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# HELVETICA PHYSICA ACTA

Zusammenfassungen der letzten eingegangenen Arbeiten

Résumés des derniers articles reçus

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## Rigged Hilbert Spaces in Quantum Field Theory: a Lesson Drawn from Charge Operators

by J.-P. ANTOINE

Institut de Physique Théorique, Université de Louvain  
and

Institut de Physique Théorique, Université de Genève

(17. VI. 71)

*Abstract.* Motivated by the problem of defining a charge operator, a systematic study is made of several classes of rigged Hilbert spaces suitable for Quantum Field Theory. The result is that (essentially) only one of them satisfies all the requirements, namely  $\mathcal{H}_{ql} \subset \mathcal{H} \subset (\mathcal{H}_{ql})'$ , where  $\mathcal{H}_{ql}$  is the well-known space of quasi-local states. It is then shown that, even in the case of a non-conserved current, the charge operator always exists as a continuous operator from  $\mathcal{H}_{ql}$  into  $(\mathcal{H}_{ql})'$ .

## Etude de la réaction $^{176}\text{Lu}(n, \gamma) ^{177}\text{Lu}$ au moyen d'un spectromètre à paires et anti-Compton

par B. MICHAUD, J. KERN, L. RIBORDY et L. A. SCHALLER

Institut de Physique, Université de Fribourg, Fribourg, Suisse)

(21. VI. 71)

*Abstract.* The  $^{176}\text{Lu}(n, \gamma)$  reaction has been studied by means of a pair and anti-Compton spectrometer. The high energy resolution and peak-to-background ratio have allowed to observe new  $\gamma$ -lines to improve the energy accuracy of the known ones. New transitions have been fitted into a more precise level scheme. The neutron separation energy was found to be  $E_n = 7072.4 \pm 0.6$  keV. The results are interpreted in terms of the collective model. We discuss inconsistencies about the  $1/2^+$  [411] rotational band, for which we give two alternative constructions. The  $5/2^-$  ground level of the  $1/2^-$  [541] band was disclosed at 761.7 keV. A tentative rotational band is built on this state.

## Scattering into Cones

by J. M. JAUCH, R. LAVINE and R. G. NEWTON

Department of Theoretical Physics, University of Geneva, Switzerland  
and

Department of Physics, Indiana University, Bloomington, Indiana, USA

(29. VI. 71)

*Abstract.* Dollard's result concerning scattering into cones is generalized for arbitrary dimension of space and more general Hamiltonians.

### Time-Delay in Scattering Processes

by J. M. JAUCH and K. B. SINHA

Department for Theoretical Physics, University of Geneva, Switzerland  
and B. N. MISRA

Postgraduate Department of Physics, Sambalpur University, Orissa, India)

(5. VII. 71)

*Abstract.* The relation between time-delay and the phase-shift operator is derived in the context of the time-dependent scattering theory for simple (single channel) scattering systems.

The sufficient conditions on the interaction under which this relation can be established in a mathematical correct manner are formulated and the precise sense in which this relation can be interpreted is discussed.

The results obtained here generalize and unify various partial results previously published on this subject.

### Properties of High Field Superconductors Containing Localized Magnetic Moments

by ØYSTEIN H. FISCHER

Département de Physique de la Matière Condensée, Université de Genève

(17. VI. 71)

*Abstract.* The problem of paramagnetic impurities in high field superconductors is analyzed. Special emphasis is put on the effects that appear when the impurity spins align in an external field or due to interactions. The impurities then produces an exchange field on the conduction electron spins which in some cases may counteract the effect of the external field on the conduction electron spins. In such cases the critical field of the dilute alloy may rise above the value of the pure system and the phase boundary  $H_c(T)$  will have an anomalous shape. This effect is discussed theoretically in detail and experimental results on the system  $\text{Mo}_{1-x}\text{M}_x\text{Ga}_4$  ( $M = \text{Nb, Ru, Mn, Fe, Co}$ ) are presented.

### Influence of Chemical Environment on M1 Internal Conversion Rates and their Connection with the Mössbauer Isomer Shift

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

Institute of Theoretical Physics, University of Basel, Switzerland

(19. VII. 71)

*Abstract.* By measuring the change in decay rate  $\Delta\lambda/\lambda$  for M1 transitions and the corresponding Mössbauer isomer shift it is possible to extract the change of nuclear charge radius  $\delta R/R$ . Numerical results are given for  $^{119}\text{Sn}$  (23.87 keV),  $^{57}\text{Fe}$  (14.4 keV) and  $^{195}\text{Pt}$  (99 keV).

### Etude des sections efficaces différentielles des réactions $(n, p)$ et $(n, \alpha)$ sur $^{19}\text{F}$ , $^{29}\text{Si}$ , $^{32}\text{S}$ et $^{40}\text{Ca}$ à 5,85 MeV

par F. FOROUGHI et J. ROSSEL

Institut de Physique, Université de Neuchâtel, Suisse

(19. VII. 71)

*Summary.* Using  $\Delta E \cdot E$  discrimination in a counter telescope,  $\sigma(\theta)$  and  $\sigma_t$  have been measured for  $(n, \alpha)$  and  $(n, p)$  reactions in open shell nuclei ( $^{19}\text{F}$ ,  $^{29}\text{Si}$ ,  $^{32}\text{S}$ ) and in double magic  $^{40}\text{Ca}$ .

Results are given concerning  $^{19}\text{F}(n, \alpha_0 + \alpha_1 + \alpha_2 + \alpha_3)$ ;  $^{29}\text{Si}(n, \alpha_0)$  and  $(n, \alpha_1)$ ;  $^{32}\text{S}(n, \alpha_0)$ ,  $(n, p_0 + p_1)$  and  $(n, p_2)$ ;  $^{40}\text{Ca}(n, \alpha_0 + \alpha_1)$ ,  $(n, \alpha_1 + \alpha_2)$  and  $(n, p_0 + p_1)$ . In the open shell nuclei  $\sigma(n, \alpha)$  angular distributions are mostly forward compared to  $(n, p)$  processes but no other specific shell effect is observed. In  $^{40}\text{Ca}$  the situation is reversed;  $\sigma(\theta)$  has no remarkable structure for  $(n, \alpha)$  whereas for  $(n, p)$  it is strongly peaked forward. Previous conclusions on  $\alpha$  particle dominance in compound  $^{41}\text{Ca}$  decay are confirmed.

As a by product of preliminary measurements we give upper bounds for  $(n, \alpha)$  and  $(n, p)$  cross-sections in  $^{53}\text{Cr}$  and  $^{47}\text{Ti}$ .