

# *The Elementary Basic Principles of the Unified Theory of Relativity. A\**

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## INTRODUCTION

The unified theory of relativity recently proposed by Einstein† is based on three principles:

A) The introduction of a metric tensor  $g_{\lambda\mu}$  which is neither symmetric nor skew symmetric:

$$(0.1) \quad g_{\lambda\mu} \neq \pm g_{\mu\lambda} .$$

B) The introduction of a non-symmetric connection  $\Gamma_{\lambda\mu}{}^\nu$  by means of

$$(0.2) \quad \frac{\partial}{\partial x^\omega} g_{\lambda\mu} = \Gamma_{\lambda\omega}{}^\alpha g_{\alpha\mu} + \Gamma_{\omega\mu}{}^\alpha g_{\lambda\alpha} .$$

C) Provided that the equations (0.2) may be solved for  $\Gamma_{\lambda\mu}{}^\nu$  (which is not always the case), one imposes some intrinsic conditions on the  $\Gamma$ 's which yield the components  $g_{\lambda\mu}$  as solutions.

In a series of three papers, of which this is the first, I shall deal with each of these principles from the geometrical point of view. However, some physical conclusions may be obtained from the geometrical results.

In this first paper we are concerned only with the tensor  $g_{\lambda\mu}$ . The chief idea may be roughly described as follows. A symmetric quadratic tensor defines a cone at each point of the space. The question arises whether a tensor  $g_{\lambda\mu}$  satisfying (0.1) does not in some way privilege certain elements of the space, thus leading to results which may have a physical interpretation. The first five

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† A. EINSTEIN, *The Meaning of Relativity*, Princeton University Press (1950), Appendix II.