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HELVETICA PHYSICA ACTA

Zusammenfassungen der letzten eingegangenen Arbeiten

Résumés des derniers articles reçus

The Raman Spectrum of Ferroelectric PbTiO₃

by R. A. FREY and E. SILBERMAN

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(1. VII. 75)

Abstract. Raman scattering in ferroelectric single domain crystal PbTiO₃ reveals 14 phonons, which can readily be assigned to $k = 0$ phonons in the crystal class C_{4v}. In addition, seven quasi-phonons can be observed. This set of phonons allows the calculation of the non-observed E(LO3) phonon, a qualitative assessment of the action of long range and short range forces in the crystal as well as the calculation of a new set of dielectric constants. The ferroelectric phase has been found to persist down to 77 K.

A Mechanical Quantum Measuring Process

by BARBARA WHITTEN-WOLFE

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and GÉRARD G. EMCH

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Rochester, New York 14627 (USA)

(22. VIII. 75)

Abstract. A mechanistic analysis of the quantum measuring process is proposed. This takes into account both the reduction of the wave packet and the recording of the measurement on a macroscopic apparatus. An exactly solvable model is given to sustain the theory.

Strukturuntersuchungen an Alkalihyperoxiden

VON M. ZIEGLER, M. ROSENFELD, und W. KÄNZIG

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(29. VIII. 75)

Abstract. The alkali hyperoxides undergo with varying temperature a number of phase transitions in which changes of the orientational order of the O₂⁻-molecules play an important part.

By means of x-ray analysis of NaO₂, KO₂, RbO₂ and CsO₂ single crystals (including a study of the diffuse scattering) average structures, correlations between the orientations of the O₂⁻-molecules, and relationships between the various phases and domain structures were established.

A neutron diffraction analysis of NaO₂ single crystals and polycrystalline samples indicates magnetic short range order in the marcasite phase.

Electrostriktion Dotierter Alkalihalogenide

by H. BURKARD, W. KÄNZIG und M. ROSSINELLI

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(18. VIII. 75)

Abstract. The electrostriction of doped alkali halide crystals was investigated. For the paraelectric systems KCl:OH^- , KCl:Li^+ , NaBr:F^- , RbCl:Ag^+ and RbBr:Ag^+ in which the equilibrium position of the substitutional impurities is off-center the electrostriction consists of the following three contributions:

- (a) The electrostriction of the host lattice.
- (b) The deformation of the lattice as a result of the reorientation of the permanent electric-elastic dipoles.
- (c) The deformation arising from the field induced shift of the equilibrium position of the defects.

In KBr:Li^+ the electrostriction consists only of contributions (a) and (c), indicating that it is not a typical off-center system.

Contribution (c) does not saturate in contrast to (b) and thus is particularly important for *strong electric fields*. RbCl , for example, containing $6 \cdot 10^{17}$ Ag^+ -ions per cm^3 exhibits a temperature independent electrostrictive effect which is about 100 times larger than the effect in the pure material.

At *low field strengths* the electromechanical behaviour of KCl:OH^- and KCl:Li^+ is dominated by contribution (b). At high hydroxyl concentration the electric and elastic interaction of the dipoles manifests itself in the electrostriction.

Classical Electrodynamics with Extended Charges

by A. RICHÖZ

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Schönberggasse 9, CH-8001 Zürich, Switzerland

(17. IX. 75)

Abstract. In the first part, the problem of the existence, uniqueness, smoothness of the solution of the coupled Maxwell–Newton equations is investigated for a charge distribution with compact support. In the second part, a detailed study of this problem for the case of a spherical shell distribution shows that the limit of Lorentz–Dirac is not physical.

A Remark on Pion Capture in Heavy Nuclei

by M. P. LOCHER and F. MYHRER

S.I.N., 5234 Villigen, Switzerland

(17. IX. 75)

Abstract. The yield of neutrons from the (π^-, xn) reactions on ^{165}Ho is calculated with a two nucleon absorption mechanism followed by (nucleon, xn) reactions using experimental input only. The comparison with the experimental yield curve supports this simple two-step model for heavy nuclei.

The $P(\phi)_2$ Green's Functions: Asymptotic Perturbation Expansion

by JONATHAN DIMOCK

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(19. IX. 75)

Abstract. The real time Green's functions in the $P(\phi)_2$ quantum field theory are infinitely differentiable functions of the coupling constant λ up to and including $\lambda = 0$. It follows that the perturbation series are asymptotic as $\lambda \rightarrow 0^+$.