Nuclear Data Working Group

Catherine Romano
Chair and NA-22 Representative
Nuclear Data Working Group

Nuclear Data Week
November 2-6, 2015
BNL, Brookhaven, NY

Background

- In July 2014 the first review in ~20 years of the US Nuclear Data Program (USNDP) was performed
- The review called for
  - a "targeted experimental" component of the USNDP to "address deficiencies."
  - "Develop mechanisms to assess community data needs."
- This lead to the call for a workshop:
  - Nuclear Data Needs and Capabilities for Applications (NDNCA)
- Co-sponsored by the DOE Office of Science/Nuclear Physics and the Nuclear Science & Security Consortium (NA-22)
  - LBNL, May 27-29, 2015

All talks are at https://bang.berkeley.edu/events/NDNCA/agenda

Formation of Working Group

- **Program manager meeting to discuss how to move forward based on the workshop for Nuclear Data Needs and Capabilities for Applications (NDNCA).**
  - **NA-22, DOE/NP, DNDO**
- **Agreement that there needs to be strong communication and coordination across the community.**
- **Working Group of lab representatives proposed by**
  - **Jim Peltz (NA-22 Enabling Capabilities PM) and**
  - **Catherine Romano, (NA-22 Technical Advisor/ORNL)**
- **Idea presented to program managers across DOE/ OS, NE, NNSA, DTRA, DHS**
- **Positive feedback and strong participation!**

Working Group Members

Partners	Program Manager	Program Area	Working Group Member	
NA-22	Jim Peltz David Beach	Enabling Capabilities / Nuclear Weapons and Material Security Teams	Catherine Romano	ORNL
DOE/OS/NP	Ted Barnes Tim Hallman	Nuclear Data	Lee Bernstein	LLNL
NA-22	Tom Kiess	Forensics / Post Det.	Todd Bredeweg Jason Burke	LANL LLNL
DNDO / TAR	Namdoo Moon	Nuclear Detection	Doug Mayo	LANL
NA-511/ NCSP	Jerry McKamy	Criticality Safety	Skip Kahler	LANL
DTRA	Dave Peterson	Basic Research/Forensics/ detection	TBD	
NA-113	Ralph Schneider Staci Brown	Defense Programs/ Research and Development	Dennis McNabb	LLNL
NA-114	Douglas Wade Adam Boyd	Defense Programs/Physics and Engineering Models	Bob Little	LANL
NE	Rob Versluis	Nuclear Energy	Phillip Finck	INL
DNDO / NTNFC	William Ulicny Jeff Morrison	Forensics	Richard Essex	NIST
NA-45/83	Tom Black Steve Goldberg	Nuclear Technical Forensics	Bob Rundberg	LANL
NA-82	Rick Christensen	Nuclear Threat Science	John Maenchen	

Working Group Goal

- **Plan and execute, based on approval and funding, a collaborative 5 year nuclear data collection project based on best practices that leverages facilities, expertise and funding across the DOE/NNSA/DOD/DHS complex that meets cross cutting nuclear data needs while minimizing costs.**

- **Experimental plan to be presented to program managers March 2016 for funding in FY17.**

Working Group Tasks

- **Emphasis on experiments that can only be accomplished, or are optimally accomplished, within a large multi-program, 5 year program.**
- **Emphasis on experiments that meet multiple programs' priorities.**
- **Coordinate with existing nuclear data experimental programs domestically and internationally.**
- **End to end data processing**
  - **Ensure incorporation into ENDF**

Working Group Tasks

- **Experimental plan will address**
  - **Cross section and decay data evaluations**
  - **Modeling and simulation**
  - **Sensitivity Studies (quantify uncertainties)**
  - **Validation & Integral Benchmarking**
  - **Data management**
- **Produce a data management plan and ensure data is distributed to users as required.**
- **Establish best practices**
  - **Evaluation**
  - **Validation**
  - **Distribution**
  - **Communication of uncertainties to user community**

Final Words

This is a terrific opportunity for the nuclear data community!

- **What big problem do we want to solve?**

U.S. DEPARTMENT OF ENERGY

National Nuclear Security Administration
Defense Nuclear Nonproliferation

Highlights and Summary of the Nuclear Data Needs and Capabilities for Application Workshop 2015 (NDNCA) LBNL, May 27-29, 2015

The NDNCA Workshop
LBNL, May 27-29, 2015

- 101 Participants and registrants from 30 institutions
- Days 1 & 2 features plenary talks on:
  - The US Nuclear Data Program (1)
  - *Nuclear Energy/Dosimetry Data Needs (5)*
  - *National Security Data Needs (6)*
  - *Isotope Production Data Needs (4)*
  - Capabilities/Facilities (8)
- Day 3: *Topical* breakout sessions

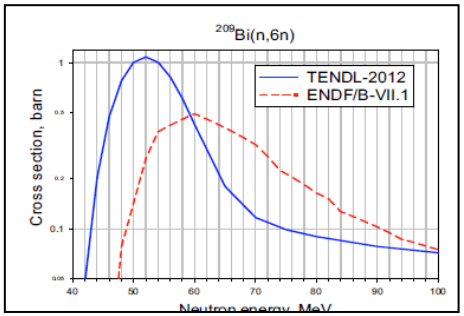
Nuclear Data Needs and Capabilities for Applications

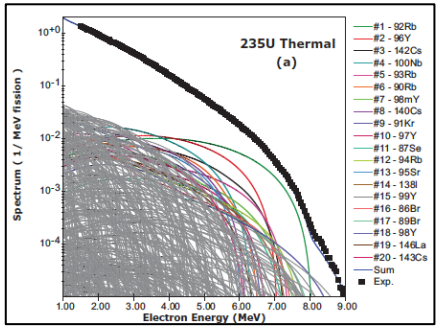
May 27-29, 2015

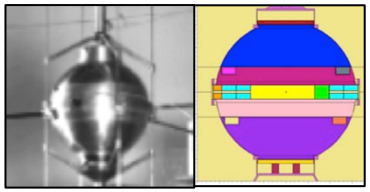
Lawrence Berkeley National Laboratory, Berkeley, CA USA

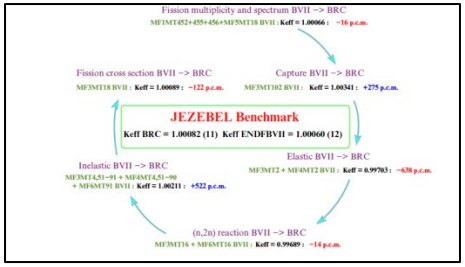
Many nuclear data needs are "cross-cutting"

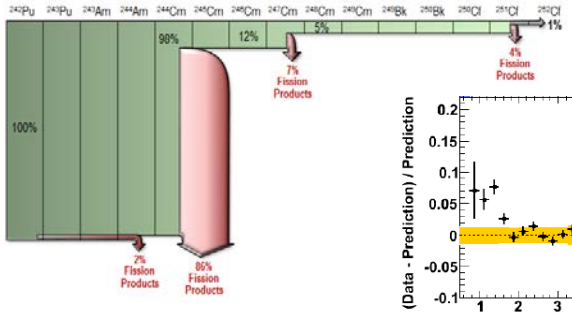
- **Dosimetry standards**
- **A deeper understanding of nuclear fission**
- **Decay data and gamma branching ratios**
- **Targeted covariance reduction in neutron transport**
- **Expanded integral validation**
- **Antineutrinos from nuclear reactors**
- **^{252}Cf production**

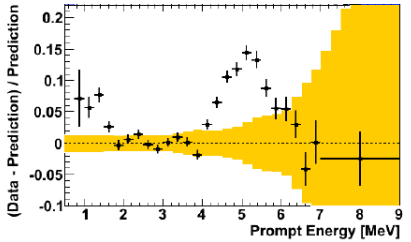












Collaboration between different nuclear data users is a "no brainer"

The results of the workshop can be found in the NDNCA whitepaper

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Production & Other Applicati

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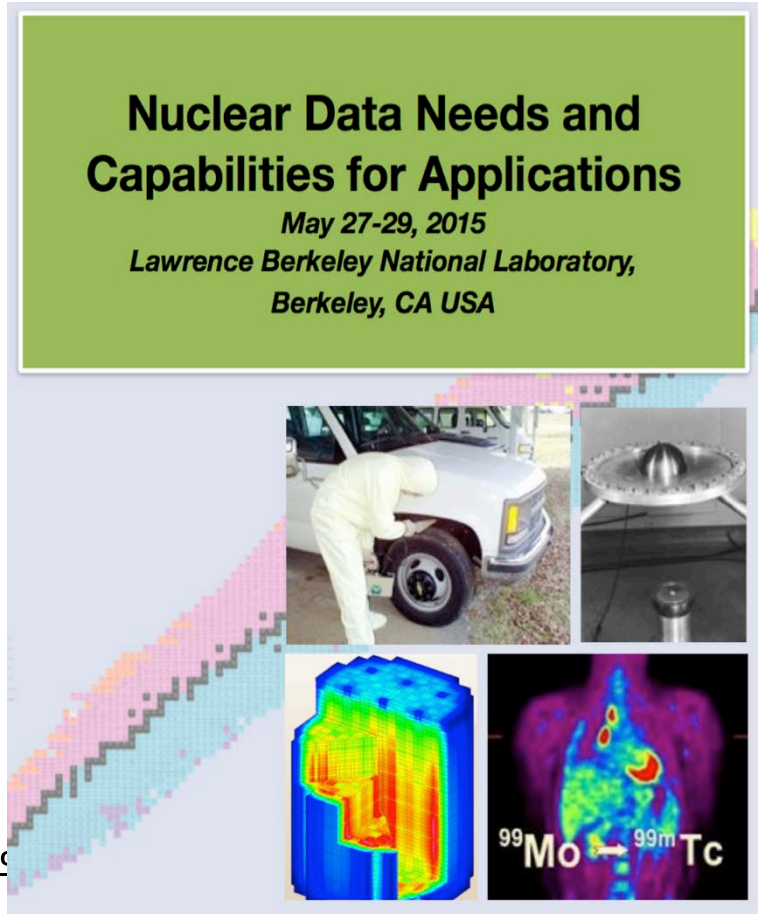

http://bang.berkeley.edu/events/NDNCA/whitepaper

Cross-cutting needs were compiled into a series of matrices

- **Matrix A.1: National Security + Counter-Proliferation + Nuclear Energy**
- **Matrix A.2: National Security + Counter-Proliferation + Isotope Production**
- **Matrix A.3: National Security + Nuclear Energy + Isotope Production**
- **Matrix A.4: National Security + Counter-Proliferation**
- **Matrix A.5: Counter-Proliferation + Nuclear Energy**
- **Matrix A.6: Nuclear Energy + Isotope Production**
- **Matrix A.7: National Security + Isotope Production**
- **Matrix A.8: Single Area Nuclear Data Needs**

Nuclides and Topic	Nuclear Data Need
^{16}O: CIELO high-priority nucleus. Improved evaluated nuclear data needed to create accurate ENDF-formatted files for general purpose transport applications, *e.g.*, criticality, shielding, and activation.	Discrepancies of up to 30% in both measured and evaluated ^{16}O(n,γ) are problematic for fission applications. These discrepancies impact criticality predictions for reactors, and helium production rates. New measurements are needed in the 2.5-20 MeV region to reduce uncertainties to within 5-10%.

79 distinct needs were identified and tabulated