GEOPHYSICS

Radiation Bulge Detected

A high-energy radiation region has been detected far beyond the earth's radiation belts which may be "created" by collision between the earth's magnetic forces and solar wind.

➤ A BIG BULGE of high-energy radiation has been detected far beyond the usual reaches of the earth's radiation belts. It is not, however, a hazard to future space travelers.

The radiation region was located by detectors on a far-ranging scientific satellite known as IMP, for Interplanetary Monitoring Platform.

The region appears to fan out beyond the radiation belts on either side of the earth and trail off in a kind of "wake" in the direction away from the sun.

The extent of this radiation "wake" suggests that the moon may be peppered with high-energy radiation particles during a portion of each monthly lunar orbit.

Whether the new region can be properly called a part of the Van Allen radiation belts is not known, Dr. Kinsey A. Anderson, physics professor at the University of California, Berkeley, reported.

There is new evidence that the high-energy radiation—both within the belts and beyond—is "created" in the collision between the earth's magnetic forces and the particles streaming from the sun that make up the so-called solar wind.

Dr. Anderson joined other experimenters at a symposium on the IMP satellite arranged by the National Aeronautics and Space Administration at NASA's Goddard Space Flight Center, Greenbelt, Md.

Space experts have agreed that NASA's IMP flight, with nine experiments aboard, is one of the most successful space research ventures to date. The 138-pound satellite was launched last Nov. 26 from Cape Kennedy, Fla.

The satellite is traveling on a four-day orbit that extends some 122,000 miles into space—or roughly one-half the distance to the moon. The orbit itself is revolving slowly around the earth to trace a path like the overlapping petals of a daisy.

The IMP satellite is thus giving U.S. space scientists their first extended opportunity to "see" far beyond the main region of the Van Allen radiation belts, lying about 40,000 miles above the earth, and to map both near and distant radiation patterns around the entire earth.

Previous satellite probes have shown large numbers of high-energy electrons "trapped" by magnetic forces in the Van Allen radiation belts.

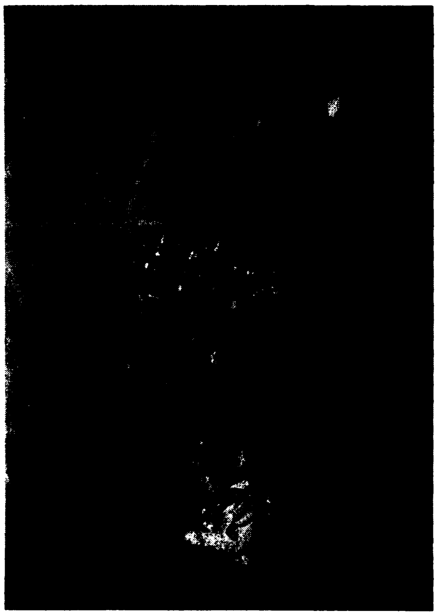
Data from IMP showed virtually no high-energy particles in the most distant portions of the first orbits, when the satellite had passed beyond the radiation belts and moved toward the sun into the solar wind of interplanetary space.

In Dr. Anderson's view, this is a clear indication that the high-energy radiation does not originate at the sun but is born in the interaction between the solar wind, which consists largely of protons and lower-energy electrons, and the earth's magnetic forces.

How electrons are accelerated in space is still unknown, but IMP data are showing where acceleration occurs.

High-energy electrons in the "wake" have been detected as far as the IMP's apogee, except in the direction of the sun, and it appears likely that the moon may encounter them as it passes through the region of the "wake" each month.

• Science News Letter, 85:179 March 21, 1964



Michigan State University

STAR PROJECTOR—Zenon D. Billeadeaux adjusts the projector of the new Spitz ISTP (Intermediate Space Transit Planetarium) at the Abrams Planetarium, Michigan State University. This projector, the only one of its kind and manufactured at Spitz Laboratories, Yorklyn, Del., has three movements enabling it to show the heavens not only as they appear from earth, but also as they would appear to an astronaut in space.

PHYSICS

'Strange' Atomic Particle

➤ AN IMPORTANT KEY to making sense out of the tens of "strange" particles in the atom's core is being sought by scientists at several laboratories in the United States and abroad.

The search for this key follows on the heels of the discovery of another atomic particle that dramatically confirmed the theory of nuclear structure called the "eightfold way." The new theory includes the eightfold way, but proposes an even higher order, or ninefold way, for the relationships of nuclear particles.

The nine-way theory comes in the form of a question from Dr. Julian Schwinger of Harvard University who asks if there is a ninth baryon. A baryon is a heavy nuclear particle. The question is Dr. Schwinger's way of suggesting a higher order within the nucleus than provided by the eightfold way.

The eightfold way puts nuclear particles into groups, or multiplets, and families of groups, or super-multiplets. Finding the predicted properties for the ninth baryon would mean there was a larger family clan, or super-super-multiplet.

The particle whose properties are now being determined is the Lambda with a mass of 1,405 electron volts. Energy is used to specify mass since the two are interchangeable in the nuclear world.

Although the mass of the Lambda is known, two of several other properties by which nuclear particles are grouped into families—spin and parity—are not firmly determined. Finding the Lambda's spin and parity is the aim of intensive research by several groups of physicists, including those at the Naval Research Laboraotry, Washington, D. C., and the University of Maryland.

The successful description of relationships between nuclear particles known as the eightfold way was proposed independently by Dr. Murray Gell-Mann of California Institute of Technology, Pasadena, and Dr. Yuval Ne'eman of the Imperial College of Science and Technology, London. Their theory was confirmed brilliantly about one month ago with the discovery of the Omega Minus having the properties predicted by the eight-way theory (see SNL, 85:147, March 7, 1964).

Dr. Gell-Mann told SCIENCE SERVICE that in his original report concerning the eightfold way he had also suggested the possibility of a still higher degree of order among nuclear particles, or super-super-multiplets.

Dr. Schwinger's question is posed in Physical Review Letters, 12:237, 1964.

The eightfold way is so named because it involves the operation of eight quantum numbers, of which spin and parity are two examples.

The name is also applied because of an aphorism attributed to Buddha: "Now this, O monks, is noble truth that leads to the cessation of pain: This is the noble Eightfold Way: namely, right views, right intention, right speech, right action, right living, right effort, right mindfulness, right concentration."

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