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ARGENTINE PROGRESS REPORT ON NUCLEAR DATA

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COMISION NACIONAL DE ENERGIA ATOMICA



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Neutron and non-neutron nuclear data

1.- Electromagnetic transitions and Transfer Reactions in odd nuclei

in the region of ²⁰⁸Pb. S.L. Reich, H.M. Soffa and D.R. Bes Calculation were made of 1°) probabilities of electromagnetic transitions and 2°) cross sections of transfer reactions that populates final states with and independent particle structure. The calculations were compared with the experimental results

2.- Non-squematic description of the beta desintegration process

E.S. Hernandez and L. Szybisz.

The values of log. It for beta transitions in the region of heavy deformed nuclei were examined. The effects of the squematic approximation in the treatment of residual interaction among nucleons were discussed.

It is found that the esquematic approximation overestimate the beta transition probabilities by an order of magnitude.

3.- Interaction particle-particle, particle-hole and collective rotatio-

nal states. E.S. Hernández and A. Plastino

It is examined a) Systematic tendencies of the coupling constants in the residual interactions b) probabilities of electrical cuadrupolar transitions c) number of cuasi-particles in the fundamental states of the nuclei.

4.- <u>Cross section for the production of 113Sn by irradiation of Indium</u> with Deuterons. A. Karpeles

The experimental values of the cross section Inll3(d,xn) Snll3 was ob-

This was obtained by irradiation of indium foil with douterons from 27.5 MeV to the coulombic threshold.

The flux of deuterons was obtained by means of aluminum monitor foils. Sn 113 was determined by means of the garma radiation of the daughter In 113m in equilibrium. The error in the cross section was estimated to be about 20%.

The excitation function obtained with the reaction Inll3 (d,2n)Snll3 was compared with the semi-emmirical values commiled by Lange and Münzel Although there was an agreement in the shape and the mosition of the maximum, the measured cross section is much larger than that mredicted by Lange and Münzel. This may be explained because it is formed a nuclei with a magic number of protons. 5.- The Reaction (d, ⁶Li) at 27.25 MeV in the isotomes ^{64,66,68}Zn A.E. Ceballos, H.J. Erramuspe, A.M.J. Ferrero, M.J. Sametband, J.E. Testoni, D.R. Bes y E.E. Maqueda

A measurement was made of the differential cross section of the reaction 64 , 66 , 68 Zn (d, 6 Li) 60 , 62 , 64 Ni that goes to the fundamental states 0 and 2 of the residual nuclei using the deuteron beams of 27.25 MeV of the Suncrociclotron of Buenos Aires.

The results were discussed in basis of an analysis of the Born approximation with distorted waves (DWBA) using fenomenological and microsconical weight factors.

6.- Levels of ⁹¹Rb and ⁹¹Sr feed by the decay of Kr and ⁹¹Sr

E. Achterberg, F.C. Iglesias, A.E. Jech, J.A. Moragues, D. Otero M.L. Perez, A.N. Proto, J.J. Rossi and W. Scheur.

Decay schemes are proposed for ⁹¹Rb and ⁹¹Sr based in the beta decay of ⁹¹Kr and ⁹¹Rb respectively.

The sources were obtained by "on-line" mass separation of 235 U fission products. Detectors of Ge(Li) and Si(Li) were used to measure gamma, beta, and X rays, and also coincidences gamma-gamma and beta gamma.

Internal convertion coefficients were determined for various transitions and also the half-life of the first excited levels of 91 Sr.

Considering the presence of levels of positive parity at low energy above the fundamental state of negative parity the posibility of deformations to explain this structure is discussed.

7.- "Isobars with $\Lambda = 141$ "

E. Achterberg, F.C. Iglesias, A.E. Jech, J.A. Moragues, D.Otero, M. J. Perez, A.N. Proto, J.J. Rossi y W. Scheur (DFN).

The genna radiation emitted after the beta-decay of Xe and Cs was measured.

The identification of the gamma radiation with the corresponding nuclei was made taking into account the different half-lives of the isobars.

Lists of intensities and energies for the gamma transition were ob-141 141 141 tained for Cs and Ba.

8.- Determination of the neutron thermal absorption cross section of <u>Cl and B</u>. J. V. Lolich and M.J. Abbate.

The absorption cross sections of Cl and B has been determined comparing the temporal decay of the neutron density in light water with solution of NaCl and boric acid for the same geometry:

The results obtained were :

 $\mathcal{O}_{a}^{C1} (2200 \text{ m/s}) \equiv (33.6 \pm 0.3) \text{ barn}$ $\mathcal{O}_{a}^{B} (2200 \text{ m/s}) \equiv (751 \pm 10) \text{ barn}$ 3

9.- <u>Measurement and Evaluation of the Activation Resonance Integral</u> 146 148 150 of Nd, Nd and Nd.

M. D. Ricabarra, R. Turjanski and G.H. Ricabarra

This measurement and evaluation has been published in the Ganadian Journal of Physics with the following abstract:

"Values of the ratio of the reduced activition resonance integral to the thermal cross section, I' $/\sigma_0$ of ¹⁴⁶Nd, ¹⁴⁸Nd and ¹⁵⁰Nd were determined relativo to gold by measuring cadmium ratios.

A lithium-drifted germanium garma ray spectrometer was used to resolve the activities of the irradiated samples.

The results are: for ¹⁴⁶Nd I' / $\sigma_0 = 1.42\pm0.10$ and with an assumed $\sigma_5 = 1.4$ barn, I' = 1.99 ± 0.20 ; for ¹⁴⁸Nd I' / σ_0 = 4.22 ± 0.14 mmxd and with an assumed $\sigma_5 = 2.5$ barn, I' = 10.5 ± 0.9 b-rn, and for ¹⁵⁰Nd I'/ $\sigma_0 = 13.7\pm0.8$ and with an assumed $\sigma_5 = 1.2$ barn, I' = 16.4 ± 2.8 barn.

The resolved and unresolved wpithermal integrals of Nd, 148 Md and 150 Md were calculated.

Values of the snectral correction factor were also calculated, so the resonance integral could be obtained from the emithermal integral data measured in our reactor snectrum in this experiment.

Epithermal integral and spectral correction factors are listed in the text.

The most immortan result of this investigation is that the 148 Md activation reduced resonance integral is about half of previously recommonded value and consequently the radiative width for $\frac{148}{Md}$ is also about half of previously accepted value"

For more complete information Table VIII is added in this progress reports.

TABLE VIII

Previous Evaluation ^a		Calculated Data			Experimental Data	
•	I	Ię	י ו	f	I	Ι'
(barn)		(barn)			(barn)	
46 _{Nd}	2.0	2.92	2.24	0.77 - 0.05	2.58 ± 0.20	1.99 ± 6.2
b K ⁸¹	20	28.73	25.76	0.90 ^{° ±} 0.02	11.7 ± 1.0	10.5 ± 0.9
50 _{Nd}	14	17.21	15.11	0.88 ± 0.02	18.7 + 3.2	16.4 • ± 2.8

a.- Walker (1969).

10.- Some observations about "The use of neutron resonance parameter and neutron radiative cross sectio for the evaluation of the resonance integral resolved and unresolved" Paper published in the Paris Conference.

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G.H. Ricabarra, R. Turjański and M.D. Ricabarra

In our paper of the Paris Conference it was shown 1°) High energy absortions may be significant in the calculation of the resonance integral 2°) This fact has not been taken properly into account in many previous evaluation or experimental determination 3°) A determination of the resonance integral implies that a careful evaluation of emithermal absorption captures in the region in which the determination is made.

It was remembered also than it is necessary and mossible to mublish tables taken into account this facts, there is enough information now in CIMDA which would mermit to do this job.

This would be esential if higher energy out-off filters were used in the emithermal activation analysis investigation.

This technic e may be foreseen as growing in importance in the future marticularly for biological and agricultural applications.

11.- <u>Measurement of activation thermal cross section and resonance</u> 112 122 124 integral of Sn. Sn and Sn.

M. D. Ricabarra, R. Turjanski and G.H. Ricabarra

A measurement of the activation thermal cross soction and resonance integral of $\frac{112}{3n}$, $\frac{122}{3n}$, $\frac{124}{3n}$ was made as has been previously reported.

The measurement was nade by irradiation of bars and calling covered foils inside the internal reflector of the R.A.L. The activity of the foils wore counted in a Go-Li spectrometer. The cross section was obtained by comparing the tin foils with the activity of Mn foils irrasimultaneously. Absolute activities were obtained by comparing the activities with a set of reference standards calibrated by the I.A.E.A.

Correction were amplied for spectrum deviation from the 1/2 behaviour and self-shielding.

Isotone	Espe	Crlculation		
	0°0	I.	I' 100	I.
112 _{Sn}	0.42±0.08	21# 4	50±10	27
122 Sn	0.18±0.02	0.71 ±0.07	5.2±0.5	0.773
124 Sn	0.11±0.04	7±1	64 <u>+</u> 6	11

Our preliminary results are shown in table I