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Zusammenfassungen der letzten eingegangenen Arbeiten
Résumés des derniers articles reçus

Wechselwirkung von 14,7 MeV Neutronen mit ^{238}U und ^{232}Th

von P. Boschung, St. Gagneux, B. Hoop jr., P. Huber, Z. Lewandowski und R. Wagner

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(5. VI. 68)

Abstract. The neutron spectra resulting from the bombardment of ^{232}Th and Uranium by 14.7 MeV neutrons were measured with a time-of-flight equipment using the associated particle method. Nuclear temperatures, from the analysis of the inelastic part of the spectra, are: (720 $\pm$ 70) keV for ^{232}Th and (850 $\pm$ 80) keV for ^{238}U. The discrepancies at a mean excitation energy of approximately 13 MeV among the earlier experimental results are explained by the different ways of subtracting the spectrum of the postfission-neutrons. The level density parameters, based on the Fermi-gas model including pairing and shell effects, were found to be a'_p = (27 $\pm$ 5) MeV^{-1} for ^{232}Th and a'_p = (20.5 $\pm$ 4) MeV^{-1} for ^{238}U. They are in agreement with results from experiments at lower neutron energies. The evaporation distributions were analyzed in terms of the Lang and Le Couteur spectra.

A Monte Carlo program was developed and successfully used to calculate the spectrum distortions due to multiple interactions in the scattering samples.

The inverse cross sections appearing in the evaporation spectra were represented by optical model values.

On the Analyticity Properties of the N-Body Scattering Amplitude in Non-Relativistic Quantum Mechanics

by F. Riahi

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(4. VI. 68)

Abstract. We consider the scattering of N non-relativistic, spinless, distinguishable particles interacting via two-body superpositions of Yukawa potentials. The on-energy-shell amplitude is studied as a function of the total center-of-mass kinetic energy E and for physical values of the 'angular' variables $\boldsymbol{x}_i = (1/k)\,\boldsymbol{p}_i$, $\boldsymbol{y}_i = (1/k)\,\boldsymbol{q}_i$, $1 \leqslant i \leqslant N$, $k^2 = E$, where $\boldsymbol{p}_1, \ldots, \boldsymbol{p}_N$ and $\boldsymbol{q}_1, \ldots, \boldsymbol{q}_N$ are the initial, respectively the final momenta.

It is shown that this amplitude is the boundary value of a function analytic in the energy E in a complex plane cut from $-\infty$ to $-\varrho^2$ for some $\varrho > 0$ and from 0 to $+\infty$ and in all variables $(\boldsymbol{x}_1, \ldots, \boldsymbol{y}_N)$ in a neighbourhood of their physical values, up to an algebraic set of codimension 1.

Equations de Ginzburg-Landau et equations phénoménologiques de transport dans les superconducteurs

par F. Rothen

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(26. VI. 68)

Summary. It will be shown that in the neighbourhood of the critical temperature the application of the theory of irreversible processes to the superconductors necessitates no other specific hypothesis but that of the validity of the time-dependent Ginzburg-Landau equations. Especially the vanishing of the thermo-electric effects and the particularly simple form of the thermal conductivity in superconductors are connected with the fact that the pseudo-wave function ψ introduced by Ginzburg-Landau satisfies a diffusion equation in the mentioned temperature region.

Wirkungsquerschnitt der $^{27}Al(n, \alpha)^{24}Na$-Reaktion im Energiebereich von 13.8 MeV bis 14.8 MeV

von P. Boschung, St. Gagneux, P. Huber, E. Steiner und R. Wagner
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(2. VII. 68)

Abstract. The total $^{27}Al(n, \alpha)^{24}Na$-reaction cross section was measured in the energy range of 13.8 MeV to 14.8 MeV using the activation method. Our results are in good agreement with data of other recently published measurements. The absolute value of the total cross section at 14.2 MeV was determined to be (120 $\pm$ 5) mb.

The Convergence of the Perturbation Series in a Model of Quantum Field Theory

von Ulrich H. Niederer
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(17. VII. 68)

Abstract. We study the behaviour of the vacuum expectation value of a regularized scalar field operator as a function of the coupling constant μ^2 in the Fierz model. The vacuum expectation value exhibits an essential singularity at $\mu^2 = 0$. Therefore, the perturbation series diverges, representing only an asymptotic expansion of the vacuum expectation value under consideration.

Elastische Streuung polarisierter Neutronen von 3,25 MeV an mittelschweren Kernen

von D. Ellgehausen, E. Baumgartner, R. Gleyvod, P. Huber, A. Stricker und K. Wiedemann
Physikalisches Institut der Universität Basel

(19. VII. 68)

Summary. Angular distributions of the azimuthal asymmetry of elastically scattered polarized neutrons have been measured between 30 and 140 degrees for the six elements titanium, chromium, iron, copper, zinc and zirconium. As a source of polarized neutrons the $D(d, n)^3He$-reaction in a thick ice-target was used (mean neutron energy: 3.25 MeV). The asymmetry was measured with fixed counter position by rotating the polarization of the incident neutron beam through an angle of $\pm$ 90 degrees by means of an axial magnetic field. The overall behaviour of the analysing power of the above elements with the exception of zirconium could be described using an optical model-potential with parameters found by Rosen [2], whereas the maximum measured value of the latter was about a factor of three higher than that predicted by the model.

Messung des Neutronen-Polarisationsvermögens der Elemente Mg, Al, Si, S für die mittlere Neutronen-Energie E_n=3,25 MeV

von K. Wiedemann, E. Baumgartner, D. Ellgehausen, R. Gleyvod et P. Huber
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(19. VII. 68)

Summary. The analyzing power $P^a(\theta)$ of Mg, Al, Si and S in the angular range from 30° to 140° has been measured for (d, d)-neutrons of mean energy 3.25 MeV with spread of 300 keV. The polarization vector of the incident neutron beam was rotated through $\pm 90°$ by means of a solenoid and the left right asymmetry was measured with a fixed counter position. The experimental results disagree with optical model predictions.

Analyse des resultats d'une mesure du moment magnétique de l'hyperon Λ°

par GÉRARD CHARRIÈRE

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(22 VII 68)

Abstract. A method is described for the kinematic reconstruction of 874 Λ decays observed in nuclear emulsions. Their angular distribution is studied in order to determine the Λ magnetic moment.

Selecting 151 events, we obtain $\mu_\Lambda = -0.50 \pm 0.28$ nuclear magneton.

A discussion of the systematic errors is given and the method of selection of the events is justified.

Effets d'interférences dans la réaction ^{7}Li$(d, n)^8$Be au voisinage de la résonance à 1 MeV

par CHRISTIAN NUSSBAUM

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(1 VII 68)

Sommaire. Différentes sections efficaces différentielles de la réaction ^{7}Li$(d, n)^8$Be ont été mesurées au voisinage et au travers de la résonance à 1 MeV afin d'étudier leur comportement et mettre en évidence des effets d'interférences entre la résonance et les contributions à la diffusion faiblement dépendantes de l'énergie. Un modèle simplifié, utilisant deux éléments de matrice rend compte de façon satisfaisante de l'ensemble des mesures. Ces mesures sont composées de 6 distributions angulaires pour des énergies de deutons de: 0,91; 0,94; 0,97; 1,01; 1,05; 1,09 MeV et deux distributions en énergie de deutons variant de 0,86 à 1,33 MeV pour 0° et 90°.

Vitesse du son dans des alliages de Pd dopés avec des éléments de transition

par J. ORTELLI, C. SUSZ, E. WALKER et M. PETER

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(2 VIII 68)

Abstract. By means of a pulse method using magnetostrictive transducers, we have measured the temperature dependance of torsional speed of sound in the alloys Rh_xPd_{1-x} and Pd_xAg_{1-x} doped with the transition elements Mn, Fe, Ni, Co, Ru, Os, Pt. The temperature variation of the speed of sound in undoped alloys shows an anomaly at the composition $Pd_{95}Rh_5$. We show that the decrease or the increase of this anomaly is in good correlation with the decrease or increase of the band susceptibility measured by usual methods (susceptibility, high field susceptibility, electronic paramagnetic resonance). We have also observed a ΔE effect having very specific properties. A brief discussion of this effect is given.

Les règles de superselection continues

par C. PIRON

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(2 VIII 68)

Abstract. Starting from the calculus of propositions, we develop a formalism which allows to treat continuous superselection rules and give some examples of applications of this formalism.

Impossibility of Quantum Mechanics in a Hilbertspace over a Finite Field

by J.-P. ECKMANN and PH. CH. ZABEY

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(12. VIII. 68)

Abstract. In this paper, we show that the lattice of propositions of a quantum mechanical system cannot be represented as subspaces of Hilbertspace with coefficients from a finite field.

The only exceptions are the two dimensional lattices, for which the restriction on the field is only that it may not be of characteristic 2.

Core Excitation in Semi-closed Nuclei

by U. GOETZ and J. HADERMANN

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(14. VIII. 68)

Abstract. Four-particle-two-hole core excitation in nuclei with two nucleons outside the closed shells is treated by direct extension of the configuration space. Some applications to a simple two-level case are given.

Contribution à la théorie des excitons de Wannier dans les cristaux anisotropes

par J.-A. DÉVERIN

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(28 VIII 68)

Résumé. Sur la base d'un modèle simple, nous avons établi que l'influence de la discontinuité du réseau sur l'énergie de liaison des excitons de Wannier était négligeable. En respectant les règles de symétrie de la théorie des groupes et à l'aide de la méthode des perturbations, nous avons calculé les corrections à apporter à l'énergie de liaison pour tenir compte de l'anisotropie, pour des cristaux uniaxes et biaxes. Les résultats de ces calculs, appliqués aux CdS, CdSe et GaSe, permettent d'interpréter les spectres excitoniques observés avec des valeurs des paramètres de bandes raisonnables.

On the Quantum Mechanical N-Body Problem

von KLAUS HEPP

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(13. IX. 68)

Abstract. Systems of a finite number of nonrelativistic particles are studied in the framework of time-independent quantum scattering theory in the approach of Faddeev. For a non-empty class of 2-body potentials, we shall prove the unitarity of the S-matrix and a singularity structure of resolvent kernels and scattering amplitudes in the physical region, which is qualitatively the same as in perturbation theory.

Elasticité des métaux paramagnétiques

par Ø. FISCHER et M. PETER

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et S. STEINEMANN

Institut Dr. Reinhard Straumann, Waldenburg et Institut de Physique Expérimentale de l'Université de Lausanne

(24 IX 68)

Abstract. The kinetic energy of itinerant electrons gives a definite contribution to the elasticity of metals. The free energy of itinerant electrons and their chemical potential is examined in a Stoner model and expressions for the susceptibility, compression modulus and thermal dilatation are derived. The 'internal pressure' of an equation of state for simple metals is explained by a same model. The main contribution of the band structure and exchange interaction appears for volume conserving shears and is demonstrated for the whole series of transition metals and their alloys; correlations between shear modulus and susceptibility refer in fact to the same contribution of band structure and exchange interaction.

Interactions p-noyau à 3 GeV/c dans l'émulsion nucléaire

par M. Bogdanski, E. Jeannet et C. Metzger
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(1 X 68)

Summary. The results of an analysis of about 700 'stars' induced by 3 GeV/c protons in photographic emulsion are presented. A new technique used for measuring the tracks is described.

Size distributions of stars in terms of black, grey and shower tracks, angular distributions of emitted particles, energy spectra of protons and alphas, emission ratios of protons and alphas as well as the excitation energy distribution of the residual nuclei after the intranuclear cascade are in good agreement with the cascade-evaporation model of nucleon – nuclei high energy interactions.

Residual Interactions and Properties of Nuclear States in the Lead Region

by J. Hadermann and K. Alder
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(14. X. 68)

Abstract. Introducing a residual interaction with a spin-spin and a tensor part, energy levels and transition probabilities of the three single-closed shell nuclei Pb^{206}, Pb^{210}, Po^{210} have been computed and compared with experimental data. The parameters of the residual interaction potential are close to the values known from nucleon-nucleon scattering data and from deuteron theory.

Résonance magnétique nucléaire de Cl^{35} en solution avec des ions paramagnétiques

par Mme Françoise Barbalat-Rey
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(15 X 68)

Résumé. Nous étudions l'influence de la présence d'ions paramagnétiques en solution avec du chlore, sur la position et la largeur de la raie de résonance magnétique nucléaire (RMN) de Cl^{35}.

Nous avons principalement mesuré les effets du cobalt (divalent) et des ions trivalents des terres rares. Nous avons pu séparer les contributions des deux complexes principaux du cobalt, le rose de structure octaédrique et le bleu de structure tétraédrique. Le deplacement de la raie de Cl^{35} produit par les ions des terres rares nous permet de comparer nos résultats à ceux déjà obtenus pour la RMN de O^{17} et pour le Knight shift de Al dans les composés intermétalliques $LnAl_2$: le signe du déplacement est directement lié à la polarisation de l'ion lanthanide par l'interaction de contact. Cependant, les quatre terres rares les plus lourdes donnent un déplacement de signe opposé à celui attendu: nous pensons alors que dans les complexes chlorés donnés par ces ions le chlore n'est pas lié directement au métal, comme c'est le cas pour les autres terres rares.

Production of Metastable Hydrogen Atoms by Electron Capture of Protons in a Thick Helium Target

by V. Dose
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(21. X. 68)

Abstract. The production of metastable hydrogen atoms by electron capture of protons in a thick helium target is calculated in a three state approximation. Theoretical cross-sections are used for the processes of electron loss from and collisional de-excitation of the excited hydrogen atom, experimental data for the other cross sections involved.