

NEW LIGHT IN THE UNIVERSE

Astronomers identify an object in space that is farther away from us, and moving faster, than anything yet observed.

An astronomer and a radio astronomer at Caltech have just identified an object in space that is farther away from us, and moving faster, than anything ever observed before. This object is also far brighter than any light source yet seen. It emits some 100 times more light than an entire galaxy of 100 billion stars.

The object, catalogued as 3C-147, was located by Thomas Matthews, senior research fellow in radio astronomy, from observations made with the twin 90-foot dishes of the Caltech Radio Observatory. The recession rate was then measured by Maarten Schmidt, associate professor of astronomy and staff member of the Mount Wilson and Palomar Observatories, using the 200-inch Palomar telescope. He found that 3C-147 has an apparent velocity of 76,000 miles a second — almost half the speed of light. It is so far away that its exact distance cannot be given at present.

For the past 35 years, astronomers have measured the composition of an object by analyzing the spectrum of its light. In a spectrogram, light is split into its different wave lengths in the same way that a prism separates colors. Each chemical element emits its own characteristic pattern of lines. These lines form the spectrum and are the fingerprints that denote the presence of various elements in the object's atmosphere.

The wave lengths of the lines of each chemical element are known. However, if an object is moving away from us, the lines in its spectrum are shifted to longer wave lengths, toward the red. In 3C-147, the lines were found to be shifted to wave lengths 54½ percent longer than the wave lengths observed in the laboratory. This large red shift corresponds to an apparent velocity of 76,000 miles per second.

3C-147 is one of the recently discovered "quasi-stellar radio sources." These objects were first noticed in 1960 because they were emitting strong radio noise. At first they were believed to be ordinary stars in our own galaxy. On photographic plates they look like stars, producing very bright images with sharp edges, whereas galaxies tend to show up in photographs as smears of light with fuzzy edges. But the large red shifts found for

these objects show that they are enormously bright objects, billions of light years away. They could be the nuclei of exploding galaxies, or they could even be objects in intergalactic space never seen before. Apparently they are undergoing titanic explosions, because they radiate enormous amounts of energy both as light and as radio waves.

Dr. Matthews estimates that perhaps a quarter of the thousands of radio sources in the universe are these star-like objects. To date, hardly more than a dozen have been found.

Before the discovery of these new objects, it was thought that the big 200-inch telescope at Palomar, which was designed for the study of the size of the universe, had reached as far into space as it was capable of doing. But these new objects are so very luminous that they enable the telescope to observe much farther out.

If the red shifts can now be determined for enough of these very distant objects, a true model of the universe may eventually be constructed.

Radio astronomer Thomas A. Matthews and astronomer Maarten Schmidt.

