

## PHYSICS

# New Form of Matter Found In Cosmic Ray Bombardments

Unnamed and Unlike Other Recently Found Particles,  
It Fails To Fit Theories; Penetrates Platinum Brick

By DR. R. M. LANGER

**A** NEW form of matter has been discovered. It has as yet no name. Unlike other recently discovered particles there is no empty niche in the present scheme of things to which the newcomer can be assigned.

The discoverers, Dr. Seth Neddermeyer and Dr. Carl D. Anderson of the California Institute of Technology, have just a few important properties to announce although they have concentrated on proving the existence and learning the nature of the new substance for over two years.

During that time the experiments seemed always to show the new particles, but because of the startling character of the particles the experimenters heretofore hesitated to emphasize the implications. It was the longest and most difficult problem undertaken with the famous apparatus built by Dr. Anderson.

With this apparatus, he discovered the positive electron in 1932, for which he received a Nobel Prize last year. It was necessary first to examine the behavior of electrons. Then protons had to be eliminated as a possible explanation of the apparent paradoxes.

Now they offer the latest striking evidence that the new particle is different from everything now accepted.

It is charged and carries about the same amount of electricity as is found on an electron or proton. Both positives and negatives are found. The particle is many times more massive than an electron and many times less massive than a proton. Its life here on earth is presumably very short for it is not found except in cosmic rays which have been bombarding the earth since the beginning of time. These properties are all inferred from a study of cosmic ray tracks in an expansion chamber.

The most recent conclusions were obtained from tracks which were seen to penetrate a platinum brick. The platinum, over a pound in weight, replaced the lead brick in the chamber in which five years ago Dr. Anderson discovered

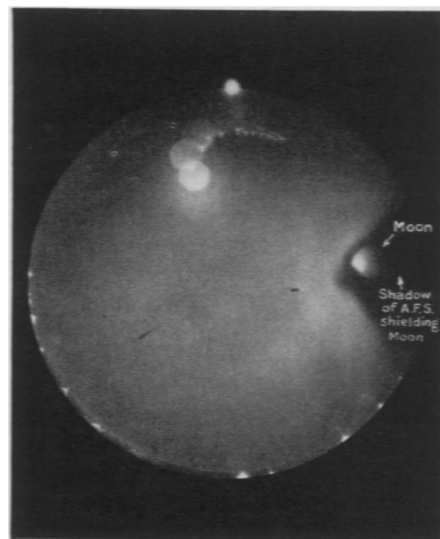
the positive electron. Platinum is twenty-one times as dense as water and almost twice as dense as lead. The platinum brick was lent to the scientist by the Baker Company.

The experiments consisted of measuring the curvature of the cosmic ray tracks before and after penetrating the plate.

Ordinary electrons produce many protons and secondary electrons. The new particles penetrate without much energy loss and almost never produce protons. All they do is to push aside the other particles and electrons in their way.

Other workers have recently become convinced that particles hitherto unknown occur among the cosmic rays. Drs. Neddermeyer and Anderson feel that some exciting and important results are due to come out in the near future. These are certain to clarify our understanding of ordinary electrons and protons as well as to extend our knowledge of cosmic radiation and of the fundamental forms of matter.

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## MEASURING WIND

*This unusual picture shows how scientists measure the velocity of upper air winds at night. It is the view of the special "fish eye" camera which sees the entire sky from horizon to horizon. A small balloon sent aloft with magnesium flares timed to ignite every few seconds produces the flashes appearing as spots in the top left center. The dimmest flash occurred at an altitude of 13,000 feet and a distance of seven miles. The bright spot centered above the big circle is a point of light which indicates true south. The light of the moon shows at the right, and around the edge of the circle are lights of neighboring cities.*

## METEOROLOGY

# Camera, Balloon and Flare Record Night Wind Velocities

**A** PHOTOGRAPHIC method of charting the directions and velocities of night winds high above the earth, a development expected to be of considerable value in weather forecasting and aircraft operation, has been developed in the Massachusetts Institute of Technology meteorological laboratory.

Cardinal feature of the method lies in its use of a "whole sky camera," one employing a wide-angle or 180-degree lens, and a sounding balloon equipped with flares so attached to an ordinary piece of blasting fuse that they flash at set time intervals.

Developed by Athelstan F. Spilhaus of the Woods Hole Oceanographic Institute, now conducting research at Tech-

nology, the new method is expected to permit studies of complicated wind structures not only in greater detail than has heretofore been possible but more accurately and more easily as well.

In operation the camera is set at a chosen observation point with its lens pointing directly overhead. As the balloon ascends the flashes of the magnesium flares, set off at time intervals as small as five seconds if desired, are recorded on the photographic plate. The picture taken by the wide-angle lens is circular, the circumference showing the horizon on all sides. Thus the brilliant magnesium flashes are recorded regardless of what direction the balloon takes.

By measuring the resulting angles of

elevation and direction between the camera station and the recorded flashes and correlating these data with the rate of the balloon's ascent, a complete and accurate record of wind velocity and direction is easily obtained.

Previous method of charting winds of the upper air has been to release a balloon and to follow its course with a theodolite with which the investigator reads the angles of elevation and direction every half-minute or minute.

At night, research workers have hung a paper lantern containing a lighted candle from the balloon and followed this light. The candle, of course, is very dim and its light is lost rather quickly. Some observers have been known to plot the course of stars, thinking they were trailing the lantern.

The Spilhaus method, however, prac-

tically eliminates this "human equation" and even the most inexperienced observers can easily make rapid and accurate readings photographically. The set-up is all but automatic—all the observer has to do is to open the camera shutter and release the balloon after he has lighted its fuse.

In preliminary tests the flashes have been recorded at distances as great as seven miles and at heights in excess of 13,000 feet. Meteorologists expect, however, that both this distance and this altitude can be greatly exceeded.

Formal announcement of the new method was made by its inventor at the meeting of the American Meteorological Society at the United States Weather Bureau in Washington, D. C.

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#### AVIATION

## New Blind Landing Beacon Has Antenna Underground

### Pit Antenna Is Found to Give Steeper and More Satisfactory Approach Path for Landing Airplanes

**A** NEW radio landing beam that emerges from an underground pit and holds great promise for making blind landings of airplanes practical and safe in foggy weather has been described by two National Bureau of Standards scientists, H. Diamond and F. W. Dunmore.

The transmitting antenna is placed in a special subterranean compartment under the center of the landing field instead of being erected dangerously in the air at the edge of the field. The Bureau of Standards scientists had their preliminary work done and ready to report two years ago but the interest of another government bureau delayed the scientific announcement. The recent scientific paper before the joint meeting of the International Scientific Radio Union and the Institute of Radio Engineers was the first public report.

About six years ago the same group of government scientists developed a radio beacon system for aircraft landing fields which was so effective that after demonstrations in this country it was adopted and put into extensive use in Europe, Japan and Russia. It has not been installed as regular equipment on American landing fields, however.

The new pit antenna improves this radio landing beacon. In the landing system, the airplane glides down a path that is marked by equal strength of radio signal, indicated on a convenient dial on the plane's instrument panel. The way that radio waves travel from the transmitting antenna makes this system possible. One kind of wave goes directly from the antenna to the plane, while another goes from the transmitting antenna to the ground and then is reflected to the plane.

The interference of these two waves and decreasing distance combine to allow the plane pilot to steer his craft along a radio path to a happy landing even if he can not see the landing field.

When the transmitting antenna is in the air at the field's edge the path of the landing glide was a little too flat. Now the pit antenna gives a steeper and more satisfactory approach path. A further advantage of the underground system is that it can be built on a turntable and swung around to conform to wind direction, thus allowing landings from any direction to be made with the aid of only one antenna. Previously several antennae at the edges of the field were necessary.

One possibility is that the whole radio equipment, transmitter as well as antenna, can be put underground at the landing field's center.

Two Berlin scientists, Ernst Kramar and C. Lorenz, discussed the principles of blind landing radio system applied in Germany based in part on the earlier American system.

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#### GENERAL SCIENCE

## 15 Scientists Honored By Election to the Academy

**F**IFTEEN new members of the National Academy of Sciences were elected at the Academy's meeting. Membership in this organization is one of the most distinguished honors within reach of American scientists.

Ten of the new members represent the "natural" sciences—biology, geology, medicine, psychology, etc.: Dr. C. B. Bridges, California Institute of Technology; Dr. E. W. Goodpasture, Vanderbilt University; Dr. C. G. Hartman, Carnegie Institution of Washington; Dr. D. F. Hewett, U. S. Geological Survey; Dr. Leo Loeb, Washington University (St. Louis); Dr. D. A. MacInnes, Rockefeller Institute for Medical Research; Dr. G. R. Minot, Boston City Hospital; Dr. F. B. Sumner, Scripps Institution of Oceanography; Dr. Charles Thom, U. S. Department of Agriculture, and Dr. E. C. Tolman, University of California.

Five represent the "exact" sciences—physics, astronomy, mathematics, etc.: Dr. Oliver Ellsworth Buckley, Bell Telephone Laboratories; Dr. Arthur Jeffery Dempster, University of Chicago; Dr. John von Neumann, Institute for Advanced Study; Dr. Seth B. Nicholson, Mt. Wilson Observatory; Dr. Otto Struve, Yerkes Observatory.

Prof. August Krogh of the University of Copenhagen, Denmark, noted for his research in animal physiology, was elected as a foreign associate of the Academy.

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In 1918, army tanks usually ran less than 100 miles between major overhauling of the mechanism; now tanks generally run several thousand miles without mechanical failure.

A survey of existing roads to find out what the country has, and needs, in its highway system is to be made by over 40 states working with the Federal Government.