THE PRINCIPLE OF RELATIVITY

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The principle of relativity by E. Cunningham

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E. CUNNINGHAM

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THE PRINCIPLE OF RELATIVITY

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PREFACE

THE controversial note which has been characteristic of discussions in respect of the Principle of Relativity has prevented the significance of the principle from being seen in its proper proportions and in its relation to general physical theory. On the one hand, there have been those who have magnified its importance, and assigned to it an unduly revolutionary power, while on the other hand, there are those who have scoffed at it as fantastic and reared on the most slender of physical bases. It has therefore seemed desirable in the first part of this book to outline the way in which the Principle of Relativity grew out of electrical theory, so that it might be made clear that there is a real place for it as a hypothesis supplementary to and independent of electrical theory owing to the limitations to which that theory is subject.

It is hoped that by drawing a clear distinction between the 'mode of measurement,' and the 'nature' of space and time, the author will escape from the charge of venturing unduly upon debatable metaphysical questions.

In the Second Part an attempt has been made to present in a simple form the more attractive of the two mathematical methods devised by Minkowski for the purpose of putting in evidence the relative nature of electrical and other phenomena.

The Third Part seeks to indicate some of the most fundamental points in which mechanical theory needs modification if the principle is accepted as universal. It has not been thought advisable to give an account of the purely formal and rather academic developments of special branches of mechanics such as hydromechanics, and elasticity, as these might tend to divert attention from the bearing of the principle on what are generally classified as the fundamental concepts. Some account of these is given by M. Laue in the second edition of his book, *Das Relativitätsprinzip*, Braunschweig, 1913. No attempt has been made to present the highly speculative attempt of Einstein at a generalization of the principle in connection with a physical theory of gravitation.

Throughout the intention has been as far as possible to consider those aspects of the principle which bear directly on practical physical questions. The mathematical part has been compressed to as small a compass as is consistent with furnishing sufficient apparatus for a systematic consideration of the problems suggested.

In the preparation of the book the author has received great help from Mr H. R. Hassé, who read the whole of the manuscript and made many suggestions for its improvement, besides reading the proofs of nearly the whole work. Mr R. W. James has also given valuable assistance in reading both manuscript and proofs. Especially would the author wish to acknowledge his debt to Sir Joseph Larmor, both personally and through his published works, for much stimulus and encouragement in the study of theoretical physics, and for valuable criticism of the earlier part of this book.

To the staff of the Cambridge University Press for care and courtesy in the work of printing the author is most grateful.

E. C.

CAMBRIDGE,
June 1914.

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