Zeitschrift: Helvetica Physica Acta

Band: 43 (1970)

Heft: 4

Rubrik: Zusammenfassungen der letzten eingegangenen Arbeiten = Résumés des derniers articles reçus

HELVETICA PHYSICA ACTA

Zusammenfassungen der letzten eingegangenen Arbeiten
Résumés des derniers articles reçus

Thermoelectric Power of Palladium Based Dilute Alloys

by D. GAINON and J. SIERRO
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(17. III. 70)

Abstract. The thermoelectric power, S, of palladium alloyed with 1 at.% of Ti, V, Cr, Mn, Fe, Co, Ru, Re, Os or Te has been measured between 1,5 °K and 273 °K. A change in the slope of $S(T)$ near the Curie temperature is observed for the ferromagnetic alloys. The PdCr alloy shows a large positive value of S at low temperature, presumably associated with an effect similar to that observed in alloys based on the noble metals (Kondo effect). For the other alloys, S is generally positive and greater than when the same dilute elements are dissolved in noble metals, but is not anomalously dependant with temperature.

Magnetic Field Effect on the Thermoelectric Power of a Dilute AuFe Alloy

by R. CALOZ, D. GAINON, J. SIERRO and M. PETER
Institut de physique de la matière condensée, Université de Genève

(17. III. 70)

Abstract. Low temperature measurements are presented on the Seebeck coefficient of an alloy Au + 0,03 at.% Fe in presence of a longitudinal or transversal magnetic field. The effect observed is explained by a theory using the first Born approximation. The *s-d* exchange integral is estimated: $J \approx -0{,}35$ eV.

The Unitarity Constraints for Multiple Resonances

by HANS ROSDOLSKY
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(23. III. 70)

Abstract. The unitarity constraints for any number of overlapping resonances are derived. These are the necessary and sufficient conditions on the resonance masses, widths, and couplings for the S-matrix to satisfy unitarity. The unitarity constraints for an isolated resonance, two overlapping resonances, and the dipole are studied in greater detail. The eigenphase behavior for an isolated resonance and a degenerate dipole is also discussed.

Bestimmung der Niveaudichteparameter von Germanium, Holmium und Tantal

von H. SOBOTTKA, ST. GRIMES, P. HUBER, E. MANGOLD, J. SCHACHER und R. WAGNER
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(26. III. 70)

Abstract. Germanium, Holmium and Tantalum samples were bombarded with 14-MeV-neutrons and the resulting neutron spectra measured with a time-of-flight spectrometer. Use of a Monte Carlo computer program permitted the calculation of multiple-scattering effects.

Application of the assumptions of the statistical and superfluid model led to a level density formula which was used to calculate the (n,n')- and $(n,2n)$-spectra. These calculations for various values of the level density parameter a were fitted to the experimental data.

As a second independent method to determine the level density parameter the Lang and Le Couteur relation was used to obtain a value for the nuclear temperature, which can be related to the density parameter a'_p of the Fermi-gas model.

The resulting values were compared with the magnitudes calculated from the shell model.

	a MeV^{-1}	a'_p MeV^{-1}
Ge	12,5 ± 0,7	12,3 + 1,6 − 1,1
Ho	23,0 ± 1,7	17,4 + 1,7 − 1,5
Ta	27,0 ± 2,0	22,9 + 1,6 − 1,5

Electron Spin Resonance of Cr^{3+} in $ZnAl_2O_4$ Spinel: Parameters and Linewidths

by P. SCHINDLER and P. GERBER
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(31. III. 70)

Abstract. The ESR. spectra of Cr^{3+} in synthetic $ZnAl_2O_4$ spinel have been measured at 35 and 9 GHz. The parameters of the spin Hamiltonian are at 300 °K: $g_{\parallel} = 1.9840 \pm 0.0003$, $g_{\perp} = 1.9798 \pm 0.0005$, $|D| = (0.9304 \pm 0.0003)$ cm^{-1}. The strongly varying linewidths are interpreted quantitatively by a simple model which is consistent with small disorder effects.

Spontane Kernspaltung von ^{238}U und ^{241}Am

von D. GALLIKER und E. HUGENTOBLER
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und B. HAHN
Universität Bern

(3. IV. 70)

Abstract. With the spinner method, which is based on the principle of cavitation of liquids induced by energy deposition by particles, we have measured the spontaneous fission half lives of ^{238}U and ^{241}Am. We found $(8.19 \pm 0.06)\ 10^{15}$ years for ^{238}U and $(9.5 \pm 0.4)\ 10^{13}$ years for ^{241}Am. In order to search for possible systematic errors, the measurements were done under different experimental conditions.

On the Infinitude or Finiteness of the Number of Bound States of an N-Body Quantum System

by BARRY SIMON
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(15. IV. 70)

Abstract. We present a general discussion of when an N-body quantum system with two-body forces will have infinitely many bound states. A physically-motivated criterion for infinitude is presented and proved sufficient. In a restricted class of cases, it is proven to be necessary. Two applications are made: first, we recover the Zhislin and Zhislin-Sigalov results on the number of bound states of atoms; secondly, we discuss the coupling constant dependence of the number of bound states and find it very different from the two-body situation. Finally, we present examples of N-body systems with infinitely many bound states even though the two-body forces are too weak to bind any states.

Spectral Concentratien for the Helium Schroedinger Operator

by P. A. REJTO
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(23. IV. 70)

Differentialraum-Quantentheorie

von W. Ochs
Sektion Physik der Universität München
(11. V. 70)

Summary. *Differential-Space Quantum Theory* reformulates quantum mechanics as a theory with *hidden variables*. In this new theory all observables of a physical system have well-defined values which change in a deterministic way. In analogy to statistical mechanics a quantum mechanical state (here regarded as a *macro-state*) is represented by an ensemble of *micro-states* with an appropriate probability distribution.

The following paper contains a simplified presentation of *Differential-Space Quantum Theory* and the underlying mathematics.

Eine Analyse der Differentialraum-Quantentheorie

von W. Ochs
Sektion Physik der Universität München
(11. V. 70)

Summary. An analysis of *Differential-Space Quantum Theory* (*DSQ*) is given, continuing a former presentation of this theory. Our investigation reveals (1) contradictions between the mathematical formalism of *DSQ* and the properties of an ensemble-theory, and (2) quantitative differences between quantum mechanics and *DSQ* in the description of the measuring process.

Etude des atomes π-mésoniques au moyen des longueurs de diffusion

par E. Lambert
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(11 V 70)

Summary. From pionic atoms measurements the π-nucleus experimental scattering lengths are determined. These s and p scattering lengths are then connected to those of the π–N elementary process through a multiple scattering theory. The binding of the nucleons is neglected and the nuclear structure introduced in a simple way using the independent particle model. The absorption is treated phenomenologically by taking complex values for the π–N scattering parameters. A set of these parameters is then adjusted to the experimental results and discussed.

Rechenmethode zur Analyse hochaufgelöster γ-Spektren und ihre Anwendung auf Spaltfragmentgemische

von P. Winiger, O. Huber und J. Halter
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(15. V. 70)

Abstract. γ-spectroscopic methods offer considerable advantages compared to other proceedings in the analysis of unknown mixtures of radionuclides. There exists especially the possibility of computer programs to achieve a complete analysis of highly resolved spectra even with rather small installations. The principles of a peak location, the approximation of the peaks with Gaussian distributions and the energy calibration and determination, which allow an identification of the peaks with a suitable catalogue of γ-ray energies, are outlined. Besides the calculation of the activity of the identified nuclides and the necessary time corrections a comparison with normal mixtures of fission fragments is executed. To do this, we assume a special fission mode and calculate to every measured nuclide the corresponding number of fissions; its expected value for normal mixtures is a constant Q, if the chosen fission mode is correct. The accuracy of this procedure has been tested experimentally with a normal mixture of fission fragments of U-235, irradiated with thermal neutrons. The mean deviation of the Q-values was about $\pm 10\%$, using the most recent data. The analysis of three airfilter samples with fission fragments and neutron induced nuclides (Np-239, U-237) from nuclear explosions allowed their attribution to two different types of bombs.