

ASTROPHYSICS

Search Is On for Quasars

► THREE RADIO TELESCOPES, consisting of two fixed parabolic reflectors and one movable one, have been installed in Cambridge, England at the Mullard Radio Astronomy Laboratory of the Cavendish Laboratory. They are expected to play an important role in the study of quasars, the mysterious "radio stars" of remote space.

The three parabolic reflectors are on an east-west line, two being fixed 2,464 feet apart and the third on a carriage sitting on a 2,600-foot rail track of 45-foot gauge. The rails are flat to one-eighth inch and distances along them have been surveyed to an accuracy of one in one million.

The carriage carries a load of some 120 tons and is moved at up to one mile per hour by a diesel-hydraulic system which allows precise control at very low speeds.

The Cavendish Laboratory is making a large-scale search for quasars. Prof. Martin Ryle, director of the laboratory since it was founded in 1946, said that the most distant quasar in the universe is eight billion light-years from earth, the farthest object ever observed by man. One of the major tasks of the new observatory will be to determine the frequency and distribution of quasars in the universe.

Work on quasars will, Prof. Ryle added, help to show whether the universe is expanding or in a permanent steady state. If quasars occur only at the vast distance of billions of light-years then the universe has expanded, and probably is still doing so. If they are uniformly distributed throughout

the universe, the steady state theory will have gained great support.

Prof. Ryle's major contribution to radio astronomy in the past was to use two small radio telescopes, each only 60 feet in diameter, to perform like a single telescope one mile in diameter. Quite apart from his contribution to astronomy itself, he is also noted for the development of the technique known as aperture synthesis, which is the basis of the construction of the new Science Research Council radio telescope. The new equipment includes a mobile telescope on a half-mile run of railroad track. It was built with the aid of a \$1.6 million grant from the Science Research Council (formerly the Department of Scientific and Industrial Research).

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OCEANOGRAPHY

'Electronic Maps' to Aid Apollo Astronauts

► WHEN APOLLO astronauts make their trip to the moon, they will be aided by "electronic maps" of the ocean bottom.

The maps will pinpoint the positions of three National Aeronautics and Space Administration ships that will furnish tracking and telemetry information to the astronauts. The ships, which will aid land-based stations in performing orbital calculations, must be precisely located on the earth's surface because navigational fixes are required every few seconds. To perform this

mission the ships must hold their positions even in bad weather and after long periods at sea.

To determine its position, each ship takes sonar depth soundings in a straight-line course over a previously "mapped" four-mile-square area. Its soundings are then electronically compared with the "map" or profile of the ocean bottom, which has been stored on punched tape.

The system, called Bathymetric Navigational Equipment, was built by General Instrument Corporation, New York.

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ASTROPHYSICS

Milky Way Galaxy Once Had Quasar Explosions

► THE MILKY WAY galaxy, the huge pinwheel of a billion stars in which the sun and its planets are located, was the scene of a massive quasar explosion about ten billion years ago.

Since then there have been other quasar explosions in the Milky Way, of which the so-called globular clusters of several hundred stars are the remnants. These ideas were reported by Dr. Arne A. Wyller of the University of Oslo's Institute of Theoretical Astrophysics at Blindern, Norway.

Quasars are the strange heavenly objects, discovered only recently, that look much like ordinary faint stars but radiate energy at a stupendous rate. No one is yet sure of the source for this tremendous outpouring of radiation, both as light and as radio waves.

If the globular clusters are actually quasar remnants, Dr. Wyller stated, the center of each will contain a core that collapsed explosively upon itself, or imploded. Such a core would represent a significant fraction of the original mass in "hidden form," Dr. Wyller reported in *Nature*, 207:393, 1965.

Dr. Wyller's theory accounts for one very puzzling feature observed in quasars—their variation of light output over short periods of time, as in two or ten years. Such light variations would result from the implosion of a globular cluster at approximately, but not identically, the same time as another.

The major quasar event in the Milky Way that took place ten billion years ago—the collapse of a huge spherical gas mass—lasted about a hundred million years, Dr. Wyller calculated.

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Do You Know?

A number of cases of *psychosis* can be traced to serious thyroid disorders.

More than 90% of all water used in the western United States is for *irrigation*.

Human hearts may be stopped and circulation of blood prevented for as long as or more than 50 minutes with the help of a heart-lung machine and a new cooling technique called *profound hypothermia*.

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Cavendish Laboratory

QUASAR SPOTTERS—These are two of the three parabolic reflectors of the new radio telescope at the Mullard Radio Astronomy Observatory, Cambridge, England. They are 60 feet in diameter and equatorially mounted. The four footed base which supports the dual frequency feed at the focus can be clearly seen.