International Atomic Energy Agency

INDC(GRC)-1/G

INDC INTERNATIONAL NUCLEAR DATA COMMITTEE

# PROGRESS REPORT TO INDC

# FROM GREECE

May 1972

Edited by

S. Dritso

N.R.C. 'Democritos'

Athens

IAEA NUCLEAR DATA SECTION, KÄRNTNER RING 11, A-1010 VIENNA

# Progress Report to I.N.D.C.

From Greece

May, 1972

Edited by

S. Dritsa

N.R.C. 'Democritos'

Athens

# 1. NEUTRON CAPTURE GAMMA-RAY SPECTROSCOPY

## 1 1. A 25 keV Neutron Beam Facility

S Dritsa, L Lois *

A high intensity, nearly monoenergetic beam of 25 keV neutrons has been produced from the 5MW 'Democritos' reactor using an iron filter facility. This filter makes use of the sharp dip in the total neutron cross section of iron at 24.5 keV the value of cross section at the minimum being $\leq 0.4$b Due to the existence of this 'window' in the cross section, 25 keV neutrons have an excellent transmission even through a thick slab of iron In order to minimize the higher energy components of the neutron beam, additional filtering materials were used, namely aluminum and sulfur The flux of 25 keV neutrons measured by activation technique was found to be $2 \times 10^5$ n/cm$^2$.sec while the gamma-ray background was sufficiently low $\leq$30 mrem/hr. Measurements of prompt gamma-ray spectra resulting from 25 keV neutron capture have been initiated using a 27 cm$^3$ Ge(Li) detector. The scope of these measurements, is to provide data of interest both for fast reactor shielding desing and for nuclear structure studies. Plans are also made to undertake a series of experiments to measure neutron activation cross sections at 25 keV to provide a cross check on the activation cross sections measured using $^{124}$Sb-Be neutron sources

* National Technical University of Athens.

## 2 NUCLEAR SPECTROSCOPY

### 2 1. Concerning the Decay of the 2.6 hrs $^{65}$Ni

T. Paradellis and A A. Katsanos

Samples of natural nickel were irradiated at the 5 MW 'Democritos' reactor and the decay of $^{65}$Ni was investigated by single and coincidence gamma-ray measurements with Ge(Li) and NaI(Tl) detectors. The results support the existence of the following states in $^{65}$Cu with corresponding spin and parity assignments : 0 ($3/2^+$), 770 7($1/2^-$), 1111.5 ($5/2^-$), 1481.9 ($7/2^-$), 1623.5($5/2^-$) and 1725.0($3/2^-$)keV.

Submitted to the Canadian Journal of Physics

### 2 2. The M1 Transition from the First T= 1 State in $^{10}$B.

G. Andritsopoulos, P.A. Assimakopoulos and C Papadopoulos.

The life time at the first $J^\pi = 0^+$ 1.74 MeV state in $^{10}$B was measured through the Doppler shift attenuation method. The state was populated through the $^{9}$B (p,$\gamma$ ) $^{10}$B reaction at the E = 0.33 MeV wide resonance . The measured life time of $\tau_p = 67 \pm 22$ fs corresponds to a transition rate $B(M1) = 0.45^{+0.22}_{-0.11}$ single particle units, or radiative width $\Gamma_\gamma$ (M1) = $9.8^{+4.8}_{-2.4}$meV This result is about an order of magnitude smaller than the predictions of shell model calculations.

### 2 3 The decay from the reaction $^{23}$Na(p,$\gamma$) $^{24}$Mg at 308 keV

A.A. Katsanos, T. Paradellis and C. Christodoulides.

The decay of $^{24}$Mg has been investigated from the reaction $^{23}$Na(p,$\gamma$) $^{24}$Mg with the 400 keV van der Graaff accelerator using Ge(Li) and gamma-ray pair spectrometer detectors.

From the 40 gamma-ray groups detected fourteen excited levels in $^{24}$Mg have been studied up to 12 MeV of excitation. The experimental work and most of the analysis have been completed and a paper is under preparation.

## 3. NEW FACILITIES

### 3.1. The 5 MW reactor

The 'Democritos' reactor (GRRI) is in operation again after a shut down of twelve months during which major modifications have been made to upgrade its power from 1 to 5 MW. The works done on the cooling system the control and monitoring system were completed by the middle of 1971 and after a period of trial runs and zero power experiments the reactor is in routine operation at the power of 5 MW since October 1971. The maximum thermal flux being $7 \times 10^{13}$ neutrons/cm$^2$ sec

### 3 2. The New High Current Tandem van der Graaff Laboratory.

The new nuclear physics laboratory is expected to be in operation by the end of this year. The accelerator is a T-model Tandem van der Graaff by HVEC. with 5.5 MV maximum terminal voltage capable of producing proton beams up to 100 $\mu$A. Heavy ions will also be accelerated. The installation on site of the factory tested machine has started since April 1972 . The data collection system includes a PDP-15 computer . The experimental programms include nuclear spectroscopy, heavy ion reactions, neutron physics , nuclear methods for analysis and production of short lived isotopes.