



International Atomic Energy Agency

INDC - 258

(INDC(YUG)-1)

**INDC**

**INTERNATIONAL NUCLEAR DATA COMMITTEE**

PROGRESS REPORT FROM YUGOSLAVIA

SUBMITTED TO THE 7TH INDC MEETING, VIENNA 1968,

BY

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Progress report from Yugoslavia

1. Research facilities relevant for neutron data programme:

Cockroft Walton 200 keV accelerators in Belgrade, Ljubljana and Zagreb.

Measurements performed in these centers use fast neutrons, incident energies being around 2.5 and 14 MeV.

Additional research facilities: Reactor (Belgrade) 10 MW, reactor (Ljubljana) 250 kW, cyclotron (Zagreb) 16 MeV deuterons, 2.5 MeV Van de Graaff (Ljubljana), 1.5 MeV Cockroft-Walton (Belgrade).

2. Nuclear data:

a) Elastic scattering differential cross sections for 14.4 MeV neutrons from H, D, T and  $^3\text{He}$ . Except for T absolute accuracy 6%. Relative accuracies 4%.

b) Nonelastic scattering cross sections for 14.4 MeV neutrons from D and T, i.e. D (n,2n) and T (n,2n); partial angular distributions. Nonelastic scattering on  $^3\text{He}$ , i.e.  $^3\text{He}$  (n,d)D;  $^3\text{He}$  (n,p)T;  $^3\text{He}$  (n,2n)pp; and  $^3\text{He}$  (n,d)np.

c) (neutron, charged particle) reactions. Various counter telescopes enabled to detect p, d, t,  $^3\text{He}$ ,  $^4\text{He}$ ,  $^6\text{He}$ ,  $^6\text{Li}$  and  $^7\text{Li}$ , e.g. reactions  $^9\text{Be}$  (n,  $^6\text{He}$ ) and  $^{10}\text{B}$  (n,  $^7\text{Li}$ ) were studied.

d) (n,t) reactions on  $^6\text{Li}$ ,  $^7\text{Li}$ ,  $^{10}\text{B}$ ,  $^{11}\text{B}$ ,  $^{14}\text{N}$  and  $^{19}\text{F}$  leading to low lying levels of the residual nuclei.

e) (n,d) reactions on  $^{11}\text{B}$ ,  $^{35}\text{Cl}$ ,  $^{37}\text{Cl}$ ,  $^{39}\text{K}$ ,  $^{40}\text{Ca}$ , As and  $^{48}\text{Ti}$ .

f) (n, $\alpha$ ) reactions on  $^9\text{Be}$ ,  $^{10}\text{B}$ ,  $^{16}\text{O}$  and  $^{19}\text{F}$ .

g) Activation measurements of (n,2n) reactions on various nuclei up to A = 200. Activation measurements of (n,2n), (n, $\alpha$ ), (n,p) and (n,d) on tin isotopes.

3. Work in progress:

a) Capture cross sections n+p and n+d at 2.5 and 14 MeV.

b) Capture cross sections (n, $\gamma$ ); fast and thermal neutrons.

c) Activation measurements ( $n, 2p$ ); ( $n, 2\alpha$ ) and ( $n, {}^{12}\text{C}$ ).

d) The reactions (neutron, charged particles) were studied only for  $E$  (charged particle)  $\geq 2$  to 5 MeV depending on the type of the particle. The arrangements are built which enable to reduce this limit to about 0.5 MeV.

e) The measurements were characterized with a rather poor angular resolution (typically  $6-10^\circ$ ). The use of position sensitive detectors and the multiparameter analysis should provide the angular resolution almost comparable to charged particle studies.

f) Correlation studies: ( $n, n'\gamma$ ); ( $n, 2n$ ) and ( $n, n$  charged particles).

May 15, 1968.

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