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National Nuclear Data Center and Nuclear Energy

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National Nuclear Data Center

Probably the oldest active organization at BNL

History

- Founded in 1952 as Sigma Center, neutron cross sections
- Changed to National Nuclear Data Center in 1977
- 40 staff members in good old times
- 12 staff members + 2 postdocs today

Mission

Compile, evaluate and disseminate nuclear physics data for basic nuclear physics research and applied technologies

Funding, close to \$4M

- DOE-Office of Science, ~85%
- DOE-NNSA ('Defense') and DOE-Nuclear Energy

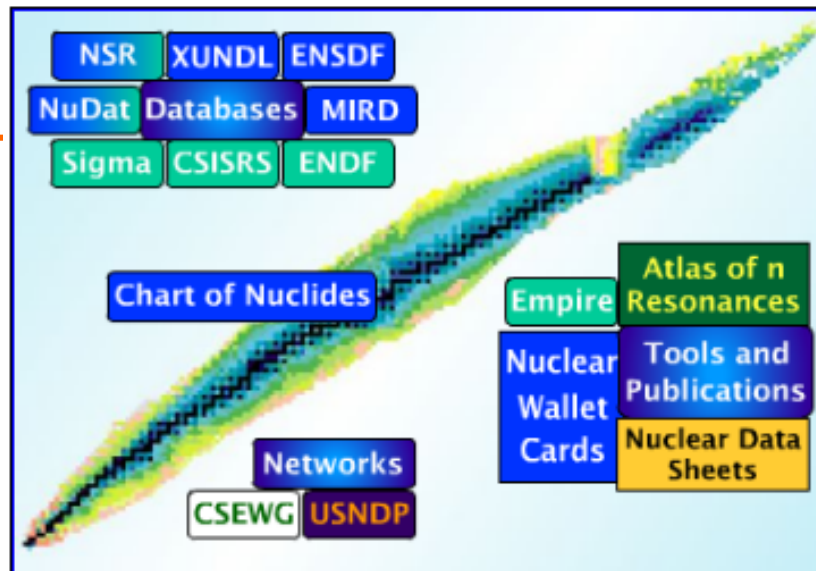
Stories to tell

How BNL high flux research reactor was shut down

Why electricity cost on Long Island is the highest in the United States

How can one learn about US nuclear 'secrets'

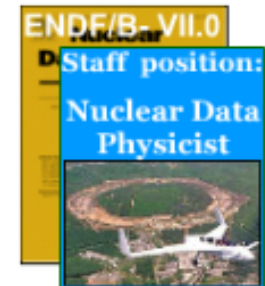
How the Russian submarine fleet in Murmansk with Pb-Bi cooled reactors got rescued



National Nuclear Data Center

BROOKHAVEN
NATIONAL LABORATORY

Nuclear Structure and Decay
Nuclear Structure and Decay Tools
Nuclear Reaction Databases
Nuclear Reaction
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Low-Fidelity Covariances New ENDF Checking Codes

Site Index - Search the NNDC:

AMDC Atomic Mass Data Center, *Q-value Calculator*

CINDA Computer Index of Nuclear (reaction) Data

ENDF Evaluated Nuclear (reaction) Data File, *Sigma*

NMMSS & DoE NMIRDC Safeguards & inventory decay data standards

NucRates MACS & Astro-physical reaction rates

Atlas of Neutron Resonances Parameters & thermal values

CSEWG Cross Section Evaluation Working Group

ENSDF Evaluated Nuclear Structure Data File

NSR Nuclear Science References

NuDat Nuclear structure & decay Data

CapGam Thermal Neutron Capture γ -rays

CSISRS alias EXFOR Nuclear reaction experimental data

IRDF International Reactor Dosimetry File

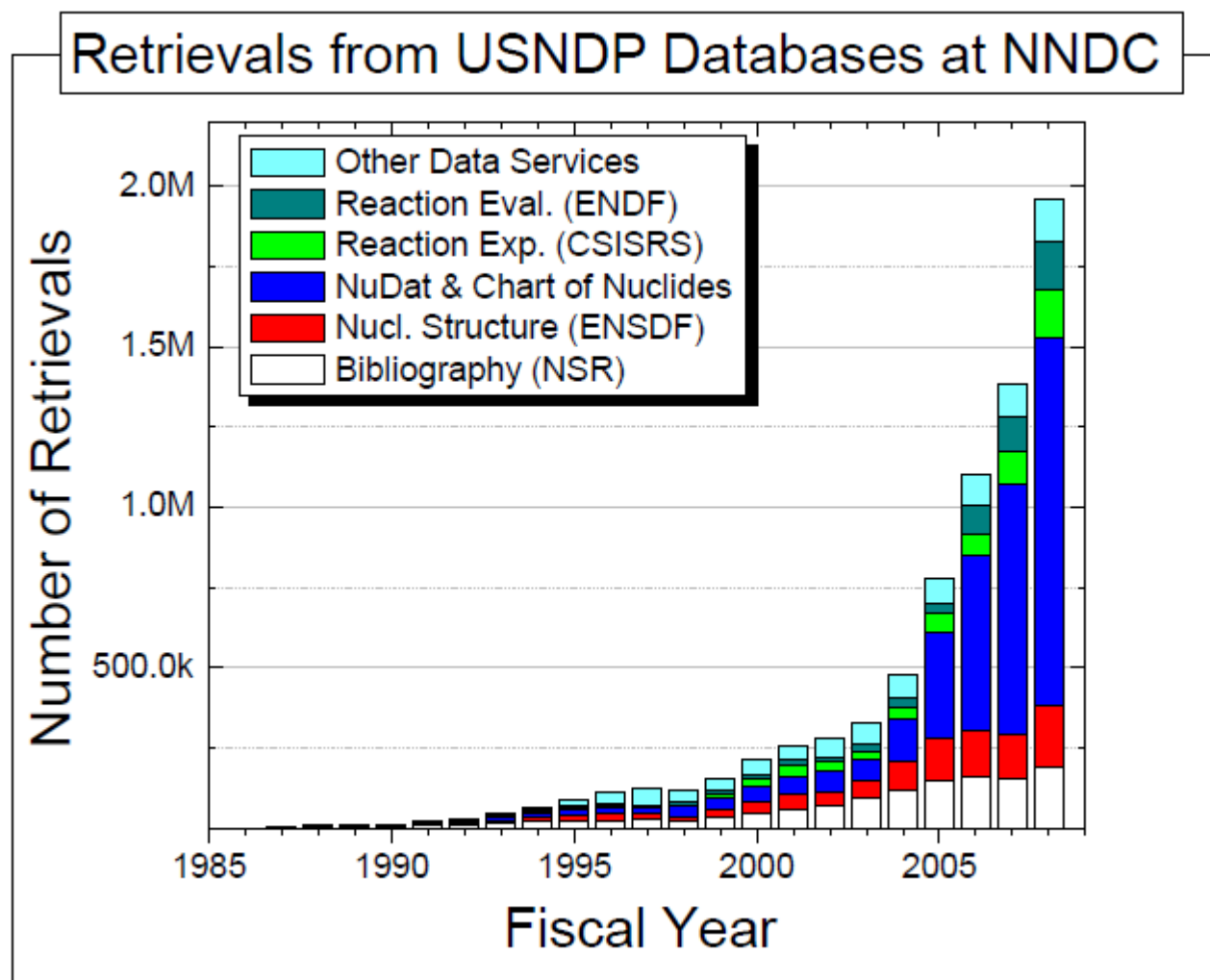
Nuclear Data Sheets Nuclear structure & decay data journal, *Special Issues on reaction data*

USNDP U.S. Nuclear Data Program

Special training is needed to pronounce correctly some tricky nuclear data abbreviations!

XUNDL Experimental Un-evaluated Nuclear Data List

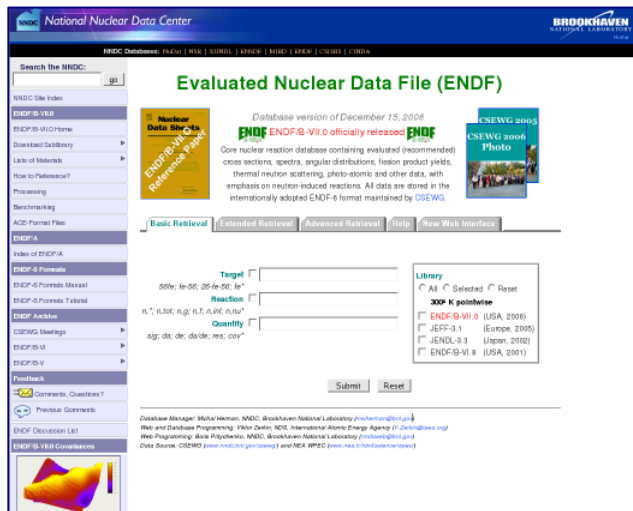
Usage of NNDC services grows rapidly



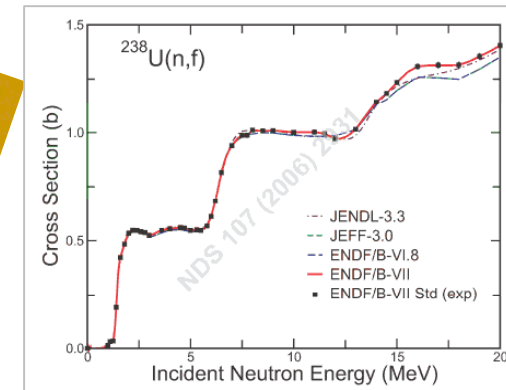
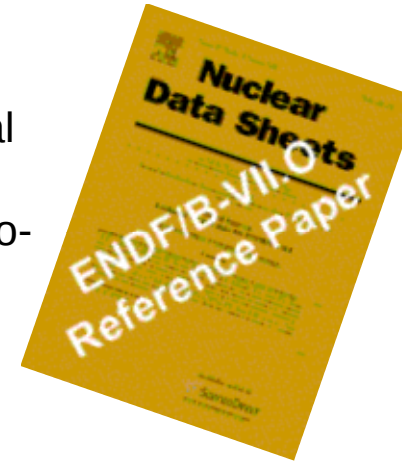
New neutron cross section library in 2006

Workhorse behind all reactor calculations for next ~100 years!

ENDF/B-VII.0 developed by CSEWG with a significant contribution from several national labs. “Big paper” published, more than 50 citations in 2 years. Strongly related to up-to-date nuclear reaction physics.



Validation carried out in US and Europe (hundreds of integral experiments) proved absolute superiority of the ENDF/B-VII.0 over precedent libraries



Principal advances over ENDF/B-VI library

- Many new cross sections for major actinides
- New set of fission product evaluations
- Improved thermal neutron scattering
- More precise standards
- New radioactive data
- Photonuclear reactions
- New methods for uncertainties and covariances

