



China Institute of Atomic Energy

Present Status of CENDL Project

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Chinese Nuclear Data Committee

The management of CENDL project.

- Chair: Zhao Zhixiang
- Evaluation Working Party.
- Measurements Working Party.
- Benchmark Working Party.
- The committee meetings are generally held once per year



China Nuclear Data Network

China Nuclear Data network

China institute
of Atomic Energy

Peking
University

Schuan
University

NanKai
University

Jilin
University

Et al



CENDL-3.0

- **CENDL : CNDC and Chinese Nuclear Data Network**
- **CENDL-3.0 was accomplished during 1996~2001, it includes 209 nuclides for general purpose**
- **The FP of CENDL-3 has been officially released on October 6, 2001. It includes 2 evaluations from CENDL-2.1 ($^{107, 109}\text{Ag}$) and 101 new evaluations for 100 isotopes.**
- **The other file of CENDL-3.0 have been tested and improved for the problems found in the test within china .**



CENDL 3.1

- The CENDL meeting was held on 17-18 March 2005
- The next released version of CENDL library: CENDL 3.1
- Contains: the update of CENDL-3.0 .
- Release : is foreseen in the end of 2005.



New evaluations

- Nuclear data evaluations for Neutron:

^3He , ^9Be , ^{12}C , ^{31}P , ^{51}V , nat,106,108,110,111,112Cd, ^{55}Mn ,
127,129,132,132m,133,133m,134,134m,135,136,136m,137,138,139,140I,
84,86,88,90,92,94,96Rb, 87,88,90,91,92,93,94,95,96,97,98,99,100Y,
92,94,96,98,100,102,104,106Mo,
233,234,235,236,237,241,242,243,244U, 244,245,246Pu,
240,241,242,243,244,245,246Am, $^{236,237,238,239}\text{Np}$ and
 $^{232,233,234}\text{Th}$.

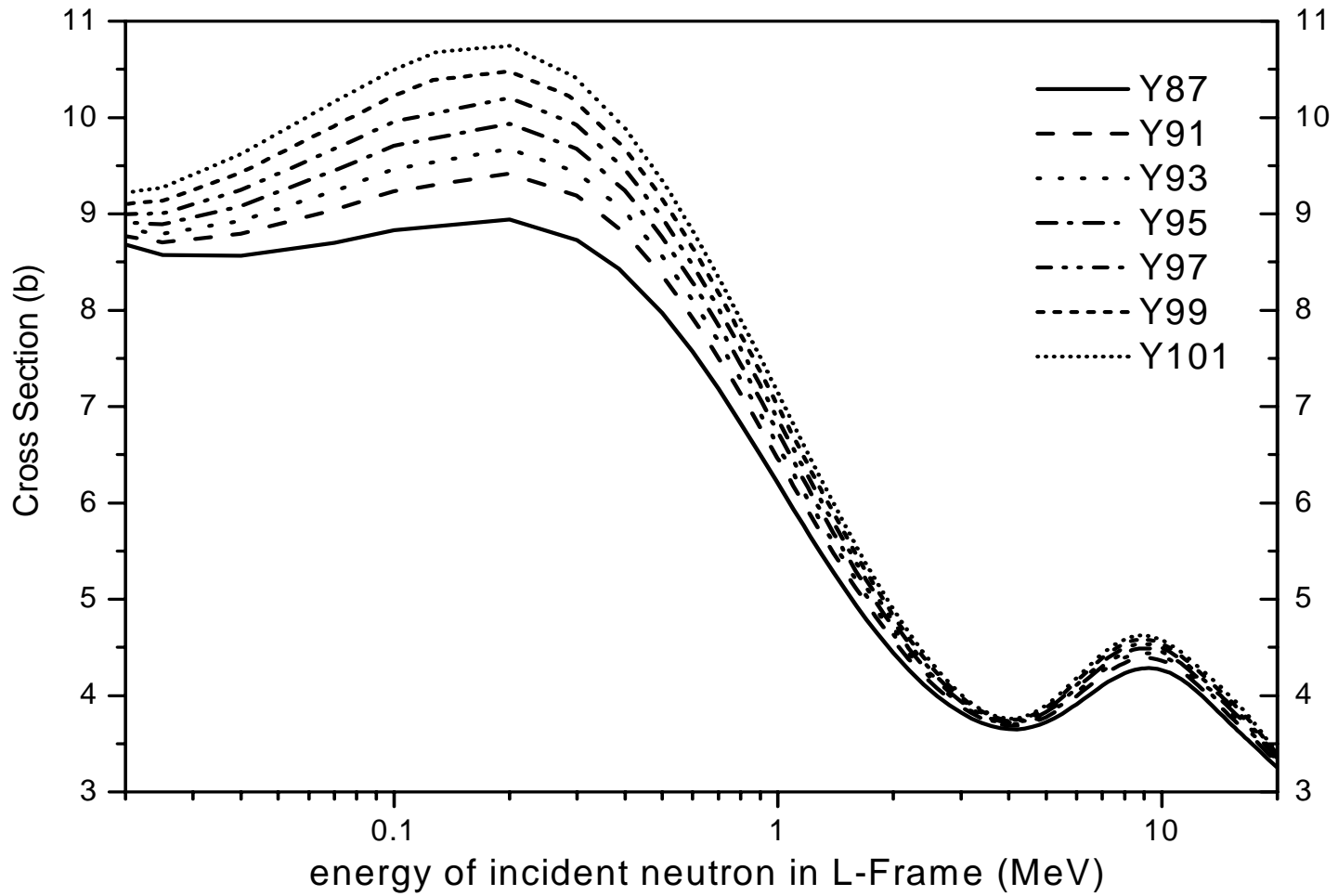


Codes

- The UNF code for nuclear data model calculations with the unified Hauser-Feshbach and exciton model are implemented in the CENDL nuclear data evaluations.
- The APMN code was used for automatically searching a set of optimal optical potential parameter.
- A method to set up file-6 of light nuclei for evaluated neutron data in ENDF/B-6 format below 20 MeV has been established and the energy balance was strictly considered.



Fig.1 total cross sections



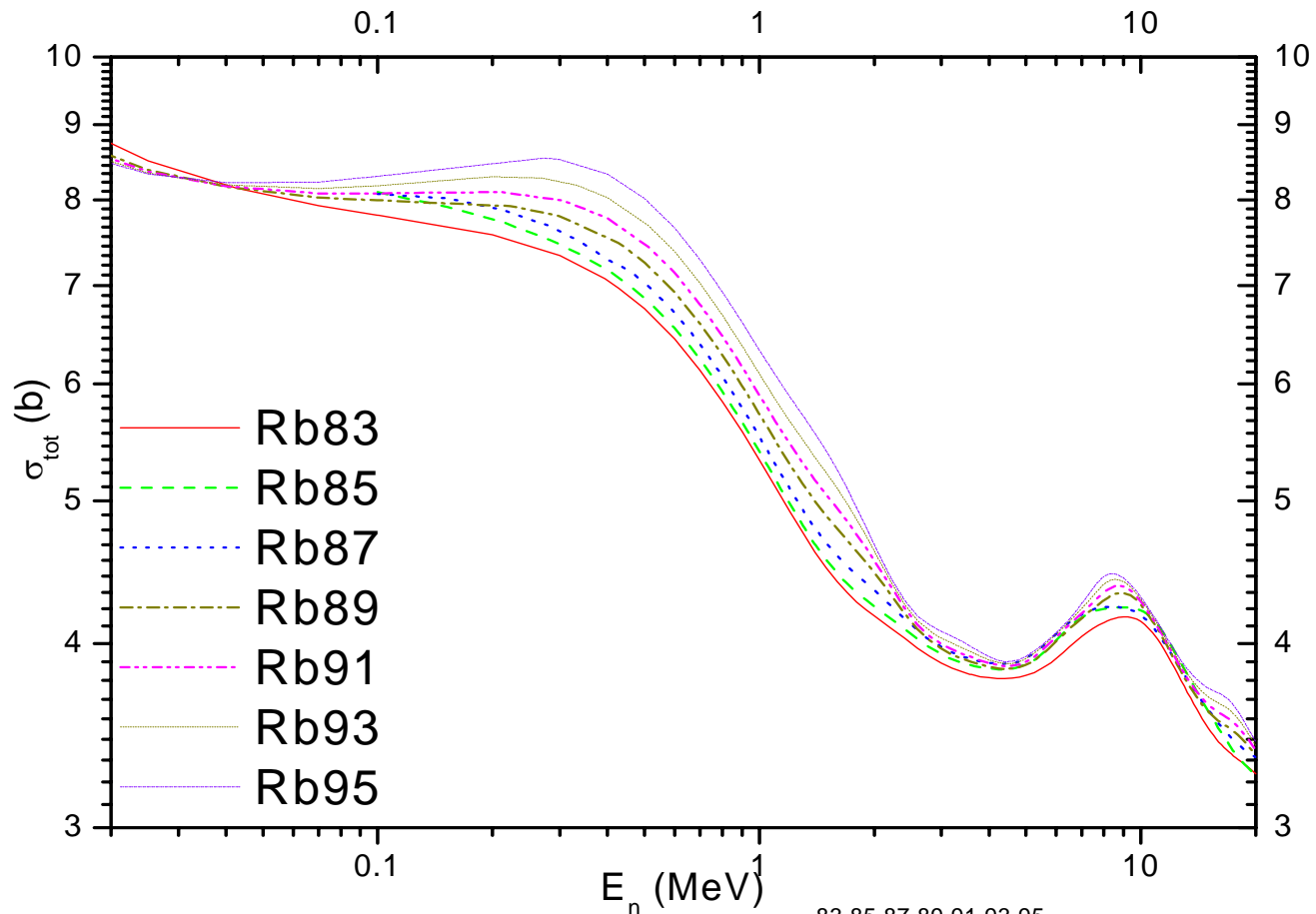
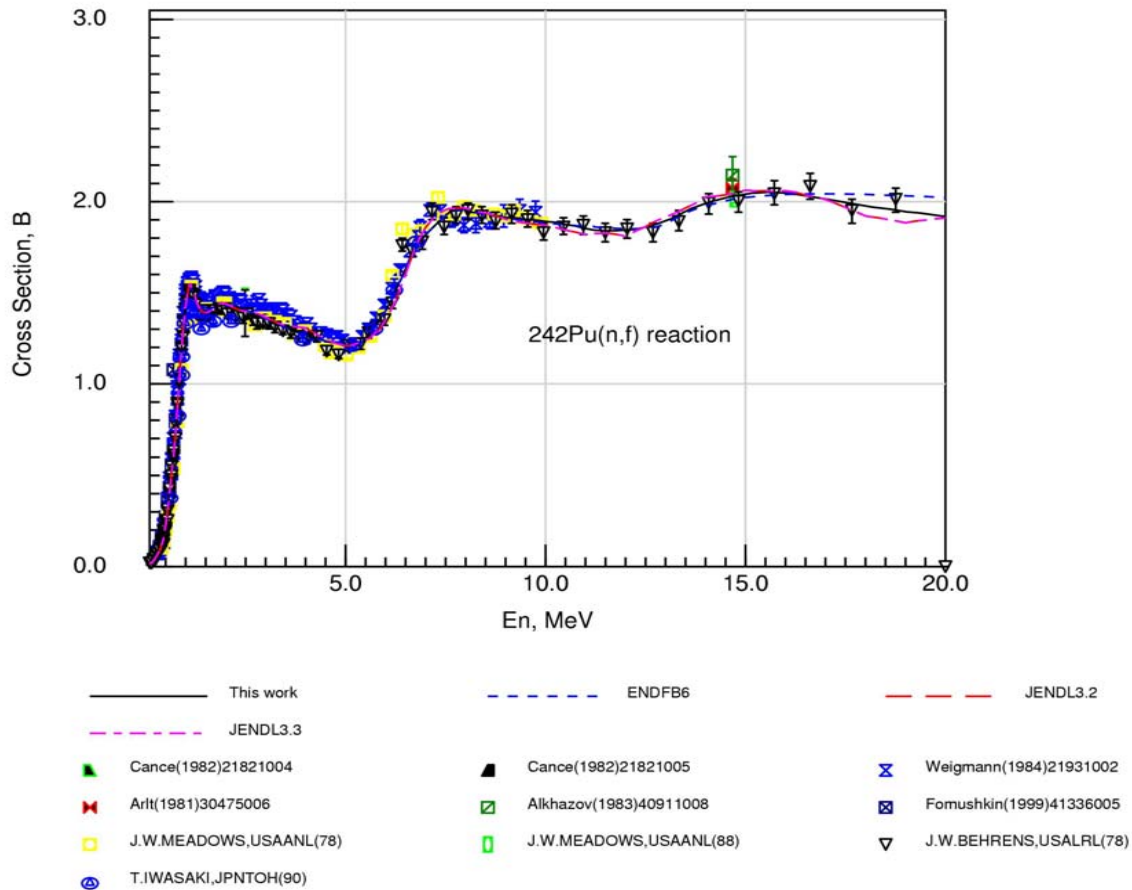
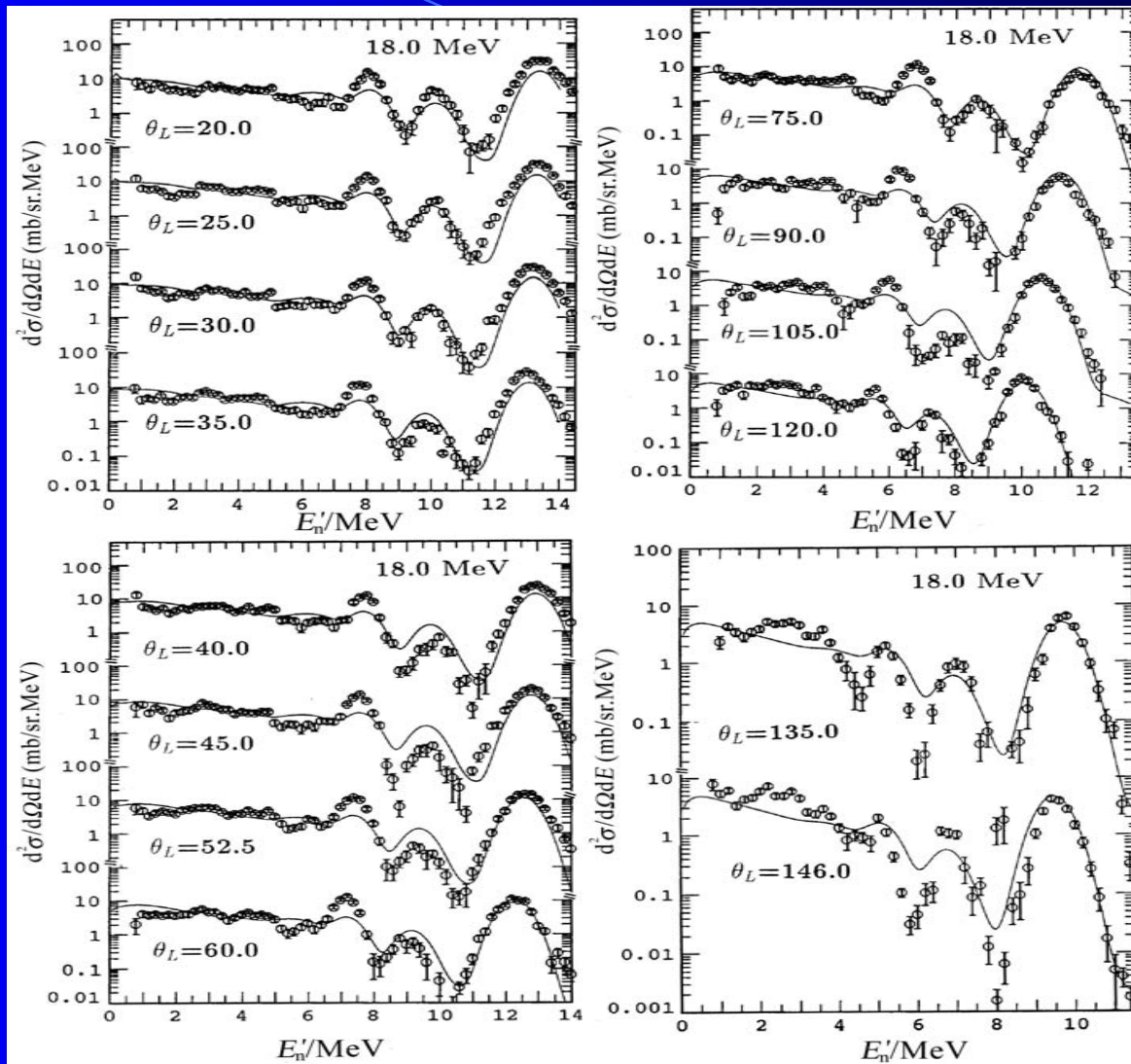


Fig.1 total cross sections of ^{83,85,87,89,91,93,95}Rb



Fission cross section of ^{242}U



DDX of ^{12}C at $E_n=18.0\text{MeV}$



Covariance

- A code for evaluating the covariance matrix of experimental data was developed. The covariance data are output in ENDF/B-6 format. The code together with the spline fitting code for multi-sets of correlative data was used to practically evaluate the covariance data for $^{58,60,61,62,64,\text{nat}}\text{Ni}$, $^{63,65,\text{nat}}\text{Cu}$ and ^{27}Al , the reasonable results have been got.
- A program RAC for calculating covariance data of light nuclide was developed, based on the R matrix theory. The program has been tentatively used to calculate the covariance data for ^6Li and ^{10}B , the reasonable results have been got for the cross sections up to 5 MeV.



Validation and benchmarking

- Some nuclei from CENDL-3.0 were tested against the benchmark assemblies. The continuous energy Monte Carlo code MCNP was used to do the benchmark testing calculations. The K_{eff} values, the leakage spectrum and central reaction rate ratios were calculated. The tested nuclei of CENDL-3.0 include Uranium isotope, Plutonium isotope, ^{232}Th , ^{237}Np , partial minor actinide, Pb, Zr, Al, Cu, Fe, Be, C, H, D, O and fission product nuclei etc.
- improved for the problems found in the test.



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



Fission yield

- The systematic dependence of chain yield on incident neutron energy for each mass number A was studied. And also the systematics of mass distribution on mass A and incident neutron energy was investigated by using 5 (or 3) Gaussian model.
- The dependences of fission yield on incident neutron energy were studied. The covariance data were evaluated for each set of experimental data and the correlation among the data due to the error of fission rate (or normalization), detector efficiency, decay data etc. was taken into account in the fitting and the covariance matrix was obtained for the fit.



Structure and decay data

CNDC have taken permanent responsibility for evaluating and updating NSDD for $A=51$, and $195-198$. The mass chain $A=197$ have been revised using available experimental decay and reaction data, and $A=196$ is being updated. Updated evaluation of $A=197$ has been sent to NNDC, USA. The evaluations of mass chain $A=52-56$ were being updated at Jilin University. Decay data of ^{232}Th , $^{231,233}\text{Pa}$, $^{232,233,234,236}\text{U}$ have been intercompared and checked. The decay data of ^{233}U and ^7Be were being evaluated on the basis of the new measured data.



Nuclear data for ADS

- A new program MEND for calculating the nuclear data in medium energy region has been developed.
- Calculated and evaluated

Nuclear data for incident neutron from 20 to 250MeV:
50,52,53,54Cr, 54,56,57,58Fe, 90,91,92,94,96Zr, 180,182,183,184,186W,
204,206,207,208Pb, 238U.

Nuclear data for incident proton from threshold energy to
250MeV: 54,56,57,58Fe, 180,182,183,184,186W, 204,206,207,208Pb, 209Bi,
238U.



Nuclear Data Service

- A Powerful software TT was developed for nuclear data retrieve and evaluation under Windows and Linux platforms.
- IAEA NDS Mirror site will constructed in CNDC



The meeting and symposium

- The symposium on special purpose database
Jun. 2004, Beidaihe
- Chinese Nuclear Data Committee meeting
Oct. 2004, Beijing
- The symposium on Nuclear Data Future
need, Jan. 2005, Nanjing
- The symposium on Nuclear Data library,
Mar. 2005, Beijing



Summary

- The release of CENDL is foreseen in the end of 2005
- More new evaluations
- five years plan of CENDL will finish:
2001-2005
New five years plan will begin:2006-2010