PHYSICS

Super-Heavy Elements May Be Stuff of Dense Dwarf Stars

Material 10,000 Times as Massive as Any on Earth Would Yield Cosmic Ray Energies When Atoms Split

THE astounding picture of cosmic rays generated in the dense white dwarf stars of the universe by the splitting of super-heavyweight elements, nearly 10,000 times as massive as any known on earth, is suggested by Dr. Felix Cernuschi, Argentine exchange scholar at Massachusetts Institute of Technology.

To generate cosmic ray particles of 1,000,000,000,000 electron-volts, like those which have been observed, requires elements having atomic number 10,000 and atomic weight 26,000. (The heaviest element found on the earth is uranium of atomic number 92 and atomic weight 238.)

In a report to the Physical Review, published today, Dr. Cernuschi suggests that the kind of splitting recently found to occur in uranium under neutron bombardment—which makes a single uranium atom liberate about 200,000,000 electron-volts of energy—is possibly going on in his hypothetical super-heavy elements too.

His X elements, or whatever name they may be given, would break down into two fission elements having atomic number 5,000 each. And then these would each in turn go into an element of 2,500 atomic number and so on; all the while liberating tremendous quantities of atomic energy that would appear both as light and as invisible atomic particles (the cosmic rays).

The new Cernuschi hypothesis is not only intriguing because it is the first application of the new uranium splitting phenomenon to cosmic ray theory but also because the suggestion of super-heavyweight elements would account for the known dense white dwarf stars.

These stars, like the small dwarf companion of the bright star Sirius, are known to have a density 50,000 times as great as water. A cubic inch of the material from this star would weigh tons.

It has previously been suggested that such stars were "collapsed" stars consisting only of neutron particles. Dr. Cernuschi's suggestion gives an alternative explanation which possesses the additional virtue of providing a reasonable explanation of the origin of cosmic rays.

Prof. M. S. Vallarta of M.I.T., well known for his studies and calculations in astrophysics and cosmic rays, was the faculty adviser of Dr. Cernuschi for the new hypothesis.

Drs. W. Baade and Fritz Zwicky of California Institute of Technology have suggested that super-novae stars (having a brightness of more than 630,000,000 times that of our sun) were exploding stars and the place of origin of super-high energy particles like those found in cosmic rays.

Dr. Vernuschi says he is unable to agree with parts of their reasoning as to this origin of cosmic rays and adds that no known atomic transmutations appear sufficient to account for the tremendous energies cosmic rays possess. Hence he calls on his new hypothesis of the fission of super-heavyweight elements.

Science News Letter, July 15, 1939

PUBLIC HEALTH

Undulant Fever Can Be Spread by Water

UNDULANT fever can be spread by water, it is now known. This disease, serious, long-drawn out and marked by frequent relapses, has hitherto been thought to spread only through the milk or meat of infected domestic animals, particularly cows, goats and pigs. Other names for the ailment are brucellosis, from the family name of the germs, brucella, and Malta fever, from the island of Malta where it was first differentiated from other fevers.

The first outbreak of water-borne undulant fever in this country, with 80 cases and one death, is described by Dr. Don W. Gudakunst, formerly Michigan State Commissioner of Health, and members of his staff, in the current issue of the *American Journal of Public Health*.

The outbreak occurred under rather special conditions, so that scientists feel that infected meat and milk are still the chief means by which this disease is

MOST BEAUTIFUL

Given an award by the American Institute of Steel Construction as the most beautiful monumental bridge constructed during 1938, is this $3,000,000 structure at Middletown, Conn. It was designed by William G. Grove under the direction of L. G. Sumner, engineer of bridges and structures, Connecticut State Highway Department.