Electrons Behave Like Waves

General Science

Physicist Describes Their Reflection By Crystal

ONE of the outstanding puzzles of modern physics—how electrons, once thought of as material particles, can behave sometimes like waves, while "waves" of light sometimes behave like particles—was discussed at the meeting of the American Philosophical Society by Dr. C. J. Davisson, of the Bell Telephone Laboratories. One result has been that the physicist no longer tries to imagine a model of every physical phenomenon.

Describing his own experiment, Dr. Davisson told how a stream of electrons aimed at the face of a crystal had behaved much as light does on striking a mirror. Most of them were shot back at the same angle to the surface layer of atoms as they had approached.

"There is a strong and well defined beam of regularly reflected electrons," he stated. "This is a phenomenon which is not predicted and cannot be explained if we insist on assuming that electrons are solely corpuscles much smaller than the individual atoms, for to such corpuscles the surface of the crystal must appear not as a smooth plane, but as a rough and broken field.

"Picture the crystal built up of atoms, each of them enormous in size compared to an electron and each of them comprising a nucleus surrounded by a larger number of electrons rotating in closed orbits. Imagine now an electron plunging into the galaxy of planetary systems. It is obviously a comet. The simplest event which may ensue will be a comet-wise deflection of the electron in the field of some atom into which it happens to strike, and then a speeding away of the electron from the crystals without loss of energy. The direction taken by the departing electron would be determined by a number of circumstances, one of which would be the distance of the line of approach of the incident electron to the nucleus of the atom responsible for its deflection."

"If we regard the beam of incident electrons as a beam of waves instead of as a stream of particles," he continued, "then each wave-front of the beam comes in contact with all the atoms of the surface, and the regular reflection is explained, as in the case of X-rays, as the result of constructive interference among the coherent secondary wave trains scattered by and proceeding from the regularly arranged atoms of the crystal."

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Favored Many—Cont'd

the American school system has been the determination to keep religion out and to get character in. The substitutes for religion, some think, have not been satisfactory. Because many of the great moral leaders are associated with religion, much of their influence and power have been denied our boys and girls in school. The schools need substitutes for the great moral leaders of the past and the question many ask is whether they are finding them.

If there is question as to national wisdom in side-stepping the influence of religion, there is no question as to the importance of cutting superstition out of the child's environment.

The future of education in our great democracy gives us anxiety. It must be different. Under it, boys and girls will be educated less in specific subjects so that a boy with a gift for science but no mind or interest for language will be acceptable in any university. Education will be directed not to subjects but to boys and girls. Its purpose will be to adapt each one to the environment science has created and to the society of democratic America. At the same time, it will preserve personality and health.

When the findings of the White House Conference are all in, the nation will know better how to protect its children, how to harmonize science and democracy in their lives. Any agency like May Day—National Child Health Day speeds the good work along!

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