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NEUTRAL CURRENTS, THEORY AND APPLICATION

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1. INTRODUCTION

In the decade that has elapsed since neutral currents wei
weak interaction has been studied in a wide variety of phenomena and its properties have been delineated, in some cases with great accuracy. To a fascinating degree, the structure of

LIGHT CONE PERTURBATION THEORY AND ITS APPLICATION TO DIFFERENT FIELDS

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Abstract—The field theoretical foundations of the light cone perturbation theory, including QCD, are reviewed on the basis of the original papers. Great attention is paid to the systematic account of the spin effects in the light cone scheme. We also emphasize the rôle of the Jacobi relative momenta in giving an invariant formulation of the light cone approach, and proving the cluster decomposition property. These features are very important in the relativistic dynamics of many body systems. There is stressed the existence of the physical vacuum in the light cone approach, which allows to build the Fock space basis. This gives the possibility of formulating systematic approximations to the structure of hadrons. There are given examples of sizable, relativistic, repulsive effects, and there is stressed the presence of a 3-quark irreducible force, which plays an essential rôle in the deep inelastic structure of nucleon, and other nuclei. We show the asymp
magnetic form factors of bound states, and indicate, that to a
data it is insufficient to treat only the mesonic and nucleonic d
quark level).

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1. SUMMARY, VARIABLES AND

A brief account of the reviewed topics is given in adv
important points, and the enumeration of a more technical material, which may be

A REVIEW OF NUMERICAL SIMULATION METHODS

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Abstract—I review numerical simulation techniques used in the study of problems in field theory.

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1. INTRODUCTION

Very few of the interesting problems in physics are exactly solvable. There are two approaches available when one is confronted with this situation. The traditional method is to simplify the problem, while trying to retain its relevant features, until it turns into a solvable one. The other is to solve the problem numerically. This second approach is often considered too brutal, inelegant and devoid of real content. The argument is that mere numbers do not say anything about dynamics. Whereas this is true of some numerical studies, in general, because the numerical solution usually requires one to confront every detail of the process, it yields a very special kind of understanding of the dynamics. This is analogous to a good experimentalist having a "gut" feeling for which experiments are possible and which are not.

A major goal of the present article is to help develop this "gut" feeling for numerical techniques which have recently become popular in high energy physics and which go under the generic title of "Monte Carlo methods". Although these methods have been well known to mathematicians, statistical physicists, engineers and economists, it is only recently, since the advent of high speed computers, that these techniques have been used in high-energy physics. The reason for this is that the interesting problems in this field involve a large

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ISOBAR DEGREES OF FREEDOM AND THE NUCLEAR MANY-BODY PROBLEM

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1. INTRODUCTION

In the conventional model of nuclear structure investigations
considered as a system of inert nucleons, which interact by instantaneous two-body forces and which can be described in the framework of non-relativistic quantum mechanics. For microscopic nuclear structure calculations within this model one has to solve two problems which are almost independent from each other. In a first step one has to determine the interaction between the nucleons. For really microscopic investigations the nucleon–nucleon (NN) interaction is determined by an analysis of the two-nucleon data, which are the NN phase shifts and the data of the deuteron. This can be done, for example, by considering a purely phenomenological ansatz for the NN potential with a careful adjustment of the parameter in this ansatz to fit the NN data (see, for example, Refs 1–5). An alternative way is to consider the meson exchange model for the NN interaction and to describe the NN force by a One-Boson-Exchange-Potential (OBEP) (see, for example, Refs 6–8). Also in this model some parameters have to be adjusted to obtain a quantitative fit of the NN phase shifts. A third possibility to determine the NN interaction has been developed by groups in

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THE EXPERIMENTAL DISCOVERY OF THE INTERMEDIATE VECTOR BOSONS W^+, W^- AND Z^0 AT THE CERN $p\bar{p}$ COLLIDER

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