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HELVETICA PHYSICA ACTA
Zusammenfassungen der letzen eingegangenen Arbeiten
Résumés des derniers articles reçus

Nonlinear $0(n + 1)$-Symmetric Field Theories, Symmetry Breaking and Finite Energy Solutions

by A. O. BARUT, L. GIRARDELLO and W. WYSS

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(23. II. 1976)

Abstract. We introduce a class of $0(n + 1)$-symmetric, nonlinear field theories, containing the standard chiral models as special cases. Our class is parametrized by a function α and we give explicit transformations between any two theories corresponding to different choices of the function α. We then exhibit classical 'plane wave' and static solutions of the equations of motions of these theories. However we have to introduce symmetry breaking potentials to find solutions leading to a finite total energy.

Passage de Particules Chargées à Travers un Cristal un Présence d'un Champ Magnétique Quantique

par S. P. ANDREIEV

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(17. III. 1976)

Abstract. In this article we solve the problem of the passage of charged particles through a crystal in the presence of a quantum magnetic field. We find the solution of a quantum mechanical equation which describes the motion of a flux of slow particles inelastically scattered by optical phonons. We calculate the electron energy loss per unit length travelled inside the crystal. We also calculate the characteristic length of energy loss due to interactions with optical phonons.

On a Dialectric Formulation of the Theory of Electro-Migration in Metals

by AMAL K. DAS

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(21. III. 1976)

Abstract. A simple and approximate theory of electro-migration in metals is formulated within the dielectric function approach by the use of the 'equivalence theorem' discussed earlier by Peierls and the author. In the case of an interstitial ion of weak charge, the result of earlier work by several authors follows from this formulation. The scope and the limitations of the method are discussed. The case of an ion electro-migrating in a charged Bose gas is commented on. Finally the effect of ion–ion interaction on the force in electro-migration is considered.

A General Theory of Relativistic Gravitational Energy-Momentum Localization

by JEAN CHEVALIER

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(21. III. 1976)

Abstract. In the framework of Scherrer's linear (tetradic) formalism, field equations are derived from a general variational principle (with the constraints $g_{\mu\nu} = e_\alpha g^{\alpha}{}_{,\mu} g^{\alpha}{}_{,\nu}$). By elimination of the Lagrange multipliers, we obtain six antisymmetric equations. With the ten constraints quoted above, these 'supplementary conditions' constitute a system of sixteen equations for the 'tetrads' $g^{\lambda}{}_{,\mu}(x)$. This system, with appropriate boundary conditions, should determine the $g^{\lambda}{}_{,\mu}$ unambiguously. It is then possible to express the gravitational energy-momentum (GEM) density at each point of space-time (localization). The study of the weak fields then allows us to give a physical justification of our theory, in contrast to other formalisms, which are more founded on considerations of a mathematical nature. This paper is thus a generalization of [PA 38 481 (1976)] where we gave a physical argument in favour of GEM-localizability in the static case.

An Eikonal Expansion in Quantum Electrodynamics

by M. QUIRÓS

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(6. IV. 1976)

Abstract. The classical limit of quantum electrodynamics is studied using functional methods. Two-point Green functions are developed in power series of $\sigma^{\mu\nu}F_{\mu\nu}$. In particular nth order spin corrections are associated to terms coming from $(\sigma F)^n$. The first order spin correction is analyzed in detail. In the limit of zero photon mass it exhibits cuts, in the complex energy plane, whose effects are mainly concentrated on the branching points, with coefficients $(\log \mu)^{-1}$.