

## PHYSICS

# Neutron, Atomic Brick, May Solve Mystery of Cosmic Rays

Physical Concept Made Prominent by British Researcher Is Close Combination of Familiar Electron and Proton

**T**HE NEUTRON, the physical concept brought into prominence by research reported by Prof. James Chadwick of Cavendish Laboratory, Cambridge, England, is a close combination of two other more familiar parts of the atomic structure, the electron and the proton. The electron is the negative particle or unit of matter and electricity, while the proton is the unit of positive charge. The neutron, being a combination, has no charge at all.

Therefore physicists delving into the constitution of matter have considered that it would be very difficult to prove that it actually exists. The neutron would pass through ordinary matter without having any magnetic or electrical effects, but a theoretical possibility formerly suggested for its physical detection would be through the gravitational effect of the neutron upon passing close to some atomic heart or nucleus.

## Attractive Speculation

While the idea of an electron and a proton combining to form a neutral particle that might play a part in the structure of matter is probably some fifteen years old, the idea of the neutron was put forward formally as an "attractive speculation" by Drs. R. M. Langer and N. Rosen of the Massachusetts Institute of Technology in a communication to the *Physical Review* of the American Physical Society on June 15, 1931. Prof. W. Pauli of the Institute of Technology at Zurich, Switzerland, also suggested the usefulness of the neutron when he spoke before the American Physical Society at Pasadena, Calif., last June. He suggested the neutron might explain some hyperfine structure in the line spectra of elements.

The neutron may be the solution of the mystery of the cosmic ray. Since physicists began to study these extremely penetrating radiations from outer space there has been difference of opinion as to whether they are electromagnetic waves like light and X-rays or streams of electrons, the negative particles of electricity. Prof. Chadwick's researches just

reported from England may give evidence that they are neither, but that they are instead streams of neutrons. This would fit the experimental facts of other investigators here and abroad that show that cosmic rays can not be deflected by magnetic fields as electrons should be and yet do not wholly fit the character of an electromagnetic vibration.

## New Building Block

Neutrons may prove also to be a new building block of the elements. The helium nucleus, also called the alpha particle, is now considered a fundamental brick for element building. It consists of four protons and two electrons and has a positive charge of two. The helium atom is itself built of four hydrogen atoms, which each consist of a proton with an electron revolving about it like a planet around the sun.

American physicists will await with interest Prof. Chadwick's scientific report of his experiments. It may prove that the neutron is formed during the artificial disintegration of matter, such as has been accomplished by Prof. W.

Bothe of Giessen, Germany, who recently described his experiments in an exclusive Science Service dispatch.

*Science News Letter, March 5, 1932*

## PHYSICS

# Solid Matter Composed of Numerous Atoms in Blocks

**T**HE MATTER that seems to ordinary eyes solid and unbroken is actually made of blocks, somewhat like a tile floor, each block made of several millions of atoms, Dr. Francis Bitter of the Westinghouse research laboratories has just established for the first time.

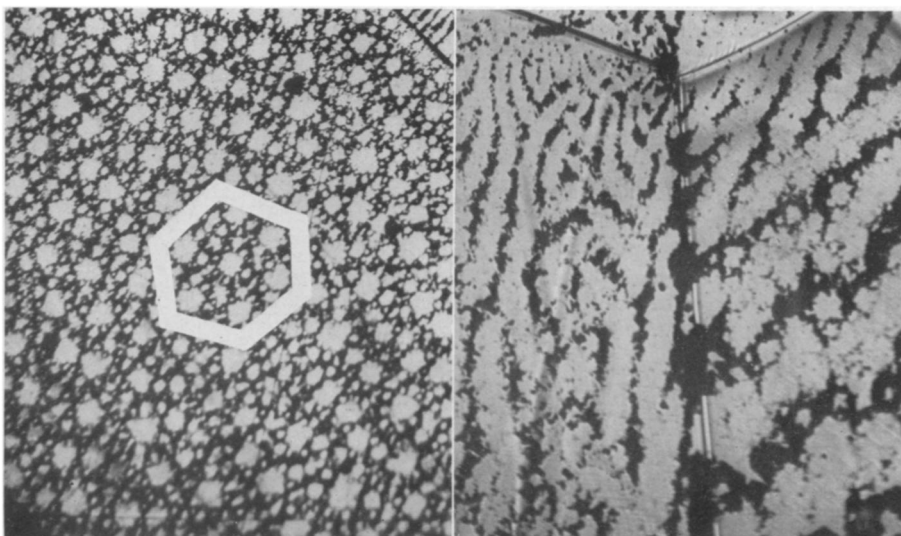
A magnetic powder was suspended by Dr. Bitter in a liquid which was allowed to evaporate on a shiny surface of the metal cobalt. As the liquid evaporated a regular lace-work appearance was produced by the grouping of the particles. As these deposits were arranged in the form of hexagons, Dr. Bitter concluded that the blocks of the metal itself had just this arrangement.

Magnetization of the cobalt specimen changed the pattern to a series of not quite parallel lines, showing that the blocks had become differently arranged under the influence of the magnetic force. Irregularities in the pattern were produced, Dr. Bitter believes, by impurities in the metal.

Dr. Bitter's discovery was not accidental but followed logically from a long series of theoretical investigations.

Dr. Bitter is the son of Karl Bitter, internationally famous sculptor.

*Science News Letter, March 5, 1932*



## LIKE A TILE FLOOR

*A highly magnified section of cobalt crystal is shown at the left. The white hexagon roughly indicates the shape of the blocks of atoms. At the right is shown what happens to these blocks when the cobalt crystals are magnetized.*