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HELVETICA PHYSICA ACTA

Zusammenfassungen der letzten eingegangenen Arbeiten

Résumés des derniers articles reçus

The Parametrization of π^-p Scattering Experiments

by G. RASCHE

Institut für Theoretische Physik der Universität, Schönberggasse 9, CH-8001 Zürich,
Switzerland

and W. S. WOOLCOCK

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(3. I. 72)

Abstract. The difficulty of making a precise statement of charge independence for pion-nucleon scattering is pointed out. We emphasize that in taking account of electromagnetic effects in the analysis of π^-p scattering experiments, it is necessary to consider the radiative capture process $\pi^-p \rightarrow \gamma n$. A procedure for doing this is given.

A Proposal for Corrections to Thermodynamic Scaling

by T. SCHNEIDER, G. SRINIVASAN and E. STOLL

IBM Zurich Research Laboratory, 8803 Rüschlikon, Switzerland

(23. XII. 71)

Abstract. Application of the scaling hypothesis has been highly successful in the immediate vicinity of the critical point. The determination of critical exponents from experiments usually incorporates a wide range of temperature so that the scaling theories would have to be generalized to a larger neighborhood around the critical point. We propose such an extension which is consistent with available experimental data on the structural phase transformations in SrTiO_3 , LaAlO_3 and the order-disorder transitions in MnF_2 . It is shown through this scheme that *two* critical exponents can be deduced from given data on the temperature dependence of the order parameter.

On the Decay of an Unstable Particle

by KALYAN SINHA

Department of Theoretical Physics, University of Geneva

(22. XII. 71)

Abstract. It is shown that the absence of regeneration of the unstable particle from the decay products is inconsistent with a Hamiltonian bounded below. Consequences of some decay laws are also derived.

Das Einschwingen eines zylindrischen Plasmas in magnetoakustischer Resonanz

VON K. APPERT, B. HOEGGER, H. SCHNEIDER und E. WEISE

Institut für Physik der Universität Freiburg i. Ue.

(14. X. 71)

Abstract. The transient behaviour of an oscillating plasma cylinder is studied near magnetoacoustic resonance. Appropriate nonlinear magnetohydrodynamic equations are solved as an initial value problem and the results are compared with experiments. The energy absorbed in the plasma is found to be strongly dependent on transient effects.

Scattering Systems with Finite Total Cross-Section

by J. M. JAUCH and K. SINHA

Department of Theoretical Physics, University of Geneva, Switzerland

(28. X. 71)

Abstract. We give a sufficient condition for the finiteness of the total cross-section in a simple scattering system. Various corollaries of our main theorem are also discussed.

On a Covariant Expression of Energy-Momentum in the Relativistic Theory of Gravitation

by JEAN CHEVALIER

University of Geneva

and E. C. G. STUECKELBERG DE BREIDENBACH

University of Geneva and Lausanne, CERN

(29. X. 71)

Abstract. The relativistic linear formalism developed by W. Scherrer leads to a covariant expression of gravitational energy-momentum. In the case of a mass distribution with spherical symmetry (Schwarzschild's *exterior* solution), this tensor gives a total gravitational energy equal to $-M c^2$. How can the minus sign be interpreted? A detailed analysis of Schwarzschild's *interior* solution shows that the gravitational energy has to be considered as a generalization of the classical potential energy, which is *negative* in our attractive case.

**Cinétiques d'Adsorption d'Oxygène Formant des Centres Paramagnétiques
TiO₂ et SnO₂**

par C. HAUSER

Laboratoire d'Optique Physique, Ecole Polytechnique Fédérale, Lausanne

(30. XI. 71)

Résumé. Nous avons mesuré les cinétiques d'adsorption par résonance de centres paramagnétiques provenant d'ions oxygène sur la surface de TiO₂ et SnO₂. L'étude de ces cinétiques montre en début de réaction une forte perturbation. Un modèle est donné pour expliquer cette perturbation. Les énergies d'activation sont également calculées. Une discussion du modèle et des résultats est présentée.

Skineffekt und elektrische Leitfähigkeit in einem Argonplasma

von HELMUT SCHNEIDER und EDWIN HUGENTOBLER

Physikinstitut der Universität Freiburg, Schweiz

(2. XII. 71)

Abstract. Real and imaginary part of the electrical conductivity are measured in a decaying Argon plasma using skineffect of radiofrequency fields. The finite size of the probe is taken into account. The method is described and results are given.

A Coupled Channel Approach to the Isomer Fission State

by M. A. HOOSHYAR

The Institute of Molecular Physics

The University of Maryland, College Park, Maryland, USA

and F. B. MALIK

Institut de Physique, Université Neuchâtel, Switzerland

(14. X. 71)

Abstract. It has been shown that the Isomer Fission States can originate from the simple channel coupling phenomenon. The set of coupled channel equations of the recently proposed theory of fission are treated in two approximations: (i) a simple two coupled channel case and (ii) a coupled system of N channels. In each case, under a certain physical assumption, it has been possible to find a transformation which uncouples the N channels. In the two channel case, the longer and the shorter half-lives can, respectively, be identified with the spontaneous and the isomer fission states. The N channel case reduces effectively to only 3 uncoupled equations. One of these corresponds to the scattering process for the parameters pertinent to the fission case. Thus, the N channel case reduces effectively to two independent decay channels. The half-lives associated with these two decay channels can again be identified with the decay of the spontaneous and isomer fission states. This treatment of the multichannel decay process is equally valid for the Bohr-Wheeler type of theory and can also be applied to uncouple the scattering problem, which fulfills the basic assumption of this model.

Statistical Description of Elementary Processes

I. Single Particle Theory

by L. P. HORWITZ

University of Geneva

(28. I. 72)

Abstract. As a basis for the formulation of a statistical description of elementary processes, it is assumed that the measurements set up to characterize the quantum state of certain systems may not form (non-trivially) a complete set. The consequences of this assumption for the structure of quantum mechanical states and their evolution in time is investigated, and some aspects of scattering theory are discussed. A representation in terms of an overcomplete family of states is suggested by this structure, and its time evolution is studied. The phenomena of induced dispersion and broken symmetries are discussed.

Statistical Description of Elementary Processes

II. Quantum Field Theory

by L. P. HORWITZ

University of Geneva

(14. II. 72)

Abstract. In a preceding paper, the consequences of the assumption that the measurements set up to characterize the quantum state of certain systems do not form (non-trivially) a complete set was investigated in the framework of the one-particle Hilbert space. In this paper, systems of identical particles, and the structure of the associated quantum fields, are discussed. The general form of the n -body density matrices characterizing incompletely measured states is given, and a special class of observables which 'carry their own incoherence' is constructed. As an illustration, a free charged Klein-Gordon field is constructed; it is shown that the field is non local if the energy momentum is a non-trivial function of unmeasured variables. Coherent states are discussed, and it is shown that fields with some similarity to those of the Veneziano operator theory appear as a special case in which the spectrum of unmeasured observables corresponds to the four-fold tensor indices of space-time.