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THE PAST TWENTY YEARS OF PHYSICAL ASTRONOMY[1]

A COMPLETE survey of the progress of physical astronomy during recent years would be so formidable an undertaking that to attempt to cover the entire field would require a whole series of lectures rather than a single evening. So I shall limit myself to the attempt to trace for you the development of only one or two of the more recent conceptions and methods of modern astrophysics and to show how greatly they have enlarged the views which we held, even as recently as the first ten years of this century. From the standpoint both of the results accomplished and the outlook toward the larger problems of astronomy there probably has never been a period quite comparable to that of the past twenty years.

The underlying cause of this remarkable progress has been the intimate relationship which has developed between physics and astronomy, so that important discoveries in the one science have reacted immediately upon the other and found far-reaching applications almost at once. A quarter of a century ago an immense amount of observational material had been collected in our physical laboratories and observatories to the interpretation of which the key was almost entirely lacking. We could hardly hope to understand the behavior of matter in the distant stars when the mechanism of the light given out by a candle flame was still quite unknown to us. So in astronomy, as in physics, a great new field was opened up by the fundamental discoveries of Rutherford, Bohr and many others on the structure of matter and the nature of radiation.

It is a commonplace to say that all our primary knowledge of stars is derived from the light which they give out, where the term *light* is used in a general way to include both visible light and invisible radiation, such as heat or X-rays. From a star's light we can measure its position, its slow movement across the sky, its brightness and its distance, but we can do a great deal more. By analyzing its light we can study its individuality, which is defined almost as uniquely by the faint rays of light which reach us as is the personality of a friend by the actions of his daily life. The main problem of physical astronomy,

[1] Address given in San Francisco on April 16, on the occasion of the presentation of the Bruce medal by the Astronomical Society of the Pacific.

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