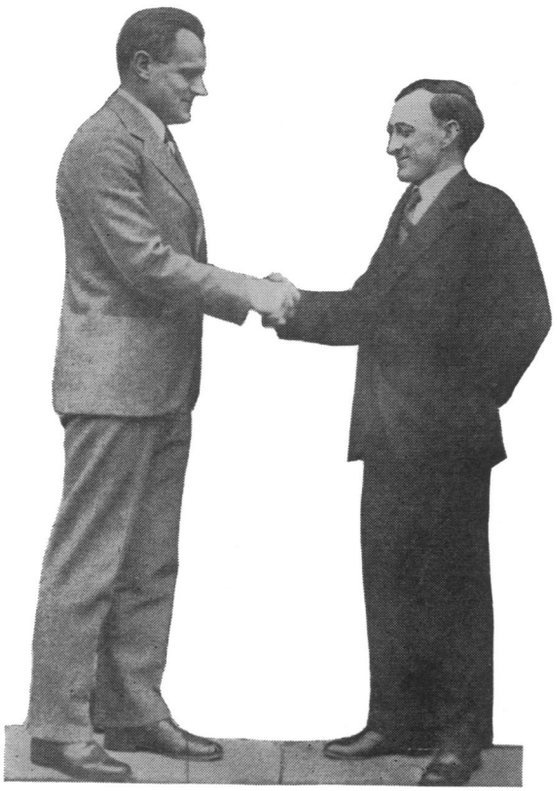


Proof Protons Act Like Waves Wins Physicist A. A. A. S. $1,000 Prize

Physics

Prof. Arthur H. Compton (left) who was awarded the Nobel prize for showing that X-rays have some of the properties of particles of matter, congratulates his University of Chicago colleague, Prof. A. J. Dempster (right), honored by the A. A. A. S. for showing protons act like waves.

For demonstrating that atoms act like waves of light and thus strengthening the experimental proof of the new kind of physics known as wave mechanics, Prof. A. J. Dempster of the University of Chicago was awarded the $1000 prize of the American Association for the Advancement of Science for a noteworthy contribution to science presented during the annual science meetings.

Prof. Dempster's researches are an extension of the new physical concepts which last fall won for Prince de Broglie, eminent French scientist, the Nobel prize in physics.

It was once believed that matter and radiation, such as light, had different kinds of properities, but de Broglie's wave mechanics predicted that small particles of matter should behave like waves of light in many respects. This revolutionary idea was first given experimental support by Dr. C. J. Davisson and L. H. Germer, New York physicists, about two years ago when they showed that electrons, particles of electricity and the most minute matter, are deflected from a crystal of nickel as though they were waves instead of particles. Dr. Davisson was honored with a National Academy of Sciences gold medal for his research.

Now Prof. Dempster in his prize paper delivered before the American Physical Society showed that atoms, larger particles of matter than electrons, also act like waves when they are deflected from a crystal in much the same way that sunlight is reflected from a finely ruled diffraction grating, to make a glorious rainbow. A firmer foundation is provided for the new ideas of the constitution of matter.

A stream of canal rays, charged hearts or nuclei of hydrogen atoms, also called protons, speeding 1500 miles a second at a potential of 30,000 volts, were used by Prof. Dempster in his experiments. These were projected against a crystal of calcite with the experimental result that the atomic hearts were shown to act like waves instead of particles of matter.

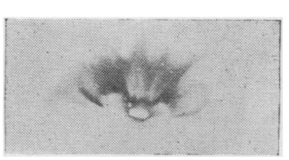
Since the hydrogen atom's heart is 1843 times as massive as the electron and since the larger the particle of matter the less it acts like a wave, Prof. Dempster's achievment is hailed as a considerable advance.

Proof of the wavelikeness of atoms was also presented, by an unusual coincidence, on the same program of the physicists by a German, Prof. Otto Stern of Hamburg. He obtained results like those of Prof. Dempster through the use of another method. Slower hydrogen particles were used and the crystal used was lithium fluoride. Two University of Iowa physicists, Drs. Harold A. Zahl and A. Ellett, reported similar reflections of zinc and cadmium atoms from crystals that lend further support to wave mechanics.

Prof. Arthur H. Compton, Nobel prize winner in physics, when asked to comment on Prof. Dempster's work said:

"The most important contribution of twentieth century physics has been the discovery that the physical world is composed of three kinds of particles—protons, electrons and photons, and that each of these particles has also the characteristics of waves. The last stage of this work is the proof that protons, the positively charged parts of matter, have wave characteristics. It is this completion of the great work of twentieth century experimental physics which has been accomplished by Prof. Dempster's discovery of the diffraction of protons by crystals."

Science News-Letter, January 11, 1930



Fan-like impression made on photographic plate by speeding protons deflected like waves from a calcite crystal. Photograph by Prof. A. J. Dempster, reproduced same size as his experimental plates.