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京都大学基礎物理学研究所　湯川記念館史料室

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General Relativistic Quantum Theory

(in many respects)

Introduction

~~The~~ theories of elementary particles have been developed as a natural extention of nonrelativistic quantum mechanics ~~to the in such way that both the principles~~ of resulting in the quantum theory of fields in the framework of special relativity. In spite of its great success, we ~~have~~ feel strongly that the present theory of elementary

In spite of its elegance and achievements in many respects, we feel strongly that the present theory of el. par, which is based on principles of q.m. and special relativity, is to be modified somehow for the following obvious reasons;
Firstly, the divergence difficulty is seems to be something inherent in the present theory and cannot be eliminated without some fundamental change in the framework of the theory
Secondly, ~~there are two~~ much arbitrariness in the choice of field operators
~~There is no indication in the theory~~
~~to~~ elementary particles are ~~treated~~ by field operators describing certain kinds of

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are included in the theory just because we know their existence in Nature, but the theory can say nothing about the reason of existence of so many different kinds of particles of such and such properties. ~~What~~ Most of the attempts hitherto done in ... have the following points in common: Special relativistic covariance of field ~~operators~~ quantities and equations are taken for granted from the beginning and they are subject to quantized afterwards subsequently. In other words, ~~the~~ space-time structure underlying is fixed at the beginning and the physical quantities quantization is carried out in conformity with this space-time structure.

Now, one can attempt try to do construct a theory by reversing the order of the above procedures. Namely, one can start from a set of field operators defined at each point of the space-time world, ~~which~~ which is given not yet given any specific structure, but is a four-dimensional manifold (continuum) without a definite structure as yet. At this stage, we ~~do not~~ have no particle