

The Spectra of Hydrogen
and Their Role in the Development of Our Understanding
of the Structure of Matter and of the Universe

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THE last two presidential addresses have dealt with problems of the activities of the Royal Society and of the organization of science in Canada. In view of the admirable presentations which the Society has had on these subjects, I feel unable to add anything significant and would therefore like to resume the old custom which many previous presidents have followed of presenting in somewhat general terms a topic closely connected with their own scientific work.

In reviewing possible topics for discussion, I became more deeply aware than before of the fundamental role which the study of the spectra of hydrogen has played in the development of our understanding of the structure of matter and of the nature of the universe. Since my first scientific paper dealt with the spectra of hydrogen and since this subject has returned time and again to occupy my interest (including my work at the present moment), I thought it appropriate to deal with the wider, partly historical topic of the importance of such studies, without wanting to imply that my own work has made more than a minute contribution to our present understanding of the subject. Rather, I feel humbled by the thought of how many individual investigators had to make small contributions before the whole picture evolved.

At the fiftieth anniversary of the National Research Council last year Dr. Baker in his address on "Information Processing Machines and Modern Science" quoted V. Weisskopf as having said: "If you understand hydrogen, you understand all that can be understood." I was not aware of this quotation when I chose the subject for this address. What I suppose Weisskopf, as a theoretical physicist, wanted to emphasize was that only for hydrogen can theoretical calculations be made completely rigorously. It is, however, also true that hydrogen is the most important constituent of the universe, and our knowledge of this fact and of the distribution and form of hydrogen in the universe is based on the study of the spectra of hydrogen in celestial

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