The investigation of the capture process has now been extended to the heavy nuylei. The experimental spectra of Ba, Pb and Bi are presented for the first time. These spectra are reasonably reproduced by the theory, so confirming at least the general correctness of the present day state of DSD theory for the radiative

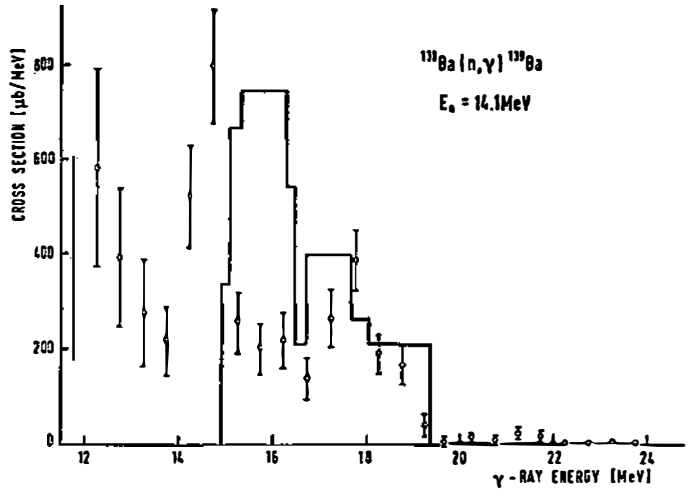

Fig. 1 Comparison of experimental (circles) and theoretical (solid line) spectrum of γ-rays from the radiative capture of 14,1 MeV neutrons in barium.

capture process. Fig. 1 presents the measured spectrum for ^{138}Ba in comparison with the spectrum calculated according to Zimanyi, Halpern, and Madsen formulation[3] of DSD theory. The integrated cross sections agree with our previously found smooth mass dependence, the values being 1600 ± 300 μb, 1150 ± 200 μb, and 1150 ± 200 μb for Ba, Pb and Bi, respectively.

References

1) F. Cvelbar, A. Hudoklin, M. V. Mihailović, M. Najžer and M. Petrišič, Nucl. Phys. **A130** (1969) 413;
2) F. Cvelbar, A. Hudoklin and M. Potokar, Nucl. Phys. **A158** (1970) 251 (other references contained therein);
3) J. Zimanyi, I. Halpern and V. A. Madsen, Phys. Lett. **33B** (1970) 205.

6.3. ^{9}Be(^{3}He, p)^{11}B reaction at low ^{3}He energy

D. M. STANOJEVIĆ, K. M. SUBOTIĆ, B. Z. STEPANČIĆ, R. V. POPIĆ and M. R. ALEKSIĆ, *Institute of nuclear sciences »Boris Kidrič«, Beograd*

We report on the measurements of excitation functions for twelve groups of protons emerging from the reaction ^{9}Be(^{3}He, p)^{11}B for $0.5 < E_{^{3}\mathrm{He}} < 1.1$ MeV. This energy region corresponds to the excitation of ^{12}C nucleus from 26.78 up to 27.38 MeV where the data on ^{12}C are scarse and inadequate. From the reaction

$^{11}B(p, \gamma)^{12}C$ there is an indication[1] on the existence of a resonance corresponding to a level of ^{12}C at 26.9 MeV, which possibly might be seen in $^{9}Be(^{3}He, p)^{11}B$ reaction at $E_{^3He} \approx 0.82$ MeV.

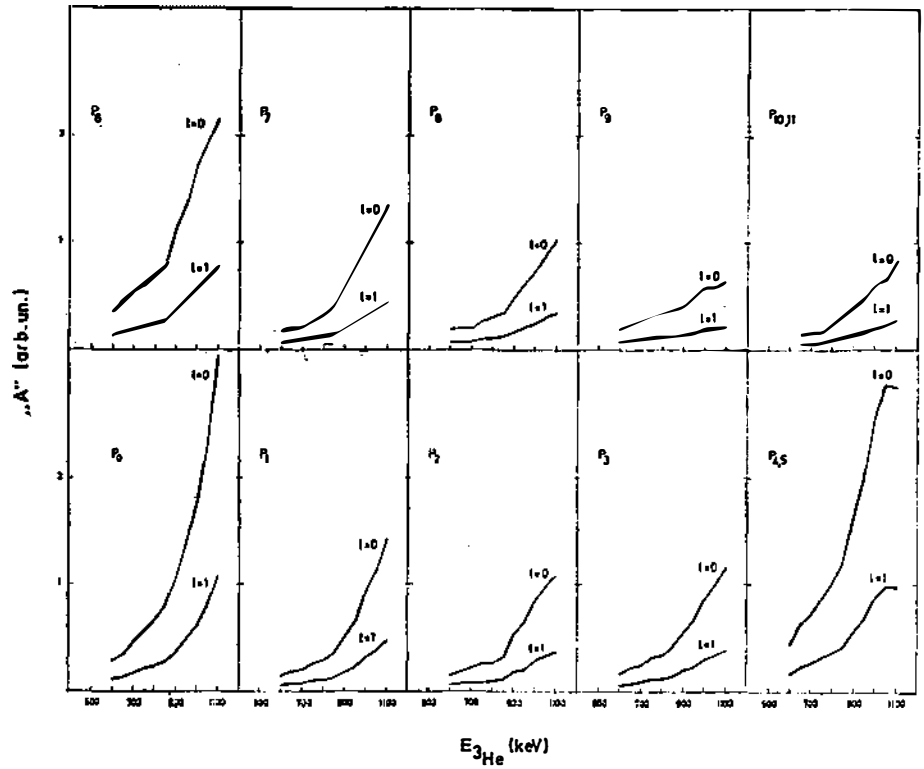

Fig. 1. 110° excitation functions for $^{9}Be(^{3}He, p_{0-11})^{11}B$.

The analyzed ^{3}He beam was obtained from the 1.5 MeV Cockcroft-Walton accelerator of the »Boris Kidrič« Institute. The target was metallic Be evaporated onto a thin Al foil. A Si-detector, 2 mm thick, was used for the detection of protons. Ten peaks in proton spectrum belong to twelve proton groups, two peaks being doublets (p_4, p_5 and p_{10}, p_{11}). The excitations of all ten peaks are given in Fig. 1.

It is typical that all ten excitation functions are free from any resonant behaviour. Since the Coulomb barrier strongly dominates the behaviour of excitation curves at low energy, we have computed the quantity;

$$A = \frac{N_{exp}}{4\frac{k_{out}}{k_{in}} P_{l_{in}} P_{l_{out}}}$$

where N_{exp} is the c. m. yield taken from our excitation curves, k_{in} belongs to ^{3}He and k_{out} to proton groups, while $P_{l_{in}}$ and $P_{l_{out}}$ are Coulomb barrier penetration factors for incoming and outgoing channels. The quantity A, computed for each

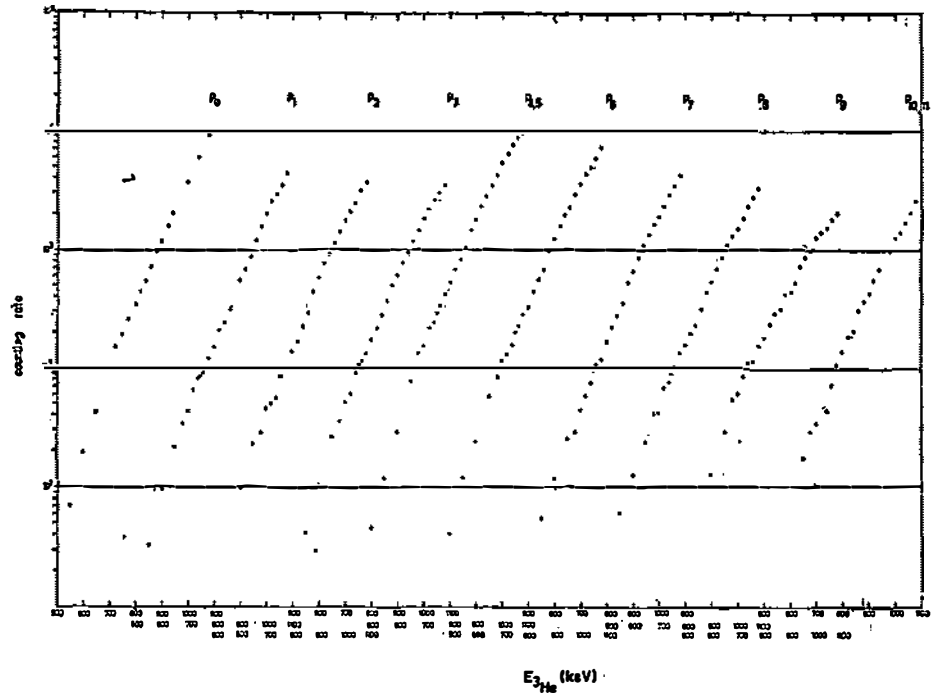

Fig. 2. Quantity A_0 computed for $l = 0$ and $l = 1$.

proton group separately, is given in Fig. 2. This additional analysis did not show any resonant structure too. Therefore, it seems reasonable to conclude that the $^9Be(^3He, p_{0-11})^{11}B$ reaction, even at low energy, proceeds via a direct process.

Reference

1) F. Ajzenberg-Selove and T. Lauritsen, Nucl. Phys. **A114** (1968) 44.

6.4. $^9Be(^3He, n)^{11}C$ reaction between 600 and 1100 keV

K. SUBOTIĆ, R. POPIĆ, D. STANOJEVIĆ, B. STEPANČIĆ and M. ALEKSIĆ, *Institute of nuclear sciences »Boris Kidrič«, Beograd*

The cross-section of $^9Be(^3He, n)^{11}C$ reaction, determined for all neutron groups together by measuring β^+ decay of the residual ^{11}C, rises from 0.1 mb at $E_{^3He} = 600$ keV to 8 mb at $E_{^3He} = 1150$ keV. The data for the individual neutron groups are obtained by measuring the gamma spectra from ^{11}C, which were analysed and resolved in order to correspond to the different gamma transitions in ^{11}C.