

PHYSICS

Atomic Physics Must Discard Conservation of Energy Law

THE BASIC law of nature that inventors are always trying to circumvent when they build perpetual motion machines—the law of the conservation of energy—may have to go by the board. This is the suggestion of no less a person than Prof. P. A. M. Dirac of Cambridge University, who was the co-winner in 1933 of the Nobel prize in physics.

Prof. Dirac asks, "Does the law of the conservation of energy hold in atomic processes?" (*Nature*, Feb. 22). And lest inventors think they now have good authoritative backing for their perpetual motion machines, let them note that Prof. Dirac specifies atomic happenings and not those of the large-scale everyday world.

Conservation of energy, believes Prof. Dirac, does not hold in processes involving very high velocities comparable with the speed of light, nor need it hold in happenings involving radiation.

New experimental findings (*Physical Review*, Jan. 1) of Dr. Robert Shankland of the University of Chicago, states Prof. Dirac, do not agree with the previous work and can only be interpreted if the conservation of energy law is given up. Says Prof. Dirac:

"Physics is now faced with the prospect of making drastic changes in its fundamentals; changes involving the giving up of some of its principles which have been most strongly relied upon (the conservation of energy and momentum)."

The important consequence, states Prof. Dirac, is that energy and momentum are conserved in atomic processes when the velocity is small compared to light's velocity, just as they are in the large scale world. The whole present quantum theory, therefore, can be retained if so applied. But the newer quantum electrodynamics used to explain radiative processes must go because of the high velocity of radiation quanta.

The new experimental work which inspires Prof. Dirac's sweeping statement was performed by Dr. Robert S. Shankland at the University of Chicago at the direct suggestion of Prof. Arthur H. Compton. It involves shooting gamma rays from radium at scattering ma-

terial of aluminum, filter paper, beryllium, paraffin and air.

As the gamma rays hit the scattering material, electrons are shot out. The angle of distribution of these electrons and their energy constitute factors in what is known as the Compton effect, which won for Prof. Compton the Nobel prize in physics in 1927.

From his original experiment Prof. Compton went on to develop a theory, explaining the phenomenon, which satisfied the laws of the conservation of energy and momentum. He and other investigators performed, ten years ago, experiments which appeared to substantiate the theory.

But now, Dr. Shankland with newer and more refined equipment, developed in light of experimental advancement in the last ten years, has repeated the experiment and has found contradictory results.

It is on this new result that Prof. Dirac bases his belief that it is time to throw out the conservation of energy in atomic experiments.

Science News Letter, March 7, 1936

ARCHAEOLOGY

WPA Project Shields Historic Indian Village

A WPA project is protecting from floods and erosion the historic Indian village at the foot of Spanish Hill, northern Pennsylvania. The historic site, discovered two years ago by Ellsworth Cowles, archaeologist for the Tioga Point Museum, is identified as the Carantouan Indian village visited in 1615 by Champlain's scout, Stephen Brulé.

If further explorations can be made before a gravel company disturbs the outlying cemeteries, it is expected that important finds revealing the aboriginal life of a few centuries ago will be made.

Excavations at the village have disclosed new features of Indian technique for defense. Besides the palisade that enclosed the village, additional post holes at two corners indicate there were inside parapets, such as figured in sketches by Champlain. That the parapet was used in defending the village and as a primitive fire tower is suggested

by such clues as piles of stone nearby, a wrecked jar of considerable size outside, and a fragment of palisade charred by fire.

Long black outlines in the clay subsoil sketched for the explorers a big fallen gate which stood about 12 feet high and had crossbars. The place where the Indians worked at pottery making is indicated by discoveries of potsherds at a fine bed of blue clay at the stream bank to the east.

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American Institute Medal Award to John C. Merriam

THE American Institute's Gold Medal, awarded annually, has been presented to Dr. John C. Merriam, president of the Carnegie Institution of Washington, "for his discoveries in paleontology, his effective promotion of research, and his recognition of the place of science in human affairs."

Fellowships of the American Institute, awarded for the first time this year, were presented to Dr. Harrison E. Howe, editor of *Industrial and Engineering Chemistry*, and to Howard W. Blakeslee, science editor of The Associated Press. Fellowships are awarded to persons who have done "outstanding work in the interpretation of scientific, industrial or engineering developments which promote the effectiveness, the knowledge and the understanding of these arts and sciences."

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