

PHYSICS

Greatest Ray Shower

► NEW EVIDENCE supporting the theory that cosmic rays come from outside our galaxy has been obtained from the greatest shower of cosmic ray particles ever detected on earth.

The shower was recorded March 19 at Massachusetts Institute of Technology's Volcano Ranch cosmic ray research station near Albuquerque, N. M. Dr. John Linsley, who directs the station, reports that the shower contained between 20 billion and 40 billion particles. This figure is from two to four times greater than the number of particles contained in the largest previous shower detected by the station in December, 1959.

By "reconstructing" such showers, *The Technology Review*, June, 1961, explains, the energy of the primary particles responsible for them can be estimated. The March shower resulted from the arrival over New Mexico of a nuclear visitor with far more energy than ever has been imparted to anything with a man-made accelerator. Its energy, in fact, was more than seems likely a particle could have acquired within our galaxy.

The shower appears, therefore, to have been touched off by something from beyond the region 100,000 light years wide and 5,000 light years deep that the Milky Way occupies in space.

Prof. Bruno Rossi of the MIT Laboratory

for Nuclear Science, which has been discovering bigger and bigger showers year after year, doubts if the limit has been reached. He has been convinced for some time that there is an extragalactic acceleration mechanism for cosmic rays, and this shower appears to be further evidence of it.

Whether the incident particles that start such showers are protons or ionized nuclei of heavier elements is still uncertain, and much more work appears to be necessary to determine the nature of cosmic particles.

Dr. Linsley is assisted at the station by Peter J. Eccles, a member of the staff of the Laboratory for Nuclear Science and the son of Sir John Eccles, president of the Australian Academy of Sciences. The Volcano Ranch research is supported by the National Science Foundation.

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ASTRONOMY

Cosmic Rays Traced to Flares in Stars

► THE ORIGIN of the cosmic rays that bombard the earth and make space travel a hazard has been traced to great flares of energy from some 16 billion stars in our galaxy or Milky Way system.

This new theory is put forth by Dr. J. N.

Tandon of the University of Delhi in a communication published in *Nature*, 190:246, 1961. Although cosmic rays have been known for more than 40 years, the explanation of their origin in the depths of space has not been satisfactory.

The new theory accepts the idea that the cosmic particles are accelerated in interstellar space by moving electric fields, as worked out by the atomic pioneer, the late Enrico Fermi. It does not require that particles of great energy come from outside our galaxy as other scientists suggested.

The stars that have enough flare energy to account for the cosmic rays are known as main sequence M-type dwarfs, and Dr. G. P. Kuiper, the American astronomer, estimated there are enough of them in the galaxy to fit the new theory.

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SPACE

Three Men to the Moon

► IT WILL NOT be just one man on the moon, but a three-member team, as the National Aeronautics and Space Administration in Washington, D. C., now pictures the climax of President Kennedy's rush program to get a manned spacecraft there and safely back within ten years or less.

NASA officials predict that a three-man crew will be necessary to cope with the variety of duties required. These include management of complex electronic controls, plus the ability to meet unforeseen difficulties en route—technological, navigational and biochemical.

And at least one of the men must be a thoroughly trained scientist, capable of returning with valuable data. The trip is not visualized as a mere matter of stepping out on the lunar surface and getting right back into the craft for a fast getaway. Scientific aspects will be of prime importance.

The trip is tentatively seen as taking about two weeks—four to five days' travel time each way, and the remainder for first-hand observation and study of lunar conditions.

No target date has been set, NASA Administrator James E. Webb said, because "if you do not achieve a precise target date, there are always assumptions that the program has gone wrong. If we can achieve it in under ten years, we certainly will. We may set it as early as 1967 so we can move

just as fast as we can." Mr. Webb said "Yes" emphatically when asked if the goal was to beat Russia to the moon. But he said the increased budget requests for NASA—61% more for fiscal 1962 than the amount originally submitted—and other agencies involved in space fields represent "an acceleration of the total program, not just the effort to get to the moon. We cannot afford to be behind in any major field of technology."

While work is in progress, there will be no attempt at "a cloak of secrecy," Mr. Webb said. NASA will continue to make full reports to "the world scientific community, and indeed, to the general public."

He believes exchanges of information will increase through the world-wide system of communication and weather satellites also featured in revised budget plans.

He said there would be opposition in some scientific circles to the moon flight prospect. However, some skeptical scientists, when shown advance plans, "had their doubts dissipated when they got thoroughly into the meat of the problem."

As to the very large expenditures involved, Mr. Webb believes "Congress will go along. I believe you'll see favorable action."

NASA's revised budget request now totals \$1,784,300,000.

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