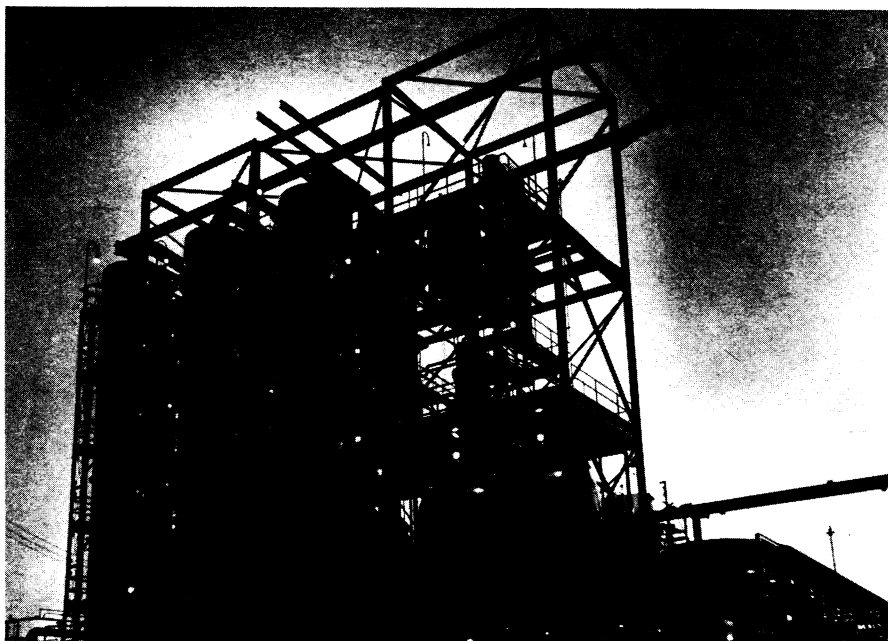
This double catheterization, when done simultaneously in the same patient, with the collection of expired air at the same time, makes it possible to calculate the output of the heart as well as the size of the openings in the heart valves. It is useful in determining the condition of a patient before and after heart surgery, he said.

Catheterization is usually performed on the right side of the heart only. There it is used to measure blood flow in the right chambers of the heart and to collect samples of blood directly from them.

While right heart catheterization makes possible the study of heart disorders existing from birth, Dr. Bougas pointed out, the double method is particularly valuable for studying heart disorders acquired during a person's lifetime.

The double catheterization has been done on 80 patients with serious heart disease without any major complications or any mortality, he said.

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SYNTHETIC RUBBER—Completion of a \$10,000,000 expansion program has been announced by the Goodyear Tire and Rubber Company. The photograph above shows the recovery area consisting of three stripping columns where unreacted styrene is recovered from synthetic rubber latex. From these columns, latex goes by pipeline to the finishing building where the rubber is coagulated, dried and baled.