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HELVETICA PHYSICA ACTA

Zusammenfassungen der letzten eingegangenen Arbeiten

Résumés des derniers articles reçus

Supraconductivité et chaleur spécifique d'alliages basés sur Ti_3Sb

par A. JUNOD, F. HEINIGER, J. MULLER et P. SPITZLI

Institut de Physique de la matière condensée, Université de Genève, 1211 Genève

(8 VIII 69)

Abstract. The superconducting transition temperature, Debye temperature and the normal electronic specific heat have been investigated in the quasi-binary alloys with A 15-type structure belonging to the systems Ti-Nb-Sb and Ti-V-Sb. Superconductivity has been discovered in single-phased, off-stoichiometric $\text{Nb}_4\sim\text{Sb}$. The change of the transition temperature as a function of annealing conditions and order in Ti_3Sb appears to be due to variations of the band structure.

$(n, 2n)$ -Querschnitte und Isomer-Querschnittsverhältnisse von ^{76}Ge und ^{165}Ho im Energiebereich von 12,5 bis 18,5 MeV

VON E. STEINER, P. HUBER, W. SALATHE UND R. WAGNER

Physikalisches Institut der Universität Basel

(15. VIII. 69)

Abstract. Cross-sections of the $^{75}\text{Ge}(n, 2n)^{75}\text{Ge}$ - and $^{165}\text{Ho}(n, 2n)^{164g, m}\text{Ho}$ -reactions were measured at neutron energies from 12.5–18.5 MeV with the activation method. A Ge-pin-diode served as detector of the gamma activity of the irradiated samples.

A method based on the statistical model was developed for the theoretical calculation of excitation functions and the results compared with the experimental values. Shell effects and pairing forces have been taken into account.

The isomeric cross-section ratios were compared with the theory of Huizenga and Vandenbosch. The spin cutoff-parameter was calculated on the basis of the Fermi-gas and the superconductor model.

Using level density coefficients according to T. D. Newton's formula, good agreement between theory and experiment could be obtained for nuclei with low values of this parameter, whereas for nuclei with high values discrepancies were observed in the excitation functions. Some improvement was obtained by introducing a correction for gamma transitions which compete with neutron-emission during the decay of the compound nucleus.

Änderung der Zerfallskonstante von ^{89}Zr in BaTiO_3

VON ST. GAGNEUX, P. HUBER, H. LEUENBERGER UND P. NYIKOS

Physikalisches Institut der Universität Basel

(1. IX. 69)

Abstract. Ferroelectric bariumtitanate crystals were grown in a BaCl_2 -flux in the presence of 1.2 mCi ^{89}Zr ($T_{1/2} = 78.4$ h, 77.7% EC).

In this way the ^{89}Zr was quantitatively bound to the lattice-site of the Ti ions in the BaTiO_3 crystals where a high electric field acts. The change of the lattice configuration by variation of the temperature of BaTiO_3 influences the lifetime of ^{89}Zr . The relative change of the decay constant

$\Delta\lambda/\lambda$ of the EC-process of ^{89}Zr is about $(8.0 \pm 0.3) \times 10^{-4}$ and was shown by measuring the γ -activity of two samples at different temperatures with 7.6×7.6 cm NaI (Tl) scintillation counters. Two different methods to measure the change of the decay constant were demonstrated.

On Properties of Unstable Particles

by Jiří JERSÁK

Institut für theoretische Physik der Universität Bern (Switzerland)

(1. IX. 69)

Abstract. The condition is postulated which determines possible decay laws of unstable particles. These decay laws are interpreted in terms of single and multiple poles on the second sheet.

Models of Local Current Algebra and Symmetry Breaking

by FRANCESCO GHIELMETTI

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(10. IX. 69)

Abstract. It is shown that a known model of local current algebra in the infinite momentum limit can be generalized to a model which includes symmetry breaking solutions. The model can further be extended to allow transitions between states of different total isospin value. The methods of generalization apply to higher algebras as well as to the SU_2 -model treated here.

Solid State Reactions and Defects in Verneuil Laser Rubies

by W. J. BORER and Hs. H. GÜNTARD

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8006 Zurich, Switzerland

and P. BALLMER

Djévahirdjian S.A., Monthey, Switzerland

(25. IX. 69)

Abstract. The defects characteristic for a certain type of ruby ('brown ruby') with very low laser efficiency were investigated by optical, infrared, thermoluminescence, and ESR spectra, and by analytical methods of trace detection. Significant correlation of these defects with impurities present in the brown state of ruby was established. The defect may be eliminated by appropriate heat treatments, which were found to be associated with several solid state reactions as well as with a considerable increase of laser efficiency. The typical UV absorption spectrum is interpreted as the crystal field spectrum of Cr^{+3} on interstitial sites. This view is supported by the results of extended computations of crystal field spectra.

Untersuchungen über die Trägerrekombination in Intrinsic-Germanium bei tiefen Temperaturen

von F. BUSCHOR and E. BALDINGER

Institut für angewandte Physik der Universität Basel

(15. IX. 69)

Spin Fluctuation Effects with Strongly Magnetic Impurities

by B. GIOVANNINI, A. J. HEEGER and M. PETER

Institut de Physique de la Matière Condensée, University of Geneva,
Geneva, Switzerland

(7. X. 69)

Abstract. A phenomenological theory of the effect of spin fluctuations on the magnetic susceptibility of strongly magnetic impurities in metals is developed. The finite zero temperature susceptibility is calculated and qualitative aspects of the temperature dependence are pointed out. The results are expressed in terms of the density of states due to the localized state virtual levels.

Untersuchung über die Erhaltung der μ -Leptonenzahl

VON K. BORER, B. HAHN, H. HOFER, H. KASPAR, F. KRIENEN und P.-G. SEILER

Bern - CERN - Fribourg Kollaboration

(16. X. 69)

Abstract. An investigation has been made on the conservation of the muonic lepton number by using a pure neutrino beam and by measuring the charge ratio of the muons in neutrino interactions. The experiment yields a new upper limit for a possible violation of the muonic lepton number of $< 3.8 \cdot 10^{-3}$ (90% confidence) expressed in the μ^+ to μ^- ratio.

Dislocations et champs cristallins

par J. ZAHND

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(5 XI 69)

Résumé. Les structures cristallines quasi-périodiques variables sont décrites à l'aide d'un champ de déformation-vitesse appelé champ cristallin. Les équations fondamentales de ce champ sont celles de la théorie des dislocations, déjà formulées en mécanique des milieux continus. Elles sont déduites ici d'un principe variationnel, qui fait apparaître une force cinétique exercée par le champ de vitesse sur les dislocations en mouvement. Les équations du champ cristallin moyen dans un réseau de dislocations sont établies, en suivant la méthode de Lorentz en électrodynamique des milieux continus, et en adoptant une classification élémentaire des réseaux de dislocations. La théorie de la dispersion des ondes élastiques dans un réseau de dislocations est abordée selon cette méthode.

Boundary Curves of the Double Spectral Functions in the Mandelstam Representation

by G. RASCHE

Institut für Theoretische Physik der Universität Zürich

and W. S. WOOLCOK

Research School of Physical Sciences, The Australian National University, Canberra

(15. XI. 69)

Summary. The boundary curves of the double spectral functions in the Mandelstam representation for the invariant amplitudes of a two-particle \rightarrow two-particle collision process are evaluated for a number of hadronic processes. Use is made only of elastic unitarity and of 'extended' unitarity and a general formula is given which applies to any case where an anomalous threshold is absent. It is shown that subtractions in the Mandelstam representation do not alter the boundary curves.