

PHYSICS

Neutrinos "Explain" Gravity

A new theory, based on study of the neutrino, that may reconcile the differences in various descriptions of the forces of gravitation has been proposed.

► A NEW THEORY describing the forces of gravitation in a manner entirely different from that used by the late Albert Einstein, was reported to the National Academy of Sciences meeting in Washington, D. C.

Dr. Leonard I. Schiff of Stanford University has devised a way to account for gravitation by assuming that it comes from the exchange of neutrinos between any kinds of matter. Neutrinos are nature's "ghost" particles, having no electric charge and virtually zero mass.

Dr. Schiff's studies, still in their preliminary stages, are aimed at finding an approach other than Einstein's general theory of relativity to explain gravitation. Einstein's theory is successful in accounting for the five known experimental tests, but breaking it down into distinct units, or "quantizing" it, is extremely difficult.

Because of this, Einstein's theory stands apart from quantum theory, which very successfully accounts for events on the atomic and nuclear scale. For many years, scientists have suggested that gravitational force might resemble electromagnetic or nuclear forces in that the last two arise from the exchange of some kind of particle between the interacting objects.

Electromagnetic forces arise from the interchange of light quanta, or photons, between electrons or protons, and nuclear forces arise from the interchange of pi mesons between neutrons or protons.

Previously, the idea that gravitational forces could arise from interchange of neutrinos between any kinds of matter could not be made consistent with a very precise experiment performed by the Hungarian physicist Eötvös in 1910. This experiment showed the gravitational weight of any object and its inertial mass are strictly proportional to each other to an accuracy of one part in 100,000,000.

Dr. Schiff has found a way to account for this experimental fact by modifying the neutrino theory in a particular way. His theory not only accounts for the Eötvös experiment, but for Newton's inverse square law of attraction and for the red shift of light originating in a strong gravitational field.

The other two experiments successfully predicted by the Einstein theory so far are not accurately predicted by Dr. Schiff's theory. These two are the deflection of light passing through a strong gravitational field (the "bending" of starlight), and the advance of the perihelion of Mercury's

orbit, which are predicted to have half their observed values.

Dr. Schiff stressed that his theory is preliminary and is now being modified in the hope of improving its agreement with observations.

In its present form the theory is not Lorentz-invariant; it is being modified in order to make it Lorentz-invariant and improve agreement with observation.

Science News Letter, May 10, 1958

PHYSICS

Anti-Matter May Have Caused Siberian Crater

► THE SIBERIAN meteor crater carved from the earth in 1908 may have been caused by a chunk of anti-matter smashing into the earth's surface.

That is the suggestion a U. S. scientist makes in *Nature* (April 26). Dr. Philip J. Wyatt of Florida State University, Tallahassee, says a meteor composed of "contraterrene" matter would account for the lack of meteorite fragments near this and a few other meteor craters.

He proposes re-examination of the crater area in order to detect any radioisotopes, such as titanium-44, that might have been formed by the intense gamma radiation present at the time of impact.

When matter and anti-matter meet, each is annihilated and great energy released. So far, this process has been known to occur only with individual bits of matter, such as the annihilation of a proton and an anti-proton in the laboratory.

Science News Letter, May 10, 1958

● RADIO

Saturday, May 17, 1958, 1:30-1:45 p.m., EDT
"Adventures in Science" with Watson Davis, director of Science Service, over the CBS Radio network. Check your local CBS station.

Dr. Donald I. Patt, professor of biology, and acting chairman of the department of biology, Boston University College of Liberal Arts, Boston, will discuss "Biology of Growth."

MATHEMATICS

Gravitational Radiation Exists, Scientist Says

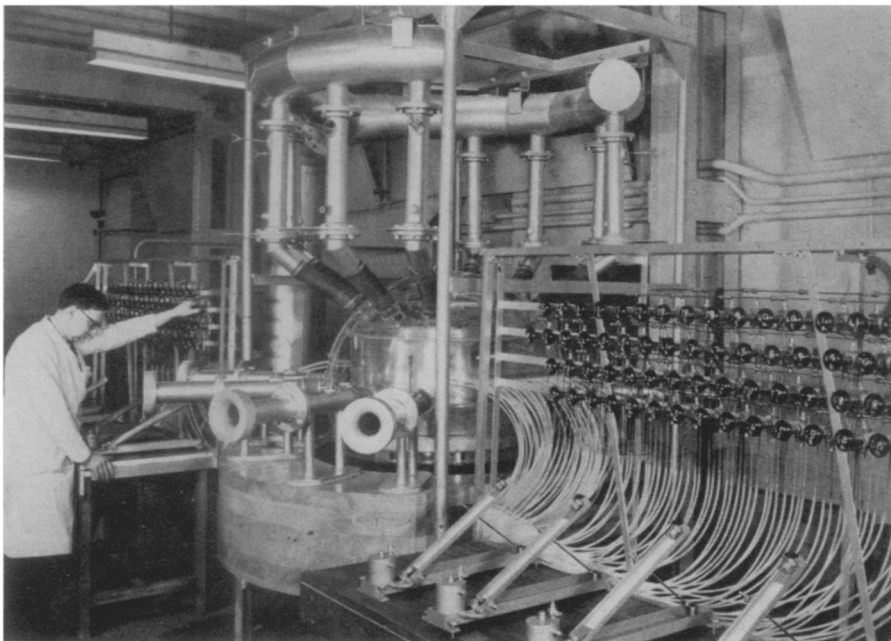
► GRAVITATIONAL radiation has a "real physical existence."

Dr. W. B. Bonnor of the department of mathematics, Queen Elizabeth College, London, England, has calculated its existence on the basis of the late Prof. Albert Einstein's general theory of relativity.

Dr. Bonnor reports he has found a way to show "quite clearly that gravitational waves have the properties" expected of radiation and that they "carry energy."

Gravitational radiation must be emitted in a wide class of particle motions, Dr. Bonnor concludes *Nature* (April 26).

Science News Letter, May 10, 1958



POWER FROM THE ATOM—Experiments in new laboratories and with new equipment are underway in England as part of their program for nuclear power plants. The photograph shows a model of apparatus for measuring the flow of gas used to transfer heat from the reactor furnace to the electricity plant.