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

Wirkungsquerschnitte in Ortho-Para-Wasserstoffgemischen

von M. CAMANI

Laboratorium für Festkörperphysik, ETH, Zürich

(16. XII. 70)

Summary. The dependence of the viscosity of ortho-para-hydrogen mixtures on temperature (15–120 °K) has been measured in the range from 10 to 100% *p*-H₂. From these data the relative differences of the interaction cross sections for *o-o*-, *o-p*- and *p-p*-collisions can be derived. The results differing slightly from earlier measurements show that quantum statistical symmetry effects are not sufficient to explain the observations. Furthermore, methods are described to produce large quantities of pure ortho hydrogen.

**Polarisation des neutrons émis par la réaction $^{12}\text{C}(d, n)^{13}\text{N}$ sous 20° Lab.
pour $E_d = 2,75$ MeV et 3 MeV**

par S. JACCARD, J.-F. GERMOND, J. PIFFARETTI et J. WEBER
Institut de Physique, Université de Neuchâtel, Neuchâtel, Suisse

(18 XII 70)

Summary. As a check of results published earlier and as a test of our liquid He polarimeter we have performed two measurements of the polarisation of the neutrons from the $^{12}\text{C}(d, n)^{13}\text{N}$ reaction at $E_d = 2,71$ and 2,96 MeV. Monte Carlo techniques have been used for multiple scattering corrections. The results are $P_1 = (-36.5 \pm 2.2)\%$ and $P_1 = (-37.0 \pm 1.8)\%$ respectively in good agreement with the results of Walter et al.

**On the Geometry Dependence of Nonlinear Electrical Conduction
in Intrinsic Semiconductors**

by W. A. SCHLUP

IBM Research Laboratory, Zurich, Switzerland

(23. XII. 70)

Abstract. It is shown that for a cylindrical-shaped specimen the current-voltage characteristic depends in its nonlinear part on the shape and dimensions of the cross-section. It saturates for a large electric field and constant mobility for any nonlinear recombination rate of electrons and holes, whereas for a linear recombination rate it exhibits a superohmic behavior. Neglecting magneto-resistance effects the result can be generalized to field-dependent mobilities. It again yields a saturation of the current for large fields if a linear recombination law and a saturating drift velocity are assumed. The result agrees with experimental data essentially for large dimensionf.

Die Diffusion von Zink und Gallium in Galliumarsenid bei 1100°C

von H. R. WINTELER

Battelle Institut, Carouge-Genève

(29. XII. 70)

Summary. The regular chemical diffusion of Zn in *n*-type GaAs at 1100°C is analysed. The Zn-concentration profiles obtained under different, well defined, Zn and As partial pressure were measured electrically. Hence the concentration-dependence of the chemical diffusion coefficient D_{Zu}^{chem} was determined by the Boltzmann-Matano-analysis for all boundary conditions. It is found that the value of D_{Zu}^{chem} depends on the local as well as on the surface concentration of Zn.

Influence of the Chemical Environment on β -Decays

by K. ALDER, G. BAUR and U. RAFF

Institute for Theoretical Physics, University of Basel, Switzerland
(26. XII. 70)

Abstract. The influence of a change of the electron screening on β -decay is discussed. The results are used to calculate the change of the half-life of various β -decays in different chemical environments.

Untersuchung der Niveaudichten von Cer und Strontium

VON J. SCHACHER, P. HUBER † und R. WAGNER

Physikalisches Institut der Universität Basel
(12. I. 71)

Abstract. Neutron time-of-flight spectra resulting from 14-MeV-neutron bombardment of Cerium and Strontium have been observed. Calculations based on the statistical model, using the superconductor and the Fermi gas model for the nuclear level density, well describe the experimental spectra. Two contributions, (n, n') and $(n, 2n)$, were included. Fermi gas level density parameters have been obtained from fitting the data.

The analysis of the experimental spectra according to Le Couteur and Lang is also discussed.

Détection optique du couplage dans un état atomique excité entre états «d'orientation» et «d'alignement»

par A. FAIST

Laboratoire d'optique physique, EPF-Lausanne
(29 XII 70)

Résumé. On montre comment le couplage entre états d'alignement et d'orientation d'une vapeur atomique excitée se traduit par des variations de la polarisation de la lumière de fluorescence et on prévoit ainsi le résultat qualitatif des expériences récentes dans lesquelles sont superposés des champs magnétiques et électriques non parallèles.

Sur une question de calcul de variations sous contraintes

par J. PONCET

Institut de Mathématiques, Université de Lausanne,
E. C. G. STUECKELBERG DE BREIDENBACH et P. B. SCHEURER
Institut de Physique Théorique, Université de Genève
(29 I 71)

Abstract. This is a mathematical complement to [2]. We prove theorems 3.1 and 3.2 below, which state that for a functional F representing an extensive quantity which is maximal under constraints defined by conserved quantities of the same density type, the condition $\delta_c^1 F = 0 \dots$, $\delta_c^{2k-1} F = 0$, $\delta_c^{2k} F \geq 0$ for *admissible* variations, is equivalent to the condition $\delta^1 \psi = 0, \dots$, $\delta^{2k-1} \psi = 0$, $\delta^{2k} \psi \geq 0$ for arbitrary variations, where ψ is the Lagrange functional $F + \vartheta_a G^a$ with the multipliers ϑ_a , the existence of which is also proved under our condition D).

Der phänomenologische Energietensor im Rahmen der linearen Feldtheorie

VON WILLY SCHERRER

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(29. I. 71)

Zusammenfassung. Der phänomenologische Energietensor der Einsteinschen Gravitationstheorie kann kovariant in die lineare Feldtheorie eingeordnet werden. Die Anwendung auf eine ruhende, homogene und inkompressible Flüssigkeitskugel ergibt eine Lösung, die sich von der entsprechenden Schwarzschild'schen Lösung im Wesentlichen nur dadurch unterscheidet, dass der totale Energietensor in absolut kovarianter Gestalt erscheint. Durch die Berechnung der Totalenergie wird die Äquivalenz von Energie und Masse mit hoher Genauigkeit bestätigt.

In einem Anhang wird dargelegt, dass der Einsteinsche Gravitationstensor in der linearen Feldtheorie exakt enthalten ist.