

## PHYSICS

# Study Cosmic Rays

► A NEW ENERGY range for studies of cosmic rays and the high energy particles produced in giant atom smashers has been opened by development of a specialized cloud chamber technique.

The new range is from 10 to 1,000 billion electron volts (Bev), the American Physical Society meeting in Los Angeles was told. Dr. William B. Fretter and Mrs. Luisa Hansen of the University of California, Berkeley, said the cloud chamber technique allowed physicists for the first time to differentiate between high energy nuclear particles traveling at energies above two Bev.

In conventional cloud chambers, bubble chambers and photoemulsions, particles above two Bev all look alike. In their cloud chamber, containing a mixture of argon and helium gas, Dr. Fretter and Mrs. Hansen can make distinctions up to 20 Bev. This permits them to figure out what happens in nuclear events with energies up to 1,000 Bev.

The achievement opens a new region of high energy physics for cosmic ray scientists, who have been hard pressed by big atom-smashers that produce high energy particles in greater quantity and under controlled conditions. Atom smashers, while they are supreme in energy ranges in which they operate, cannot match the energies of cosmic rays. Therefore, the technique enlarges the research potential of cosmic ray scientists.

At the same time, argon-helium chambers show promise of solving one of the big problems faced by scientists who are building giant atom smashers in the 25 Bev range at Brookhaven and in Geneva, Switzerland.

The Berkeley scientists appear to have

taken a step in providing the means for analysis of the high energy particles to be produced by such machines.

In part, Dr. Fretter's technique derives from a theory about what happens to the electrical field of a particle when it gets to high energy. At rest the electrical field is radial, extending in all directions at the same distance and with the same strength.

However, at great energy, the field in the direction the particle is traveling is blunted, almost disappearing; and at right angles to this direction, the field becomes stronger and extends farther with greater energy. This effect is relativistic, its occurrence being predicted by Einstein's theory of relativity.

By experimentation, Dr. Fretter found a combination of gases in which ionization would increase relativistically with increases in energy, up to 20 Bev. A droplet count in a cosmic ray track can reveal the particle's energy.

Dr. Fretter said he can make the critical distinction between a pion and a proton up to 20 Bev. Some distinctions cannot be made, as between a K particle and a proton, but he expects sensitivity to increase.

With detailed information so far gathered, the first in this high-energy range, Dr. Fretter has shown that the late Enrico Fermi's theory of what happens in proton-proton collisions at these energies is not valid. The data are consistent with theories of both L. Landau, a Russian, and Werner Heisenberg, a German, and further work may show which is the most useful.

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## GENERAL SCIENCE

# Womanpower Needed

► ONLY TWO percent of the babies born are potential geniuses who might be tomorrow's top flight scientists. Half of these potential geniuses are girls.

These facts must be digested by employers and the public if we are to solve the important problem of the status of American women scientists, Mrs. Ethaline Cortelyou, literary analyst for the Armour Research Foundation in Chicago, told the American Association for the Advancement of Science meeting in Washington.

As the earliest step, little girls should be encouraged in whatever interest they show in tools, machinery and insects and should never be teased for being "tomboys."

More girls must be persuaded to undertake the long and difficult training necessary for professional scientific careers. To do this, colleges must make girl science majors welcome, not "sadistically set about making the course an obstacle course for the few hardy girls who persist despite discouragement," said Mrs. Cortelyou.

When a woman scientist temporarily retires to raise her family, it should be made both possible and attractive for her to re-

turn to her professional work. The greatest increase in the number of working women has and will come from this group of women 35 to 54 years of age, Mrs. Cortelyou found.

By making the lady in the lab coat an appealing heroine, television, movies, books, and advertisers can complete the cast of America's scientific drama.

Few women are scientists because most people "know no more about what a scientist is like as a person, or how, why, or what he or she does from eight to five than they do about the words of the second stanza of our national anthem," Betty Lou Riskin told the meeting.

Miss Riskin, who is head of plastics research and development at Johns Hopkins University Radiation Laboratory, Baltimore, Md., proposed a nation-wide "Meet the Scientist" campaign by all mass media to tell the "human side" of science, particularly from the woman's angle.

"If there were half as much public information about the more down-to-earth phases of science as there has been about rocketeering and the missilemen during the

past year, we would have little difficulty in attracting the cream of the crop of our scientifically talented young women into technical careers," said Miss Riskin.

Only about eight percent of America's scientists and engineers are women, in contrast to one-third of Russia's, and half of Russian engineering students. "Female brainpower is our most valuable untapped natural resource," she said.

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## ENGINEERING

# Translate French at Three Words Per Second

► A BUSINESS machine computer, equipped with a dictionary in one "hand," and a French scientific paper in the other can translate from French to English at a clip of three to four words a second.

The IBM 704 goes through a process familiar to thousands of language students, but it goes about its business in a most methodical way, Dr. A. F. R. Brown of Georgetown University told the American Association for the Advancement of Science meeting in Washington.

The machine has been promised a 5,000-word dictionary soon by its operators, but at present it must work from a 600-word "book," Dr. Brown said. The computer works on translation in 1,200-word sections.

First, the computer looks up all words, which have been arranged alphabetically so that the machine only goes through the dictionary once. During each look-up, the machine exchanges a French word for an "item." These are restored to their proper sequence through help of coded instructions with each English word.

The instructions may alert the computer to idioms or to points of French grammar associated with particular words. Other instructions may tell the 704 where to put adjectives.

When all instructions have been met, the English words are sifted out, strung together, and printed as a translated sentence.

# Machine Gets Award

► DEVELOPMENT of a machine which can distinguish between right and wrong decisions and make judgments based on its own experience has won for the Westinghouse Electric Corporation the 1958 Industrial Science Achievement Award of the American Association for the Advancement of Science.

Named Opcon for "optimizing control," the machine is made to duplicate the informed behavior of a human in controlling complicated industrial processes. It replaces the pre-set routine functions performed by conventional systems.

The award is made annually to a company which brings into significant practical application a basic scientific discovery. The basic work was a system of mathematical logic worked out two years ago by Dr. Robert Hooke, a research mathematician at the Westinghouse Research Laboratories.

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