ASTRONOMY

Super-Nova is 500,000,000 Times Brighter Than Sun

Giant Exploding Star Is in Small Stellar System About Three Million Light Years From Our Galaxy

A GIGANTIC stellar explosion, producing 500,000,000 times as much light as the sun, and announced as the sixteenth super-nova of all history, was discovered at the Palomar Mountain observatory of the California Institute of Technology.

This new star, so distant that it has taken its light about three million years to reach the earth, has burst from an obscurity that could barely be pierced by the most powerful telescopes to take its place among the brighter stars. It is situated roughly midway between the Big Dipper and bright star Arcturus in the northern sky. It is not quite bright enough to be seen with the unaided eye.

Spectrographically Checked

The discovery was made by Dr. Fritz Zwicky. It was confirmed by observations of the super-nova's spectrum made at the Mt. Wilson Observatory of the Carnegie Institution of Washington by Milton Humason and was further studied by Dr. Walter Baade.

If such a stellar explosion happened in the vicinity of the earth and sun and its planets, it would undoubtedly wipe them out.

"The appearance of a super-nova in any given system of stars, such as our own, for example, is a very rare occurrence which happens perhaps only once in several hundred years," Dr. F. H. Seares of the Mt. Wilson Observatory pointed out. "Of the numerous novae that have appeared in our own system, only one, Tycho's star of 1572, was perhaps bright enough to be classed as a super-nova. For that reason search has turned to the extragalactic systems of stars, of which many thousand are bright enough to serve as a means of increasing the chance of discovering one of these catastrophic outbursts."

Dr. Zwicky's discovery results from a systematic plan for the detection of the outburst of these amazing objects which at their maximum brightness far surpass the luminosity of any other type of star.

There is no trace of the nova on a Mt. Wilson photograph taken March 8, 1937, from which it is certain that before the outburst the star was fainter than the twentieth magnitude, which is not far from the limit than can be reached with the 100-inch telescope. Now it is of magnitude 8.5, an increase in brightness of at least 40,000 times. The system within which the super-nova has appeared is small, a dwarf stellar system, in fact, situated at about three million light years and so faint as to be observable only with the most powerful telescopes. Dr. Baade estimates the intrinsic brightness of the super-nova to be of absolute magnitude minus 16.3, which is some ten times brighter than average super-nova and about 100 times more luminous than the nebula to which it belongs, or 500,000,000 times the luminosity of the sun. It is the most luminous of all the 15 super-novae thus far observed with the possible exception of Z Centauri of 1895.

Theory of Cosmic Rays

Researches now in progress may soon prove, or disprove, the controversial theory that the source of the mysterious cosmic rays is the gigantic explosion of stars in space. Cosmic ray instruments aimed at the new super-nova just discovered by Prof. Zwicky at Palomar Observatory in California may be showing right now that the intensity of cosmic rays has increased during the recent flareup of the super-nova which is said to rival 500,000,000 suns in brilliance.

If the cosmic ray intensity does increase in the direction of the new super-nova, it would be good support for Prof. Zwicky's own theory on the origin of cosmic rays, which assigned tremendous star explosions as the source of the piercing radiation. Prof. Zwicky first postulated with Dr. Walter Baade this hypothesis in 1934.

Since then at least one super-nova has been discovered, in the constellation of Virgo, but it was so small and far away (6,000,000 light years) that conclusive results in testing the cosmic ray theory of Prof. Zwicky were not anticipated.

The present super-nova, however, is only half as far away and is among the brightest star explosions yet seen among the 16 known to astronomy. While its position, roughly between the Big Dipper and the star Arcturus, is not too favorable for cosmic ray directional observations because of the bending effect of the earth's magnetic field on incoming electrical particles, the chances of checking the Zwicky theory are much better than during the similar 1936 super-nova.

The next few days of cosmic ray observations may tell the story.

Science News Letter, September 11, 1937

ANTHROPOLOGY

Eskimo-Zulu Marriage Produces Unique Offspring

KUPLOO is a lad about sixteen Arctic summers old. He lives near Churchill, far up the coast of Hudson Bay. And he has probably the most incredible parental assortment that any of old earth's racial melting-pots can boast. His father is an Eskimo, his mother a Zulu.

It happened in this wise: The Hudson Bay Company's agents at Churchill, on Hudson Bay, found a big deposit of blue clay, that looked like the stuff they take diamonds out of, down in South Africa. They asked the South African diamond people if they could send up a good diamond prospector. A skilled Zulu

ZULIMO OR ESKILU?

prospector was sent, and he brought his wife with him. There turned out to be no diamonds after all, but before the Zulu couple could get a boat back home the man fell sick and died.

The woman, not caring to go back to her people a widow, remained in the North and married an Eskimo. Kuploo, now about 16 years old, is their child.

Like a good many boys of his age, he is rather bashful and didn't want to have his picture taken, so Père Arthéme Dutilly, Canadian missionary-scientist, asked him to hold up a bird he had just shot for his collection. It didn't occur to Kuploo until the operation was all over that he would also be included in the picture.

Science News Letter, September 11, 1937

PHYSICS

Giant New Atom-Smasher Uses 2,700,000 Volt Potential

Apparatus Enclosed in High-Pressure Tank To Cut Down Sparking and Corona Discharges

THE HIGHEST steady operating potential ever used in atom bombardment research is attained in the new 2,700,000 volt electrostatic generator with which physicists at the University of Wisconsin are now exploring the nuclei of atoms.

Sealed in a giant steel tank under a pressure which can be as high as 100 pounds to the square inch, the Wisconsin apparatus has already made possible the discovery of powerful gamma radiation, excelling in piercing power the rays from radium, which is liberated when fluorine is bombarded in the apparatus. The medical implications of this discovery, in the treatment of cancer and other malignant diseases, are yet undeveloped but offer a promising field of research.

Drs. Raymond G. Herb, D. W. Kerst and D. B. Parkinson are the scientists who have fashioned, and now operate, the new tool of atomic research which operates steadily at 2,500,000 volts. The experimenters are assisted, in the theoretical implications of their discoveries, by the well-known mathematical physicist Dr. Gregory Breit, also of the University of Wisconsin.

The virtue of the Wisconsin apparatus, Dr. Breit told Science Service, is that it gives a high, steady and controllable voltage with which particle "bullets," like protons, can be driven at atoms under investigation.

The device, of the electrostatic type, differs from the famous cyclotron apparatus used at the University of California in about the same way that a rifle differs from a shotgun. The cyclotron can apply equal or greater energies to its particles but may not supply them in a steady stream with every particle in the stream having the same energy. Like a shotgun, a cyclotron can be said to spray bullets of different energies at the target.

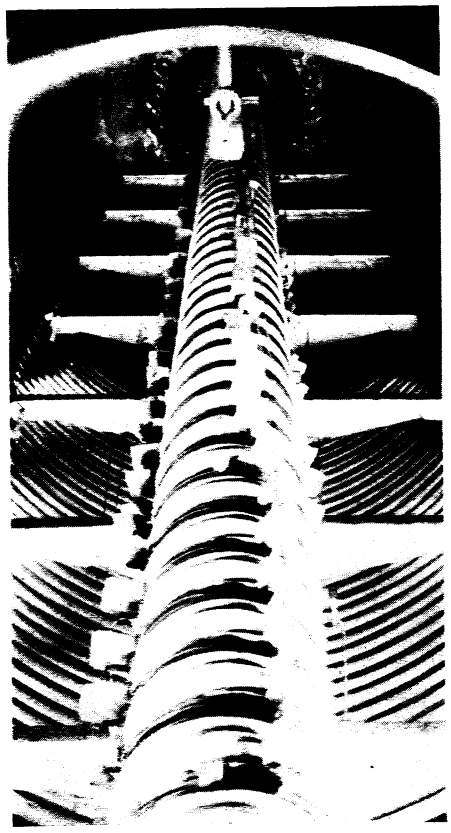
Moreover, as now used, electrostatic generators have methods of determining the energies of their particles by external means, without actually going into the bombarding particle beam (as the cyclotron investigators must do) to measure the energies of the particles.

In contrast to cyclotrons, the Wisconsin apparatus, to keep the analogy, would be a rifle which shoots its bullets with known and readily controllable energy. For many vital experiments in atomic physics, it is most important that the energy of all the particles be quite the same and their energy accurately known.

Typical of an experiment where such knowledge is vital, is that of measuring the binding force in the nuclei of hydrogen atoms. The fundamental results of this new, powerful force of nature and knowledge of the laws by which it acts, were first secured at the Department of Terrestrial Magnetism of the Carnegie Institution of Washington with the electrostatic atom-smasher of Drs. Tuve and Hafsted and their colleagues.

Already work at Wisconsin, not yet officially reported, indicates that the basic curves obtained in this earlier work will be substantiated with great accuracy, and extended into the new ranges of energy which the Wisconsin device can attain.

The function of the steel pressure tank, enclosing the Wisconsin apparatus, is to reduce markedly the corona discharge and electrical spark-over at the very high electrical potentials employed. While it might seem that this is a new idea—from the number of similar devices now being built elsewhere—it is not.



ATOMIC RIFLE-RANGE

Down this long porcelain tube speed the atomic "bullets," in the University of Wisconsin's new atom-smashing machine.

The idea of a pressure tank was in nearly all the investigators' minds as the way to accomplish the best operating conditions. The apparent delay arose from the need for much experimental spade work in learning how to construct and operate satisfactorily the electrostatic type of generator.

This knowledge has now been achieved, so that besides the Wisconsin device, operating at pressures of 100 pounds to the square inch, there is now building the Westinghouse apparatus which will have pressures of 120 pounds to the square inch. And in Washington a tank with 50 pounds to the square inch pressure is under construction which will house a new generator.

Also, Dr. Robert Van de Graaff of the Massachusetts Institute of Technology, who was the first of the modern scientists to apply to the problems of atomic bombardment the electrostatic methods