

NUCLEAR PHYSICS

Source of Cosmic Rays

The sun, magnetic dust between stars, or the explosions of stars called supernovae, are some of the proposed energy-sources for cosmic radiation.

► WHAT big guns of the universe bombard the earth with the powerful but invisible cosmic particles? The sun, the dust between the stars or even far away in cosmic space, are possible origins of cosmic rays described to the University of Denver International Cosmic Ray Symposium in Idaho Springs, Colo.

A few years ago there was no satisfactory explanation of the birth of these radiations. Now, scientists have the choice of two or more ways the rays can get started and pick up the immense energies they carry to earth.

Picture great clouds of dust in motion in the vast spaces between the stars, clouds so diffuse that they could never be seen if man were there to view them. These clouds set up magnetic fields that travel along with the dust particles. When a bit of dust collides with a cosmic ray particle the particle may disappear. But if a particle gets around in this region safely, it picks up energy as it leaves and in many collisions gets energy as great as the cosmic rays need to plunge, as they do, into the earth's atmosphere. This birth process may go on for millions of years.

Dr. John A. Wheeler of Princeton discussed at the Symposium this theory for which Dr. Enrico Fermi of the University of Chicago is largely responsible. New ideas that the Swedish astronomer, Dr. Hannes Alfvén, has put forth on energy in magnetic dust clouds have helped to produce this picture.

The sun, from which almost all other earth-received radiation comes, is the birth-place of most cosmic radiation as well, Dr. Edward Teller of the University of Chicago urged at the meeting. This allows the projectiles to get their energies closer to the earth. The radiation seems to come into the earth as it does because of the magnetic field of the earth.

To make the Teller theory work, it is necessary to have a sort of squashed-down magnetic field of the sun strongest in the plane of the revolving planets.

Still another theory is that the energy comes from tremendous explosions of stars called supernovae. Dr. Lyman Spitzer, Princeton astronomer, visualizes these explosions as shooting out immense amounts of radiation which strike the cosmic particles in such fashion as to give them the billion electron volts they need per unit particle in heavy atoms.

If the Fermi and Spitzer theories were both operated, they might explain every-

thing, as the cosmic magnetic dust birth-place is reasonable for the protons (hearts of hydrogen atoms) that arrive from outer space, and the Spitzer theory makes possible

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Find Big Atomic Showers

► IMMENSE explosive showers of atomic fragments, splattering 200,000,000 particles over hundreds of acres, have been discovered in the earth's atmosphere. Each shower is caused by a single atomic bullet from outer space.

Announced to the University of Denver International Cosmic Ray Symposium in Idaho Springs, Colo., by Dr. Kenneth Greisen of Cornell University, these showers were detected by coincidental effects upon 200 Geiger counters in experiments at the Inter-University High Altitude Laboratory at Echo Lake, Colo., two miles above sea

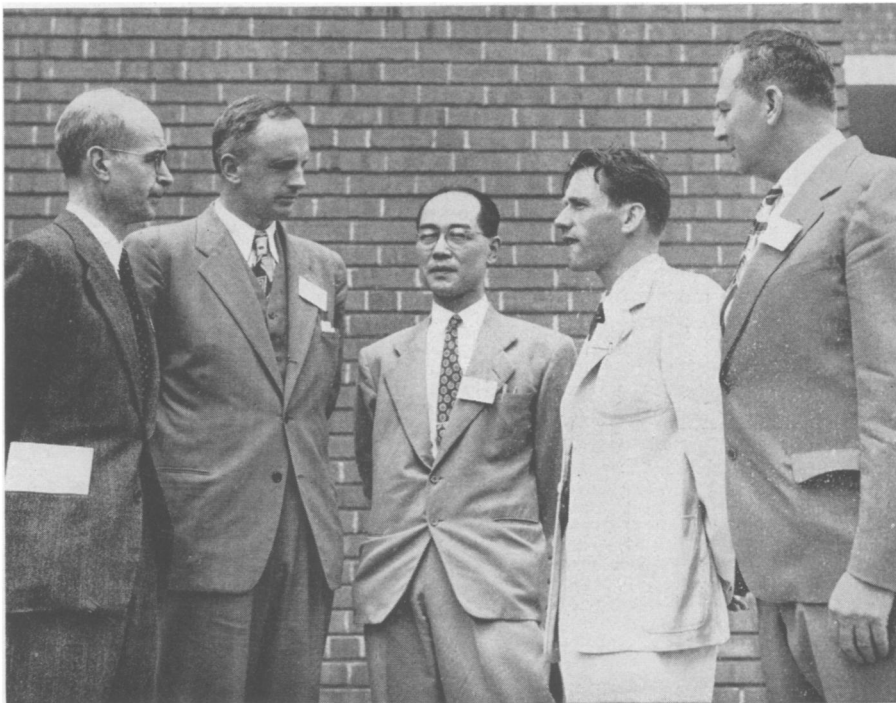
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level. Only about once a week do such gigantic showers, approximately a mile across, get detected in one place, but smaller bursts occur about every second, probably causing the streaks of particles that are the cosmic rays detected.

“We are dealing with the highest energy ever discovered in individual atomic particles, a billion times greater than the energy that is let loose by the fission of a single uranium atom,” Dr. Greisen explained.

The actual amount of the energy in the particle that enters the earth's at-

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COSMIC RAYS ARE INTERNATIONAL—At the symposium in Colorado (left to right) Dr. Manuel Sandoval Vallarta of Mexico, Dr. Hugh Carmichael of the Canadian National Research Council, Dr. H. Yukawa of Japan, Dr. Oreste Piccioni of Brookhaven National Laboratory, Dr. Byron E. Cohn of University of Denver, host institution.