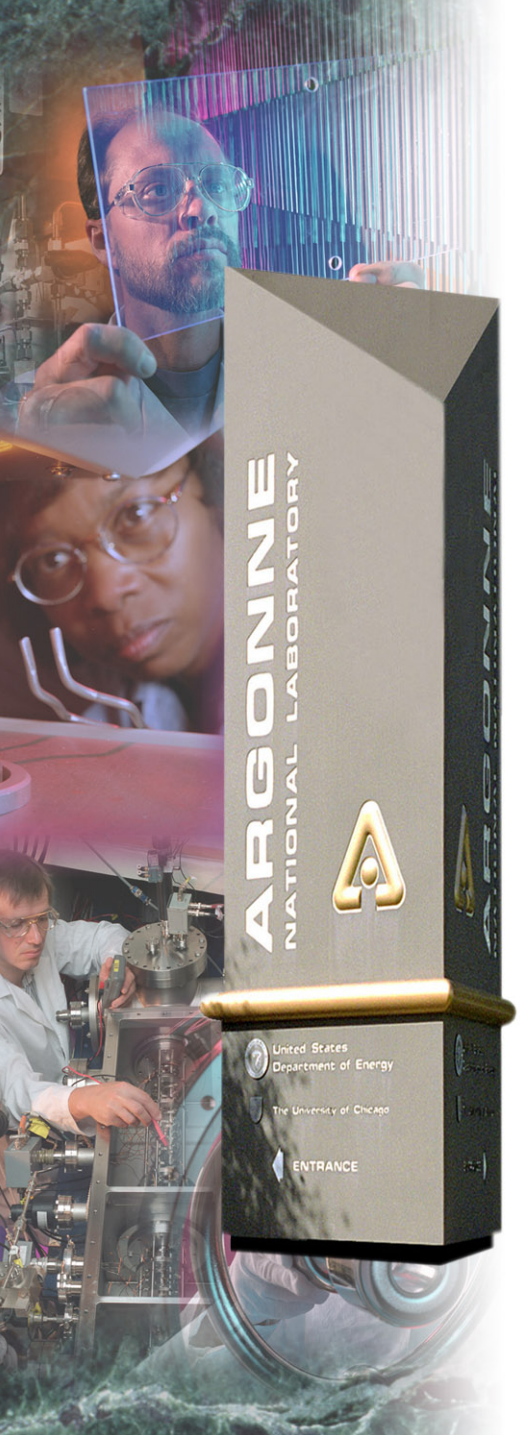

Nuclear Data Program at ANL

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Nuclear Engineering Division

2004 USNDP Meeting
Brookhaven National Laboratory, November 3-5, 2004

Argonne National Laboratory

Office of Science
U.S. Department of Energy

A U.S. Department of Energy
Office of Science Laboratory
Operated by The University of Chicago

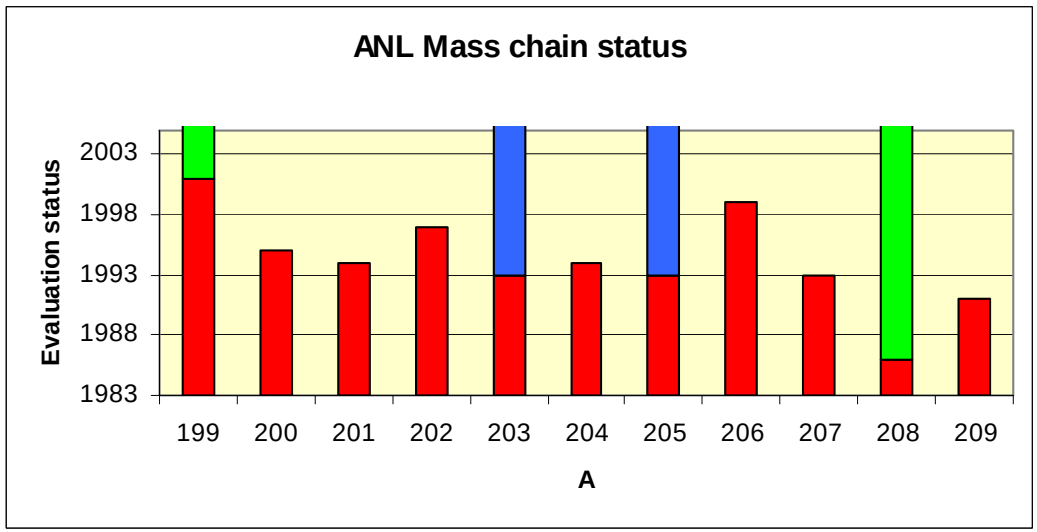
Program Overview

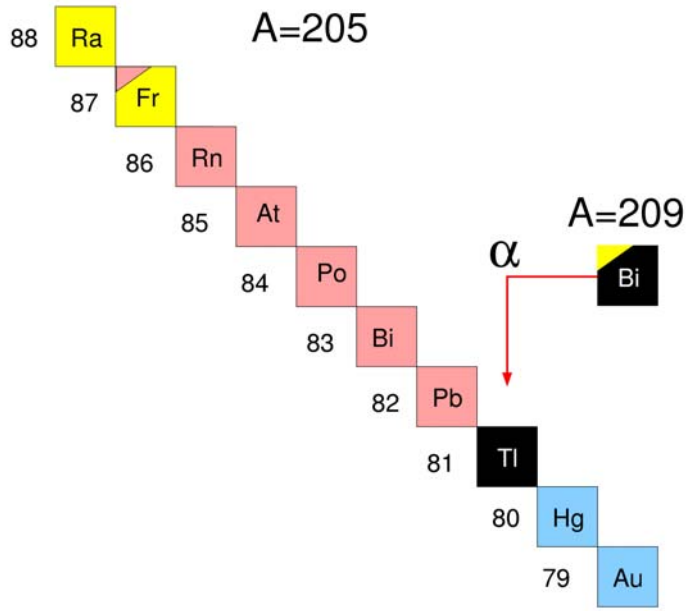
- Compilation and evaluation of Nuclear Structure & Decay Data for ENSDF, Decay Data for DDEP and Nuclear Structure Data for Nuclear Isomers.
- Experimental validation and parameter sensitivity studies for various nuclear models used in fast neutron induced reactions
- Development of improved methods for representing and propagating errors in both experimental and derived nuclear quantities
- Complementary experimental activities aimed at filling gaps in the existing databases
- Data dissemination

Evaluation activities

ANL Mass Chain Responsibility

FY03/FY04



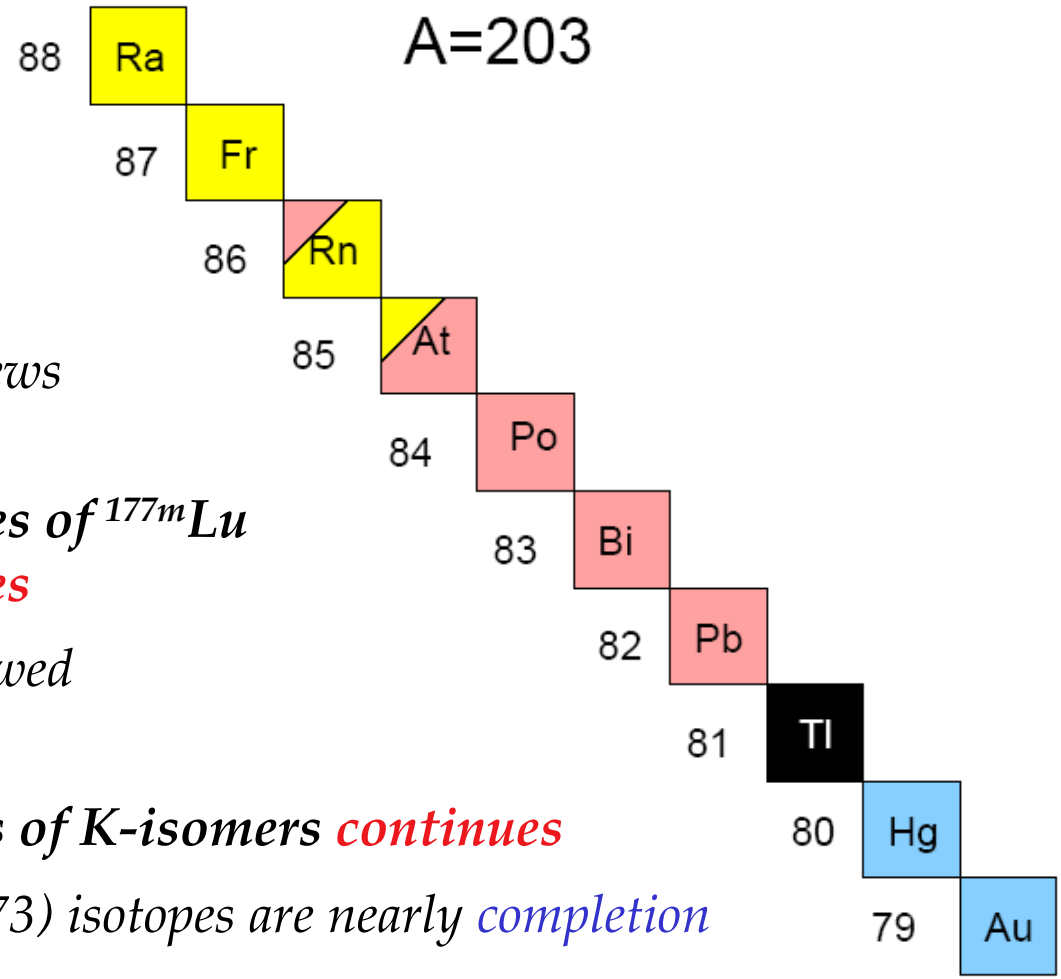


- *Member of the INSDD Network, since last November*
- *The ultimate goal is to make this region current in the next 4-5 years*

- *Completed evaluation for all nuclei with A=205 for ENSDF*
  - ✓ *Published in NDS v. 101 (2004) 521*

Evaluation Activities – cont.

FY04



- ***Completed** evaluation for all nuclei with **A=203** for ENSDF*
  - ✓ *No requests were made for reviews*
- ***Evaluation of decay properties of ^{177m}Lu and ^{178m}Hf for DDEP **continues***
  - ✓ *One nuclide (^{240}Pu) was reviewed*
- ***Evaluation of properties of K-isomers **continues***
  - ✓ *Evaluations for Ta (Z=73) isotopes are nearly completion*

Evaluation Activities – cont.

Current Projects:

- *A=201 mass chain evaluation for ENSDF*
- *Evaluation of decay properties of $^{178m2}Hf$ and ^{177m}Lu for DDEP/Detector Efficiency Standard*
- *Evaluation of properties of K-isomers in deformed nuclei in the A~180 region - from Yb (Z=70) to Pt (Z=78) – the evaluation of Lu (Z=71) isotopes will be initiated*

Other Nuclear Data Research Activities

➢ **Motivation:** To *fill gaps* and *improve quality* of existing databases & to find *new applications of Nuclear Data* in the areas of *basic nuclear physics, astrophysics, nuclear energy and national security*

- Properties of Nuclear *K-Isomers* in neutron-rich nuclei near *A~180* and *shell-model isomers* near ^{132}Sn, including spectroscopy of FP – in collaboration with *ANU (Canberra), UML and PHY/ANL*
- Properties of nuclei *far from the line of stability* - in collaboration with *PHY/ANL, UT*
  - proton-rich nuclei in the rare earth (*Re-Ir*) and *Hg-Pb* regions
- Spectroscopy of *heavy nuclei* – in collaboration with *PHY/ANL*
  - Decay data on ^{253}Es
  - Properties of high-K isomer in ^{254}No
- *Nuclear mass at finite angular momentum* – in collaboration with *Lund (I. Ragnarsson), FSU, Liverpool & Daresbury*

Other Nuclear Data Research Activities - cont

- *Survey of the status of neutron cross section data for helium producing reactions relevant to nuclear fusion applications*

- *Survey of the status of neutron activation reaction cross sections pertinent to neutron interrogation for Homeland Security applications*

- *Initiated studies of isomeric cross section ratios for long-lived nuclear isomers: currently looking at the case of ^{177m}Lu using a variety of reactions, e.g. (n,γ), fragmentation, incomplete fusion, deep-inelastic collisions – applications and nuclear models development*

Nuclear Data Dissemination

NUCLEAR DATA AND MEASUREMENTS REPORTS

URL: http://www.td.anl.gov/reports

- *The site contains 158 publications produced since July 1973 and it is devoted to:*
  - *measured microscopic nuclear data parameters*
  - *experimental techniques and facilities*
  - *analysis, correlation and interpretation of nuclear data*
  - *compilation and evaluation of nuclear data*

⇒ *Original reports by A.B. Smith and many others!*

Nuclear Data Dissemination-cont.

www.td.anl.gov/nrs

www.td.anl.gov/NDP

Nuclear Data Program
at Argonne National Laboratory

These sites are current and we plan to significantly upgrade them during FY05 !