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## SPINORS<sup>1</sup>

By Professor OSWALD VEBLEN

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THE theory of spinors had its origin in the search for a suitable mathematical tool to use in the extension of the quantum theory to the field of relativity. The quantum mechanics in the form that was given to it by Schroedinger describes the motion of a particle by means of the concept of a wave. It is not, as people used to say, that a physicist thinks of an electron as a particle on Mondays, Wednesdays and Fridays, and as a wave on Tuesdays, Thursdays and Saturdays, and on Sundays prays for a Messiah who will lead him back to the belief which he held on Mondays. The actual situation is quite different from that. He works with a mathematical theory which he visualizes for some purposes by means of the classical conception of a particle and for other purposes by means of the imagery of the wave theory. The wave that he works with is just a function which satisfies

<sup>1</sup> Fourth of the Joseph Henry Lectures of the Philosophical Society of Washington, presented March 31, 1934, in honor of the first president of the Philosophical Society. This paper was prepared from stenographic notes taken at the time of the lecture.

a partial differential equation of a certain type. The physicist believes that by applying a certain integration process to the solution of this partial differential equation he is able to express the probability that the particle which he thinks of shall be in a certain pre-assigned position with a certain preassigned velocity.

The whole thing is an attempt to find mathematical formulas and language for the discussion of phenomena which did not make sense in terms of the language and formulas which the physicist had been using before. Some people actually go so far as to say that we shall have to make real changes in our habits of thought and use of language. But I am referring to these deep and difficult questions only incidentally. I am concerned with something much more superficial.

The spinor theory grew out of the attempt to reconcile the wave mechanics with the relativity theory. The wave mechanics was at first developed so as to fit into the framework of the classical dynamics. On the other hand, the theory of relativity has taken

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