

# Experimental Activities in China

(April 2005)

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The following nuclear data measurement laboratories are included in china Nuclear Data Network: China Institute of Atomic Energy (CIAE), Peking University, Sichuan University, Lanzhou University and etc. The summarized activities are covered during the last year.

## 1 Peking University

Differential cross sections and angle integrated cross sections for the  ${}^6\text{Li}(n,t){}^4\text{He}$  reaction at  $E_n=1.54$  and 2.25 MeV were measured by using the gridded ionization chamber method. Mono-energetic neutrons were produced through the  $\text{T}(p,n){}^3\text{He}$  reaction. The experiment was performed at the 4.5MV Van de Graaff of Peking University. Neutron flux was determined by the  ${}^{238}\text{U}(n,f)$  reaction. Present results were compared with the existing data.

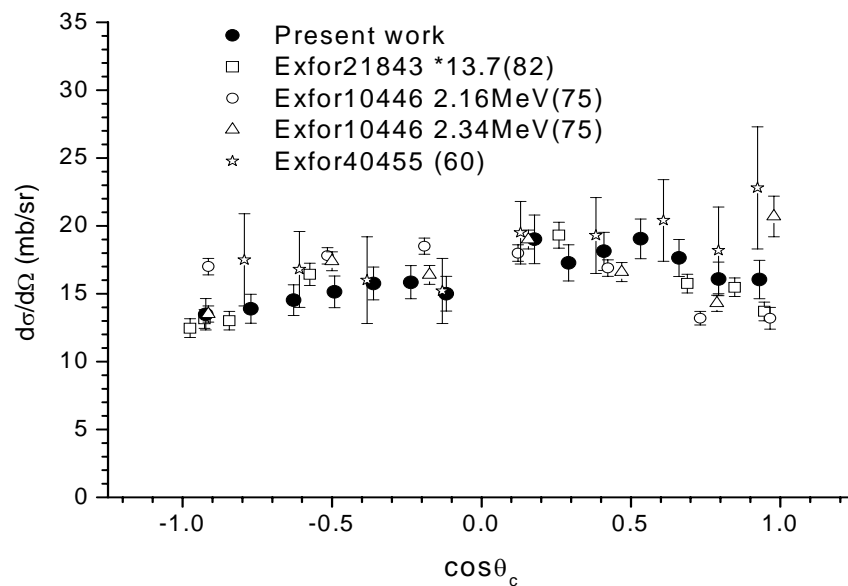


Fig. 1 Differential cross section for the  ${}^6\text{Li}(n,t){}^4\text{He}$  Reaction at  $E_n=1.54$  MeV

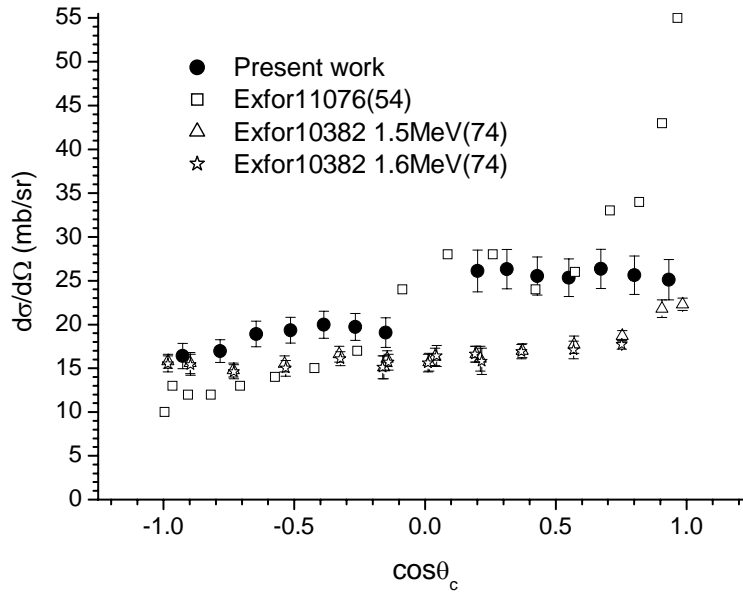


Fig. 2 Differential cross section for the  ${}^6\text{Li}(n,t){}^4\text{He}$  Reaction at  $E_n=2.25$  MeV

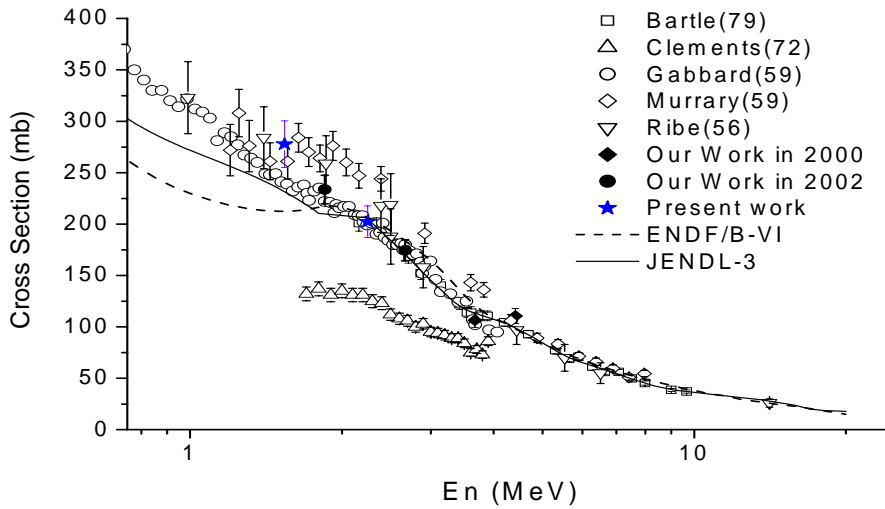
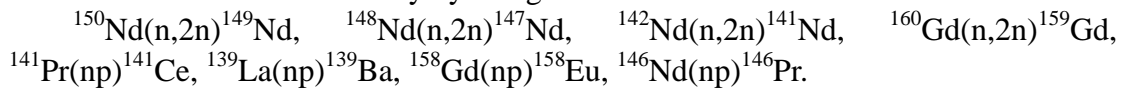


Fig. 3 The result of  ${}^6\text{Li}(n,t){}^4\text{He}$  cross section compared with existing data

## 2 Lanzhou University:

The following cross sections was measured at neutron energy from 13.5 to 14.6MeV at Lanzhou University by using the activation method :



## 3 Sichuan University:

There are no new measurement at Sichuan University in the last year . The cross sections for the  ${}^{115}\text{In}(n,\gamma){}^{116}\text{In}$ ,  ${}^{116\text{m}}\text{In}(n,\gamma){}^{117}\text{In}$  and  ${}^{71}\text{Ga}(n,\gamma){}^{72}\text{Ga}$  reaction were

measured in neutron energy range from 30 to 1500 keV in the past years.

## 4 China Institute of Atomic Energy

### Measurement of the thermal neutron cross sections of the reaction of $^{126}\text{Sn}(n,\gamma)^{127g}\text{Sn}$ , $^{127m}\text{Sn}$ .

A carrier-free radiochemical separation procedure of  $^{126}\text{Sn}$  from high level liquid waste (HLLW) is based on the separation using the strong alkali anion exchanger resin and the precipitation of PbS.  $^{126}\text{Sn}$  targets with the monitors of thermal neutron flux of  $^{197}\text{Au}$  and  $^{55}\text{Mn}$  were irradiated in 101 reactor in CIAE.  $^{126}\text{Sn}$ ,  $^{127}\text{Sn}^g$ ,  $^{127}\text{Sb}$ ,  $^{198}\text{Au}$  and  $^{56}\text{Mn}$  are detected by HPGe  $\gamma$  detector. The thermal neutron cross sections of the reaction of  $^{126}\text{Sn}(n,\gamma)^{127m}\text{Sn}$  and  $^{126}\text{Sn}(n,\gamma)^{127g}\text{Sn}$  are experimentally obtained and are given as followings:

$$\begin{aligned} ^{126}\text{Sn}(n,\gamma)^{127g}\text{Sn}: \sigma_g &= 0.200 \pm 0.039 \text{ b} \\ ^{126}\text{Sn}(n,\gamma)^{127m}\text{Sn}: \sigma_m &= 0.387 \pm 0.101 \text{ b} \end{aligned}$$

The total reaction cross section of the reaction  $^{126}\text{Sn}(n,\gamma)^{127}\text{Sn}$  is  $0.587 \pm 0.140 \text{ b}$ .

### Measurement of the cross section of $\text{D}(d,\gamma)^4\text{He}$ reaction at 300KeV

The study of  $\text{D}(d,\gamma)^4\text{He}$  radiative capture reactions at low energies is very important in the two areas of fusion energy and astrophysics. For the very small yields of high energy  $\gamma$ -rays and the serious background of neutrons and cosmic rays, a big NaI-Plastic anti-Compton spectrometer has been employed and the method of the time of flight (TOF) has been used.

Thick and thin  $\text{D}_2$  targets were measured, the branching ratios of  $\text{D}(d,\gamma)^4\text{He}$  and  $\text{D}(d,p)\text{T}$  are  $F_\gamma/F_P = (1.064 \pm 0.266) \times 10^{-7}$  and  $F_\gamma/F_P = (1.104 \pm 0.276) \times 10^{-7}$  for thick and thin targets, respectively. The cross sections are 2.47 nb for the thick target and 4.36 nb for thin the target.

### The Secondary Neutron Double-differential Cross Sections Measurement.

The neutron emission double-differential cross sections (DDXs) for V and Be at 10.26 MeV neutrons, for Be,  $^{6,7}\text{Li}$  at 8.17 MeV neutrons, were measured using normal and abnormal fast neutron time-of-flight (TOF) spectrometers on HI-13 Tandem Accelerator in China Institute of Atomic Energy (CIAE).

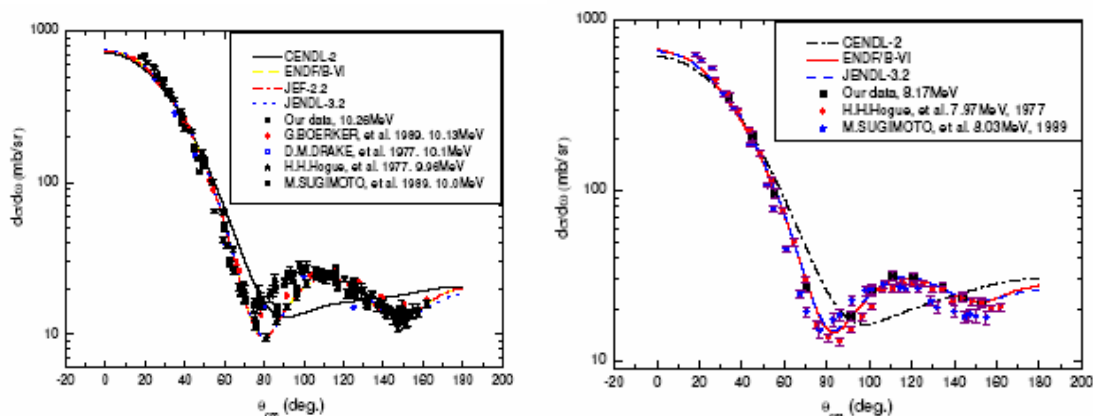


Fig. 4 Comparison of elastic differential cross sections for Be at 10.26 MeV and 8.17 MeV with evaluations and other measurements

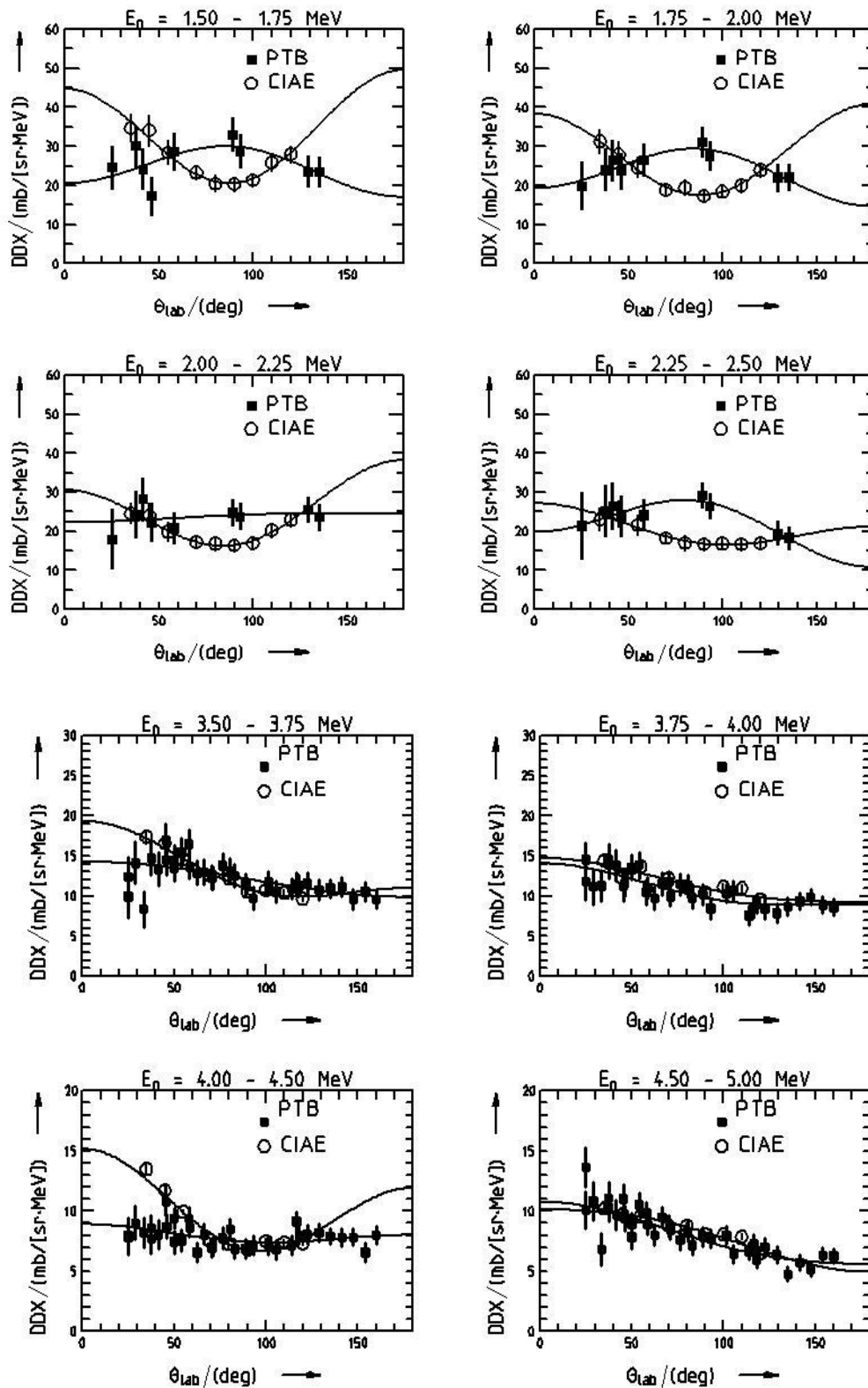


Fig.5 Comparison of DDX for Vanadium at 10.26 MeV Neutrons measured in CIAE and PTB