



*China Institute of Atomic Energy*

# Present Status of CENDL Project

**Yu Hongwei**

**China Nuclear Data Center**

**China Institute of Atomic Energy**



# Chinese Nuclear Data Committee

The management of CENDL project.

- Evaluation Working Party.
- Measurements Working Party.
- Benchmark Working Party.
- The progress and achievements in China nuclear data field are carried in the issue of “Communication of Nuclear Data Progress (CNDP)”



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# China Nuclear Data Network

China Nuclear Data network

China institute  
of Atomic Energy

Peking  
University

Schuan  
University

NanKai  
University

Jilin  
University

Et al



# **CENDL : China Nuclear Data Center and Chinese Nuclear Data Network**

- **CENDL-3.0 was accomplished during 1996~2001, it includes 209 nuclides for general purpose**



# CENDL 3.0

<b>Total</b>	<b>209</b>
Fissile Nuclides	15
Structure material	42
Fission products	109
Light Nuclides	3
CENDL 2.1	60



## CENDL 3.0

Experimental data evaluated: analyzed in physics, corrected for the standard used, adjusted for the error .

Calculation: UNF code system



## CENDL 3.0

The ENDF-6 format is adopted, the files 1,2,3,4,6,12-15 are included for major fissile nuclide, structure material and light nuclide, files 1,2,3,4,5 are given for minor fissile and fission production nuclides.



## CENDL 3.0

Structure material: given for both natural element and their isotopes. Data were adjusted to make them consistent between natural element and their isotopes.

**Light Nuclides : the double differential cross section was calculated (File 6),**



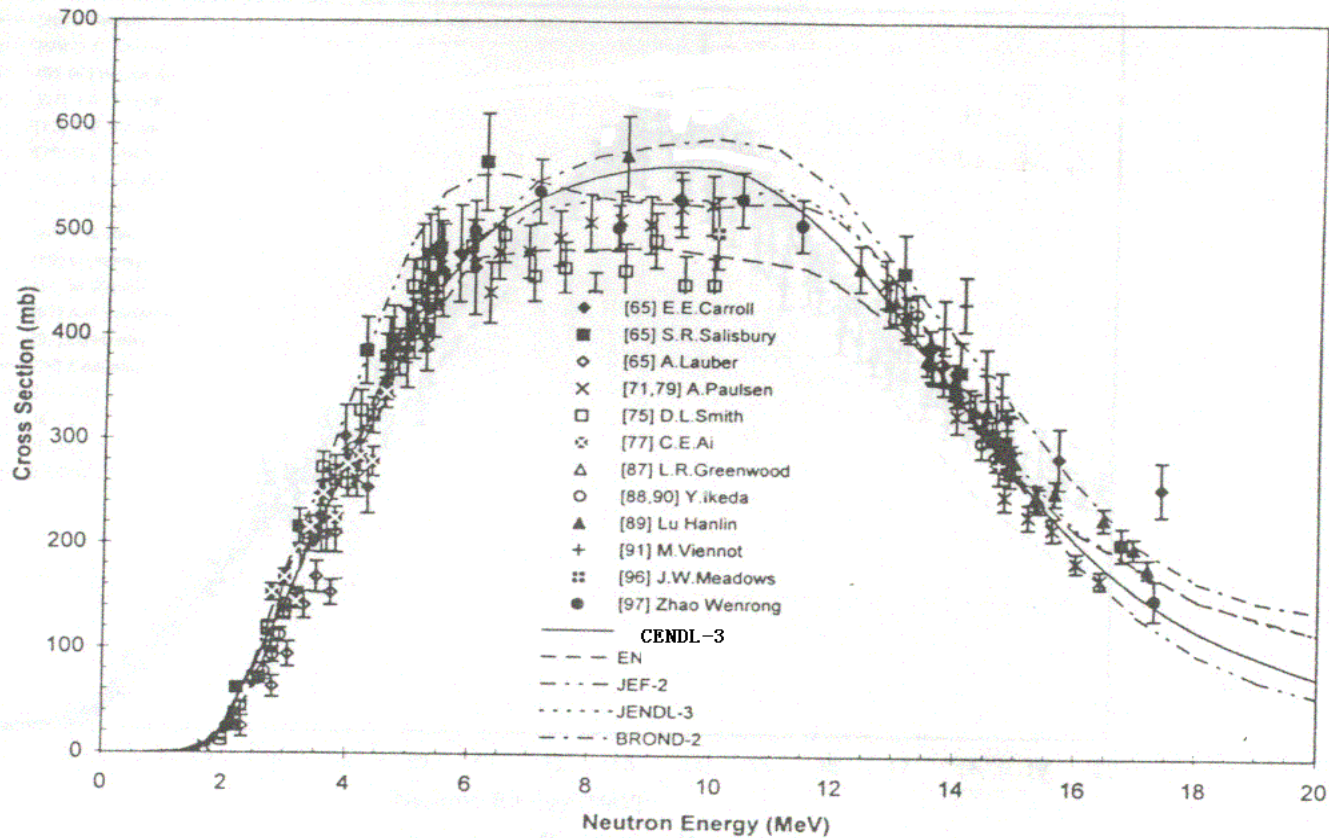


Fig. 7 Cross Section for  $^{54}\text{Fe}(n,p)^{54}\text{Mn}$  Reaction

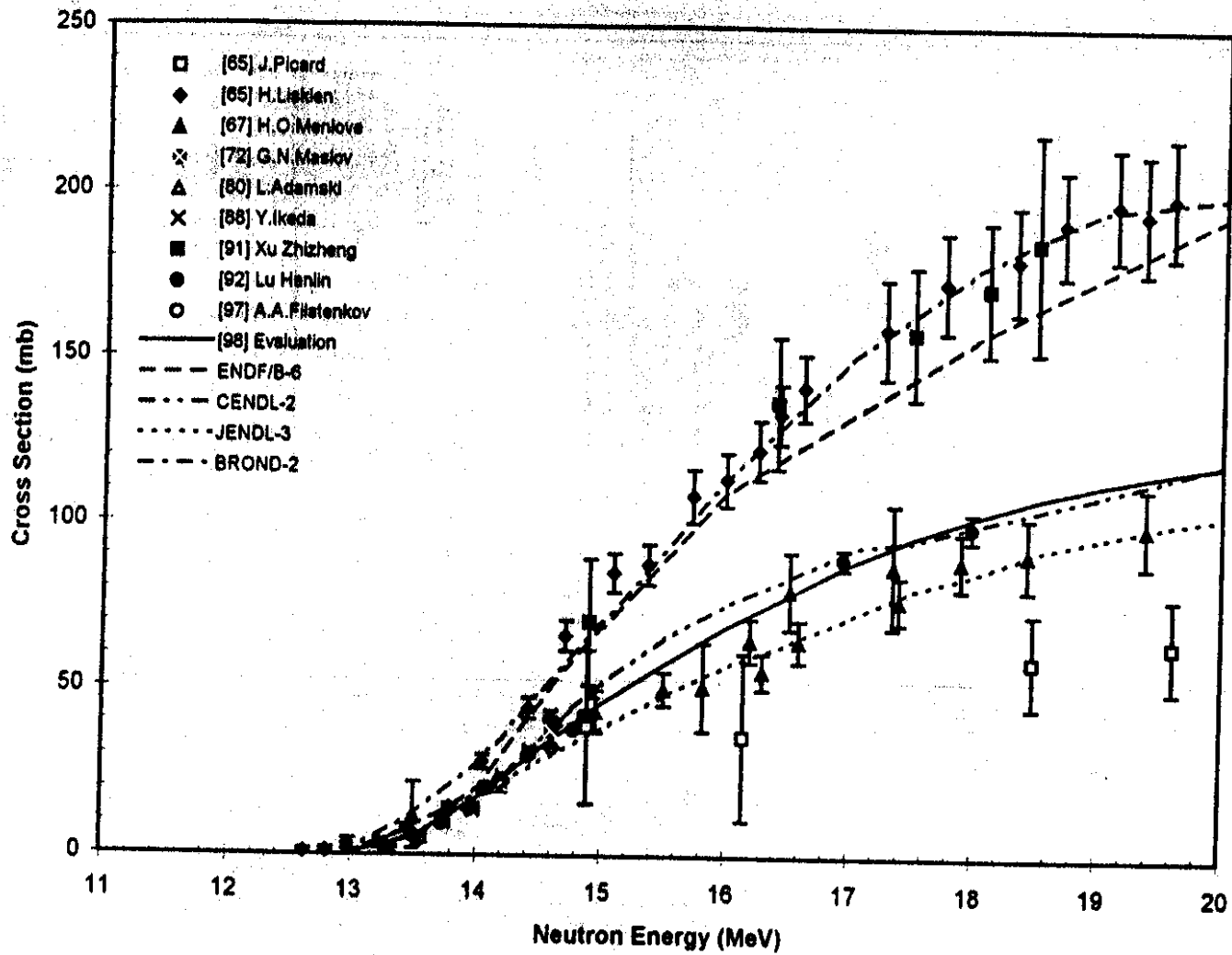


Fig.1 Cross Section for  $^{23}\text{Na}(n,2n)^{22}\text{Na}$  Reaction

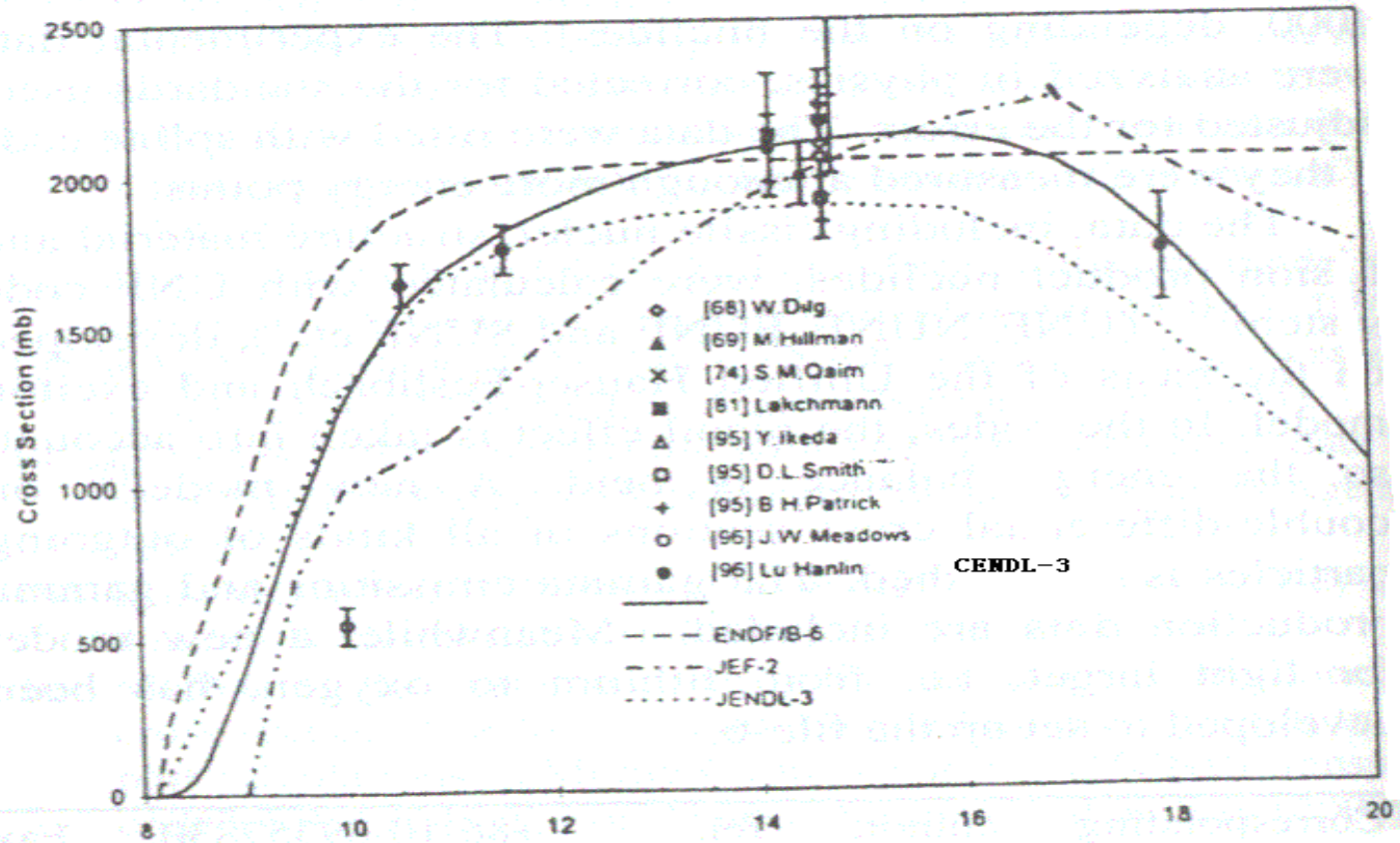


Fig.4 The evaluated cross section of  $^{176}\text{Hf}(n,2n)$  reaction based on new measured data at CIAE

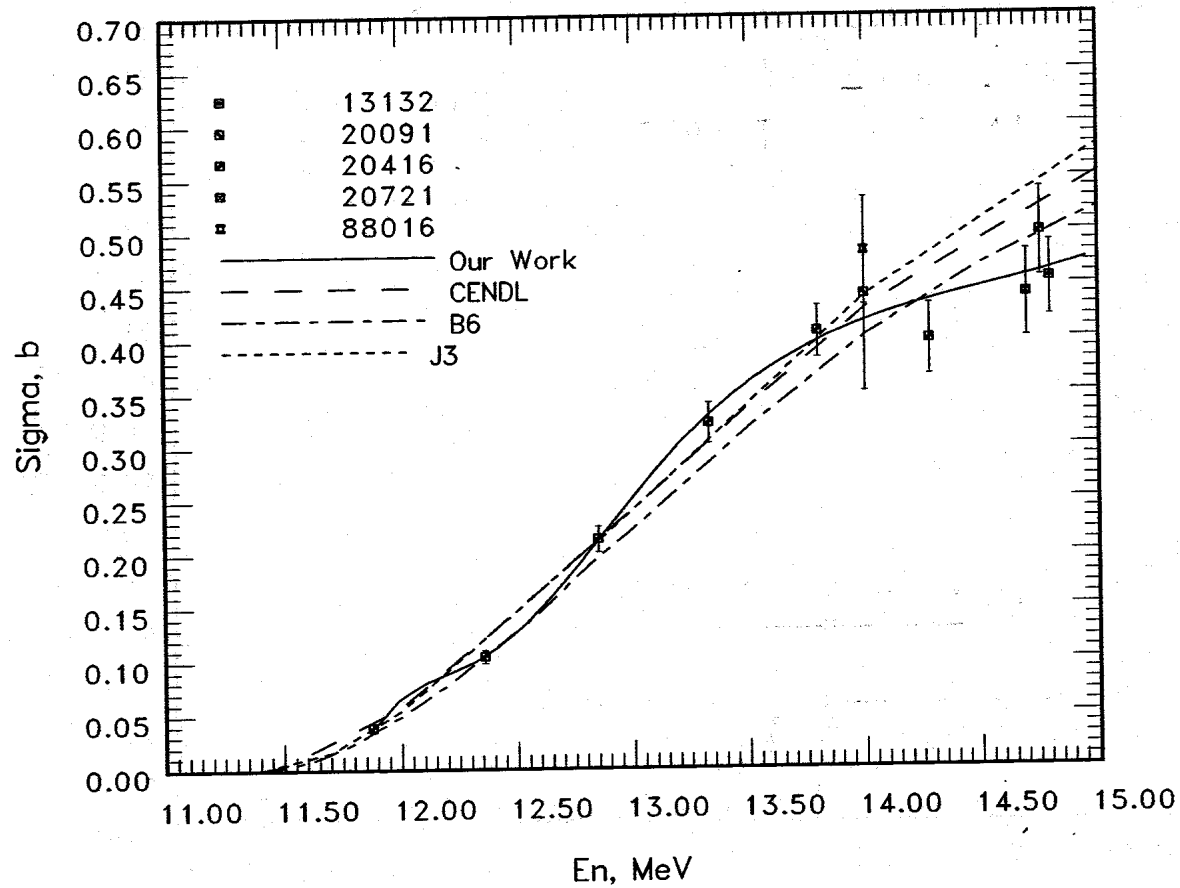


Fig1.  $^{26}\text{Fe-56}(\text{N}, 2\text{N})$  Cross Section

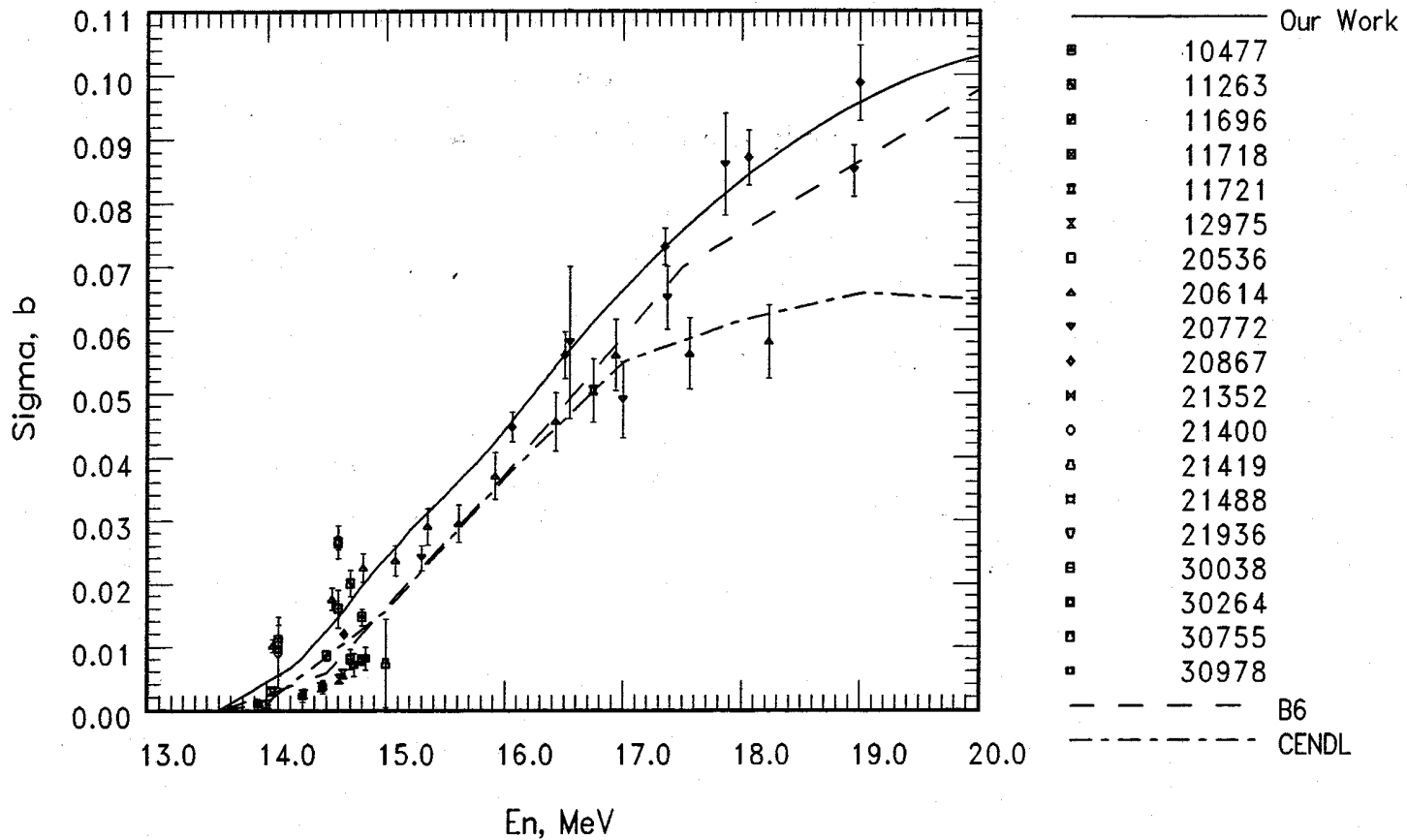
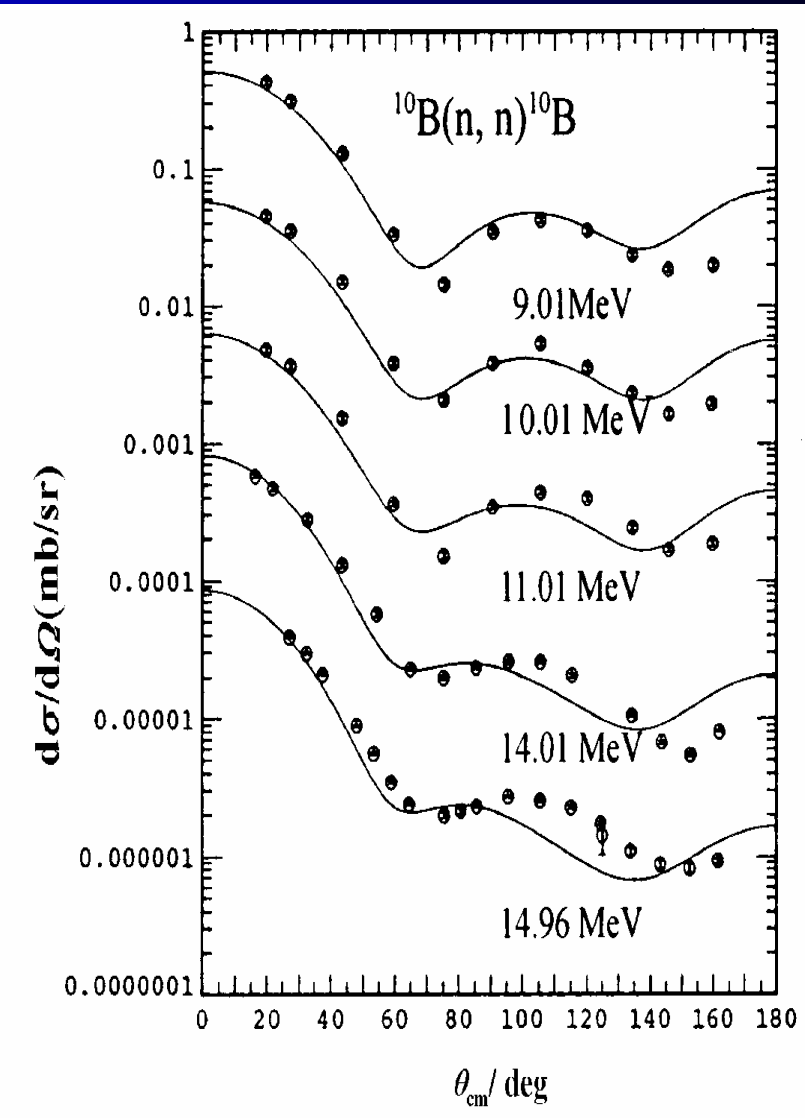
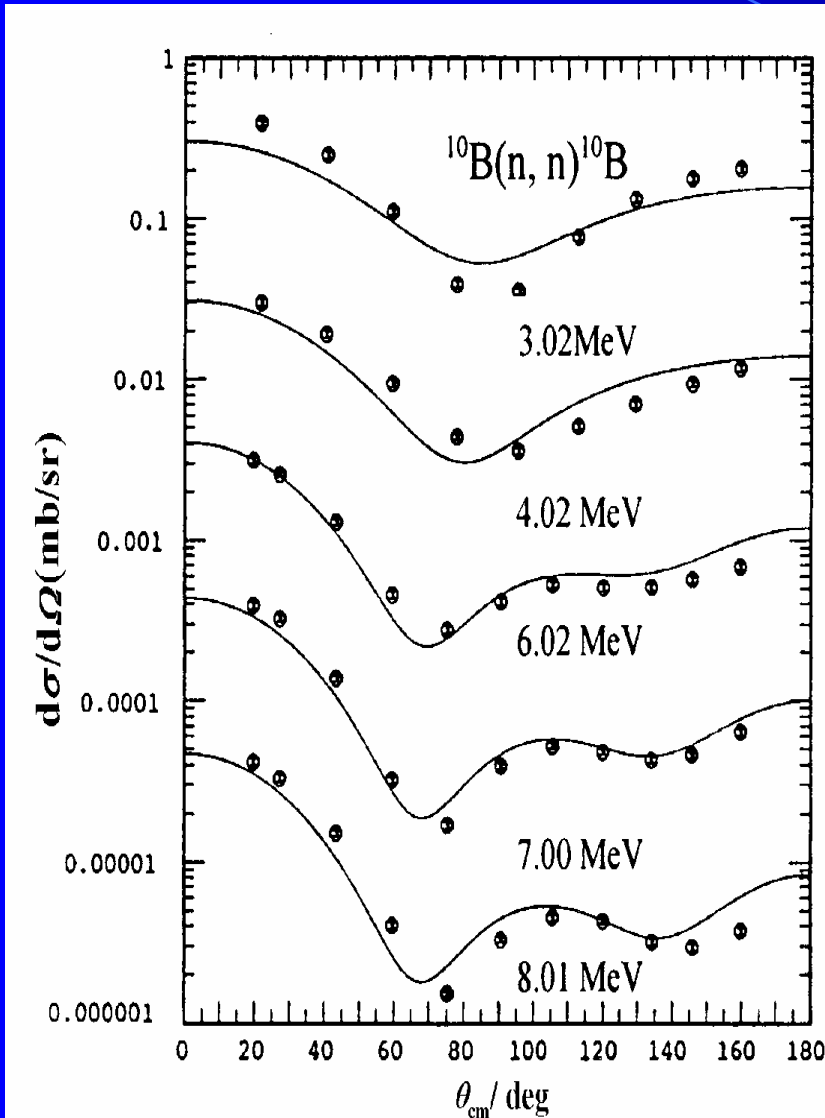


Fig1.  $^{26}\text{Fe-54}(n, 2n)$  Cross Section





# Benchmark

CENDL-3 have been tested to benchmark assemblies

Using both neutron transport theory and Monte-Carlo method, improved for the problems found in the test.



## Benchmark

The calculated results based on CENDL-3 data are in good agreement with the experimental data and shown that the data for fissile and structure material nuclides, especially for  $^{238}\text{U}$ , were improved comparing to CENDL-2.1.





## New five years plan

From 2001, we began a new five years plan of CENDL,

- **Evaluation**
- **Validation**
- **Measurement**



## The new five years plan

	<b>Planned</b>	<b>Evaluated</b>
<b>Total</b>	<b>281</b>	<b>111</b>
Fissile Nuclides	44	20
Structure material	56	26
Fission products	163	61
Light Nuclides	13	4

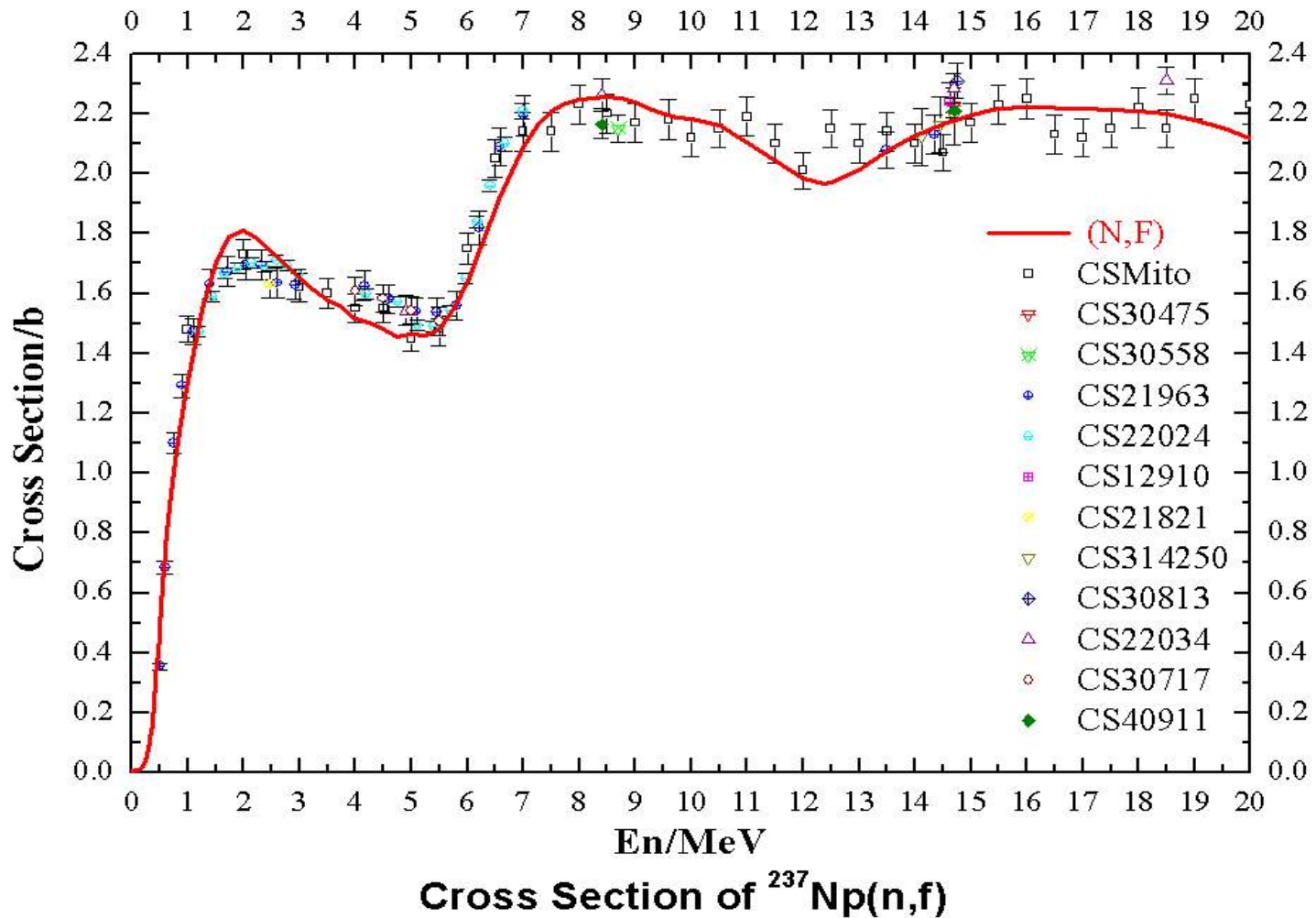


**More files will be included in the general purpose data file and the new methods of evaluation will be developed:**

- **Covariance data files**
- **The resonance parameters will be investigated and evaluated.**
- **The methods of Unstable nuclear evaluation**
- **Improvement of the Light Nuclides calculation .**



- **More fission product nuclides will also be increased.**
- **The data for important nuclides will be improved further.**



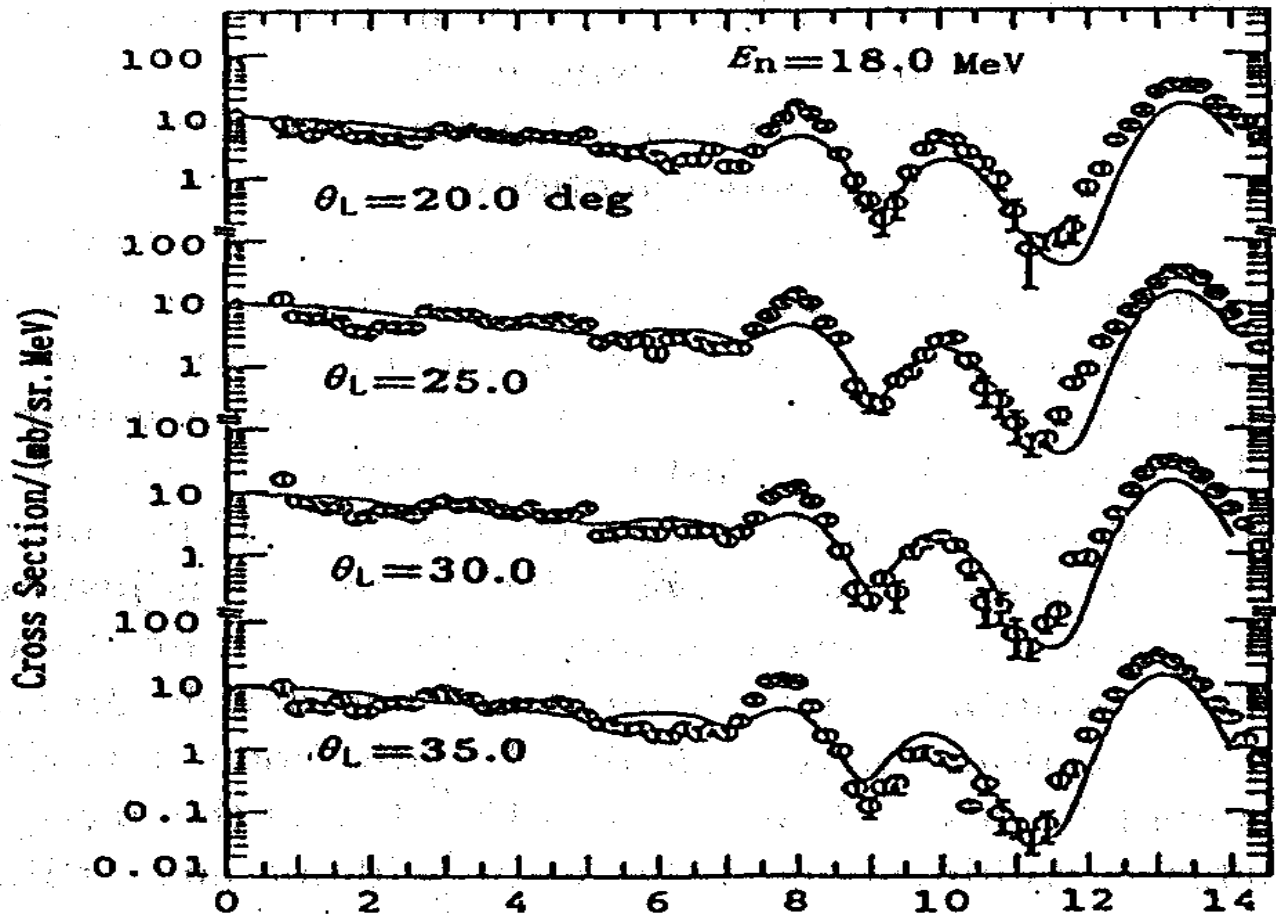


Fig.2 Comparison of calculated outgoing neutron double differential cross section of  $n+^{12}\text{C}$  with experimental data



## Nuclear physics basic database

The project is supported by China Ministry of science and technology, and it will contain the following data base:

- Nuclear structure and Nuclear Decay database
- Nuclear Model Parameters and computing programs library
- Special Purpose database
- Exfor Database
- Evaluation Nuclear data library



# Special purpose data

## Fission yield

- The fission yield data and decay data are continuously evaluated
- 79 product nuclides for  $^{235}\text{U}$
- 68 product nuclides for  $^{238}\text{U}$

## Prompt $\gamma$ -ray

Evaluate for Nuclides  $A=1-35$  and revised for 20 nuclides of  $A>190$





## **Nuclear data for ADS**

- This work is a part of the project of ADS system of China, and is supported by China Ministry of science and technology .The project include the following parts :
- Intermediate energy files
- Study of Spallation target
- Multi-group cross section generated



## Intermediate energy file

- Neutron induced and proton-induced reaction data
- Energy: 250MeV
- Nuclides:20 nuclides.
- A new program MEND for calculating the nuclear data in medium energy region has been developed.



# The meeting and symposium

- The symposium on Nuclear Data library, 13-17 Jan. 2003, Nanjing
- The symposium on Nuclear Data Future need, 13-15 Oct. 2003, Yichang
- The meeting of Benchmark Testing Working Party, 16-18 Oct. 2003, Yichang
- The meeting of Benchmark Testing Working Party, 7-9 Feb. 2004, Haerbin



# International cooperation

- Fission products
- Fission spectrum
- Covariance data
- Intermediate energy files



# Summary

- More nuclides and More files will be included in the general purpose data file
- National projects
- Need more international cooperation