OFFICE OF
SCIENCE

USNDP and NDIAWG

Presentation to the Comprehensive European Plan to acquire and curate nuclear data
May 2023

Keith Jankowski
Program Manager for Nuclear Data

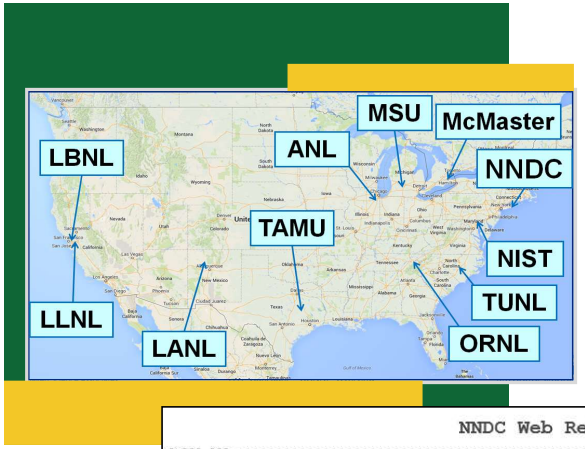
U.S. DEPARTMENT OF ENERGY | Office of Science

Discussion Topics

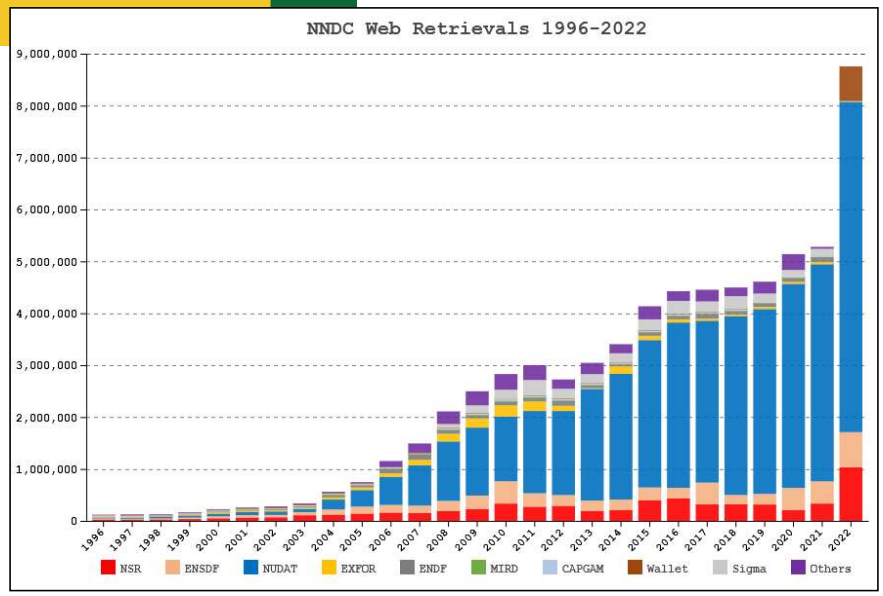
- **US Nuclear Data Program**
- **Nuclear Data Working Groups**
- **Workshop on Applied Nuclear Data Activities (WANDA)**
- **Upcoming initiatives**

US Nuclear Data Program

- The mission of the United States Nuclear Data Program (USNDP) is to provide **current, accurate, authoritative data for workers in pure and applied areas of nuclear science and engineering**.
- This is accomplished primarily through the compilation, evaluation, dissemination, and archiving of extensive nuclear datasets. USNDP also addresses gaps in the data, through targeted experimental studies and the use of theoretical models.



https://www.nndc.bnl.gov/



The NNDC on Twitter!

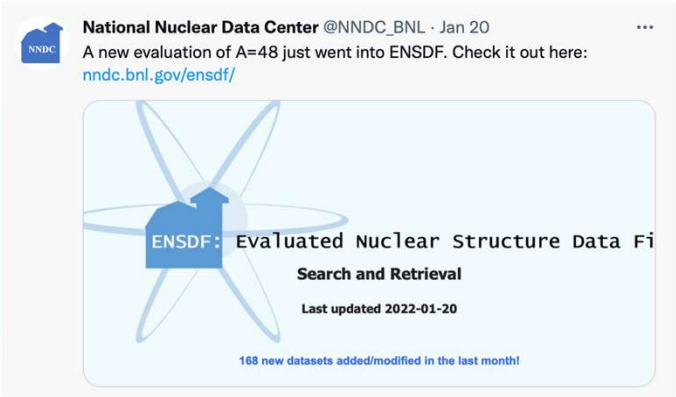
About 15,000 views per month !

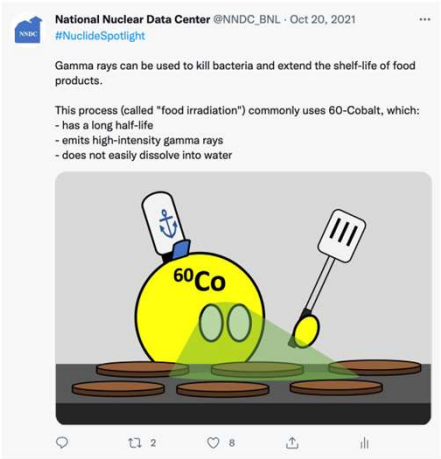
Follow us at @NNDC_BNL

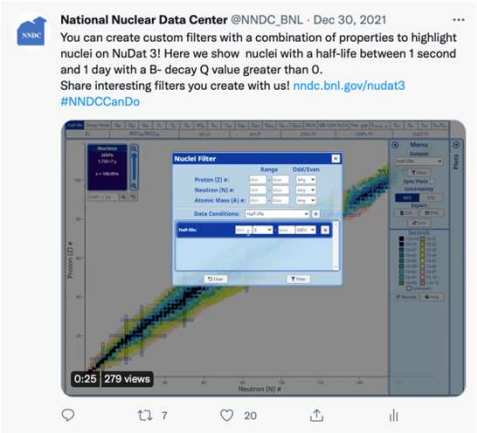
Inform users of database updates

Educate about nuclei and their applications

Short tutorials on using the website





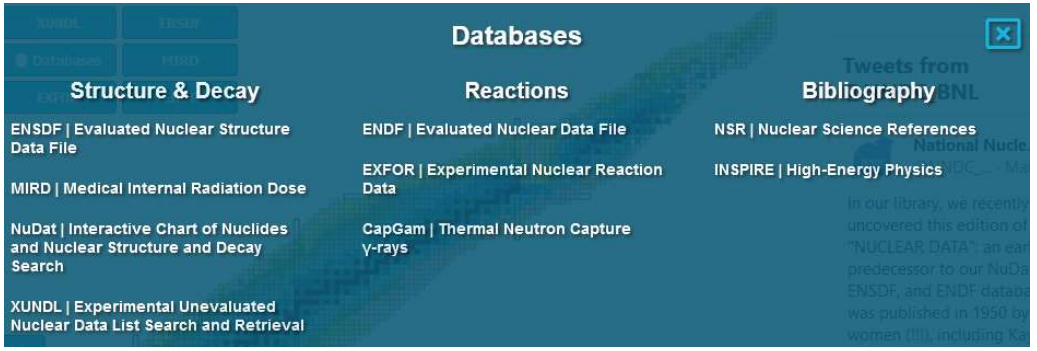


Brookhaven National Laboratory

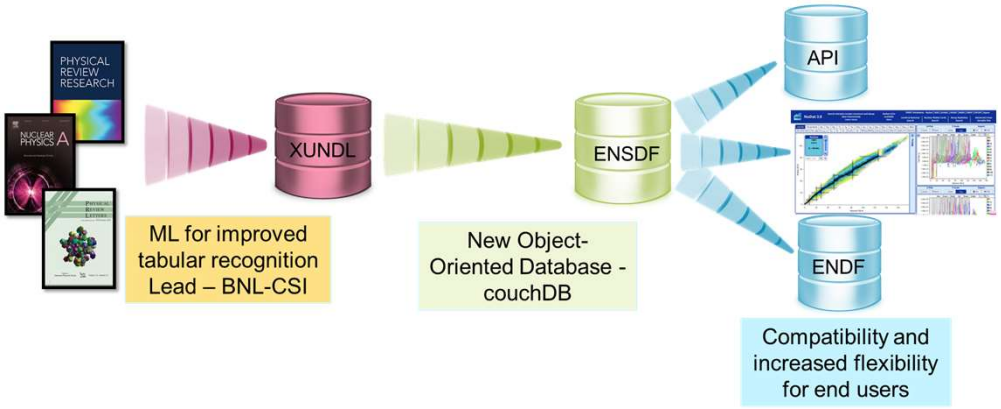
Slide courtesy of Libby McCutchan, BNL

US Nuclear Data Program

- The USNDP provides the main "infrastructure" (people, databases) for the nuclear data community
- Working to prioritize this infrastructure by:
  - Modernization of databases
  - Investing in traineeships for bring new people into the nuclear data community

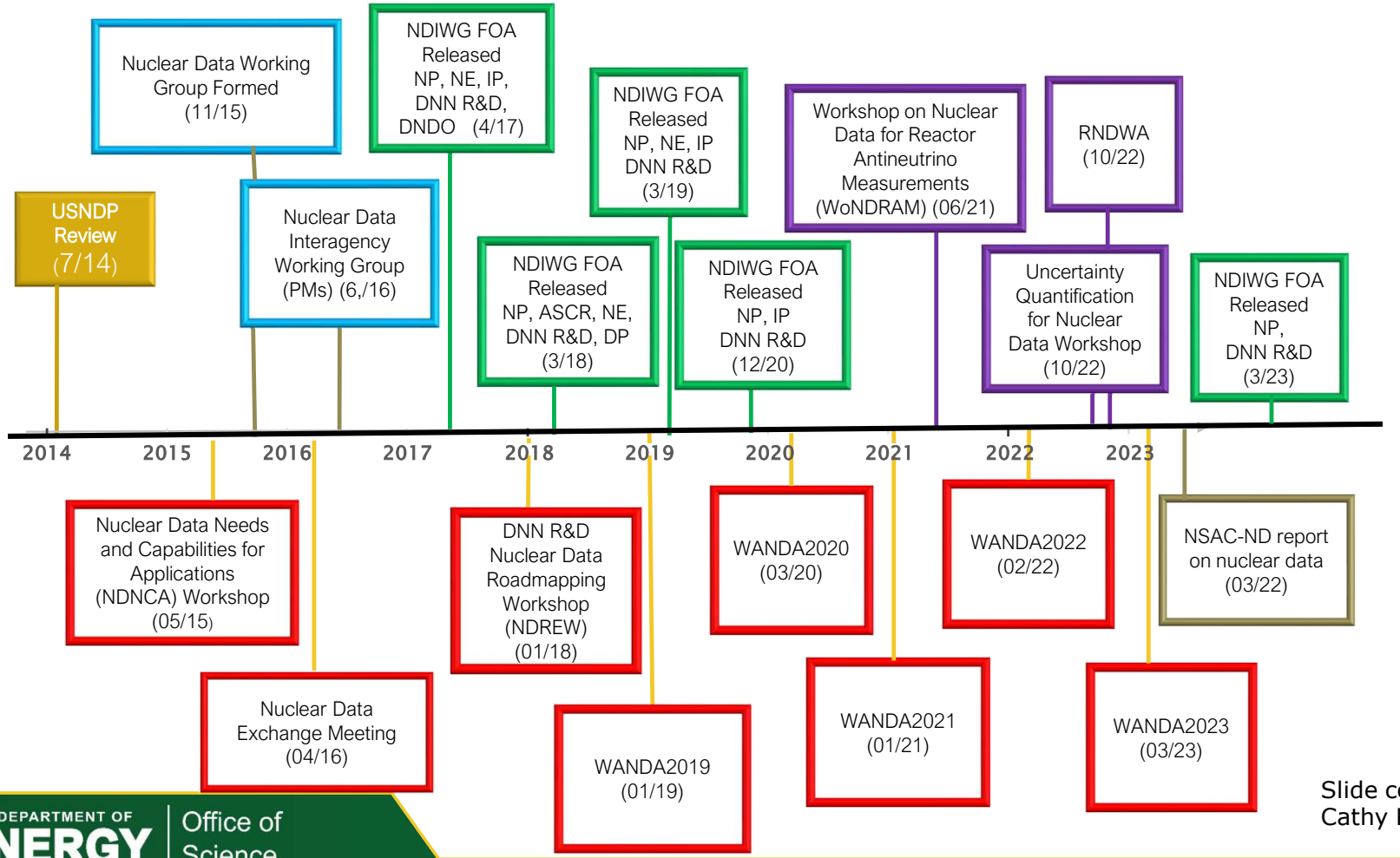


Screenshot from NNDC



Graphics from ENSDF Modernization project

Nuclear Data Working Group (Recent) History



Slide courtesy of Cathy Romano

NDIAWG

- **The Nuclear Data InterAgency Working Group (NDIAWG)** continues quarterly meetings for collaboration and coordination
  - Led by DOE/SC/Nuclear Physics
- **Agency program membership increased from 8 to 17 since 2020** and highlights the diverse areas where nuclear data has impact

- SC (NP, HEP, IP, FES)
- NNSA
- Nuclear Energy
- ARPA-E

- CWMD

- Human Spaceflight
- Electronics
- Propulsion/power
- Spectroscopy

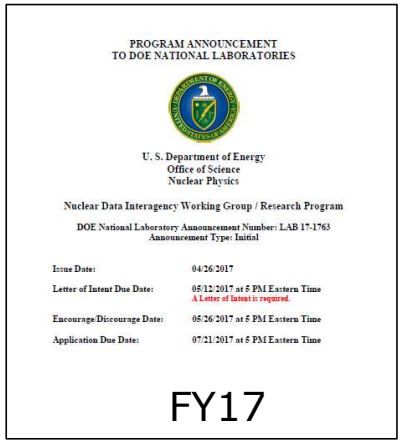
- DTRA
- Missile Defense Agency

Nuclear Physics (Experiment and Theory)

- National Cancer Institute

Boxes indicate new membership since 2020

Funding Opportunities for Nuclear Data Continue



PROGRAM ANNOUNCEMENT
TO DOE NATIONAL LABORATORIES

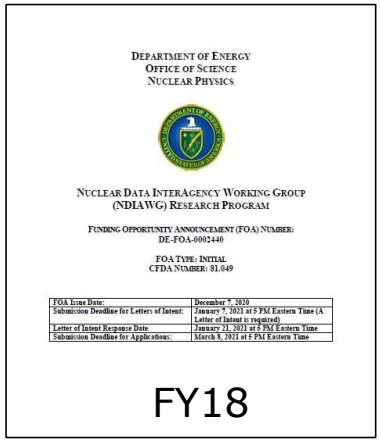
U. S. Department of Energy
Office of Science
Nuclear Physics

Nuclear Data Interagency Working Group / Research Program

DOE National Laboratory Announcement Number: LAB 17-1763
Announcement Type: Initial

Issue Date:	04/26/2017
Letter of Intent Due Date:	05/12/2017 at 5 PM Eastern Time A Letter of Intent is required.
Encourage/Discourage Date:	05/26/2017 at 5 PM Eastern Time
Application Due Date:	07/21/2017 at 5 PM Eastern Time

FY17



DEPARTMENT OF ENERGY
OFFICE OF SCIENCE
NUCLEAR PHYSICS

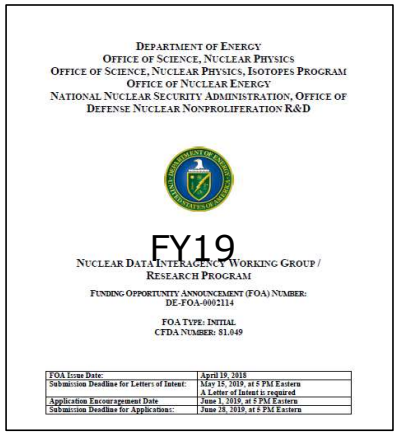
NUCLEAR DATA INTERAGENCY WORKING GROUP
(NDIAWG) RESEARCH PROGRAM

FUNDING OPPORTUNITY ANNOUNCEMENT (FOA) NUMBER:
DE-FOA-0002440

FOA TYPE: INITIAL
CFDA NUMBER: 81.049

FOA Issue Date:	December 7, 2020
Submission Deadline for Letters of Intent:	January 7, 2021 at 5 PM Eastern Time (A Letter of Intent is required)
Letter of Intent Response Date	January 21, 2021 at 5 PM Eastern Time
Submission Deadline for Applications:	March 8, 2021 at 5 PM Eastern Time

FY18



DEPARTMENT OF ENERGY
OFFICE OF SCIENCE, NUCLEAR PHYSICS
OFFICE OF SCIENCE, NUCLEAR PHYSICS, ISOTOPES PROGRAM
OFFICE OF NUCLEAR ENERGY
NATIONAL NUCLEAR SECURITY ADMINISTRATION, OFFICE OF
DEFENSE NUCLEAR NONPROLIFERATION R&D

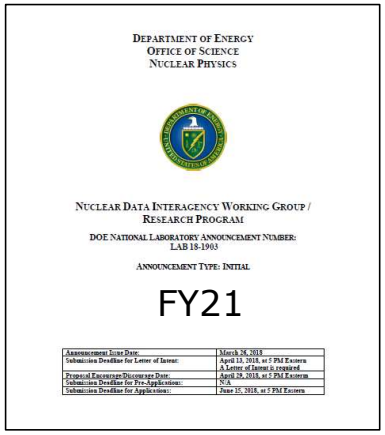
FY19

NUCLEAR DATA INTERAGENCY WORKING GROUP /
RESEARCH PROGRAM

FUNDING OPPORTUNITY ANNOUNCEMENT (FOA) NUMBER:
DE-FOA-0002114

FOA TYPE: INITIAL
CFDA NUMBER: 81.049

FOA Issue Date:	April 19, 2018
Submission Deadline for Letters of Intent:	May 15, 2018, at 5 PM Eastern A Letter of Intent is required.
Application Encouragement Date	June 1, 2018, at 5 PM Eastern
Submission Deadline for Applications:	June 29, 2018, at 5 PM Eastern



DEPARTMENT OF ENERGY
OFFICE OF SCIENCE
NUCLEAR PHYSICS

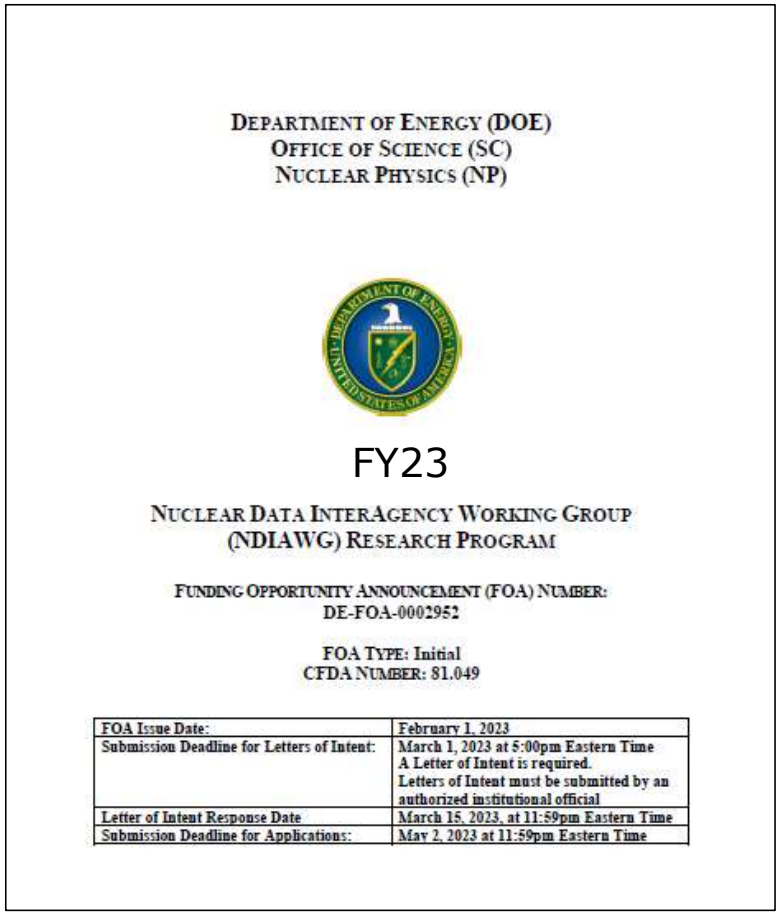
NUCLEAR DATA INTERAGENCY WORKING GROUP /
RESEARCH PROGRAM

DOE NATIONAL LABORATORY ANNOUNCEMENT NUMBER:
LAB 18-1903

ANNOUNCEMENT TYPE: INITIAL

FY21

Announcement Issue Date:	March 26, 2018
Submission Deadline for Letter of Intent:	April 13, 2018, at 5 PM Eastern A Letter of Intent is required
Proposal Encourage/Discourage Date:	April 26, 2018, at 5 PM Eastern
Submission Deadline for Pre-Application:	N/A
Submission Deadline for Application:	June 15, 2018, at 5 PM Eastern



DEPARTMENT OF ENERGY (DOE)
OFFICE OF SCIENCE (SC)
NUCLEAR PHYSICS (NP)

FY23

NUCLEAR DATA INTERAGENCY WORKING GROUP
(NDIAWG) RESEARCH PROGRAM

FUNDING OPPORTUNITY ANNOUNCEMENT (FOA) NUMBER:
DE-FOA-0002952

FOA TYPE: Initial
CFDA NUMBER: 81.049

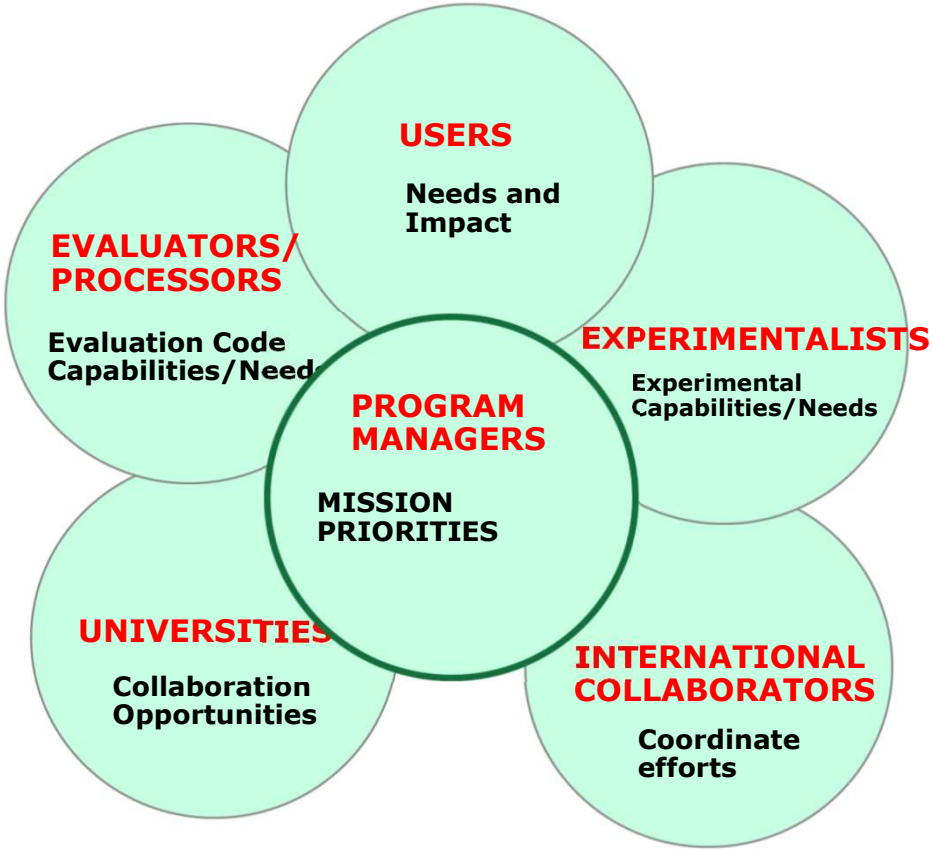
FOA Issue Date:	February 1, 2023
Submission Deadline for Letters of Intent:	March 1, 2023 at 5:00pm Eastern Time A Letter of Intent is required. Letters of Intent must be submitted by an authorized institutional official
Letter of Intent Response Date	March 15, 2023, at 11:59pm Eastern Time
Submission Deadline for Applications:	May 2, 2023 at 11:59pm Eastern Time

NDIAWG Funded Efforts Since 2016

- Total Investment $49,773,881.00
- 23 individual projects
- 8 different lead organizations
- 6 DOE sites (ANL, BNL, LANL, LBNL, LLNL, ORNL)
- 2 universities (Duke, US Naval Academy)
- 14 collaborating orgs
- 6 DOE sites (BNL, LANL, LBNL, LLNL, PNNL, NNSS)
- 8 universities (Duke, Notre Dame, Univ. of Dallas, Mississippi State, Kentucky, NC State, TUNL)

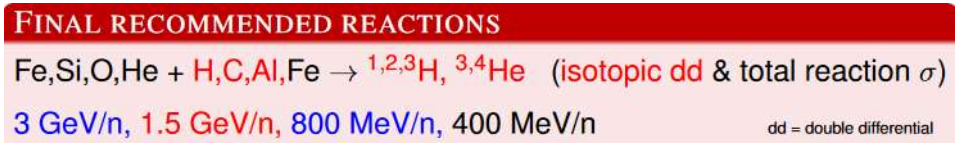
WANDA

- Workshop for Applied Nuclear Data Activities (WANDA) brings together federal programs, nuclear data users, and nuclear data practitioners to discuss current needs for nuclear data
- # of attendees (and programs!) have grown since 2015.
  - ~150 in 2020 (last in person before COVID)
  - ~300 during WANDA virtual meetings
  - ~200 during WANDA23, held in person

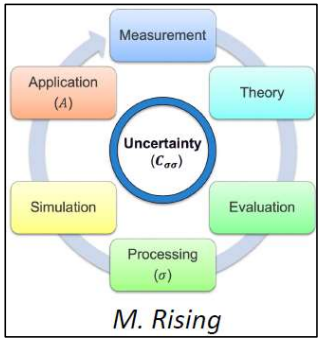


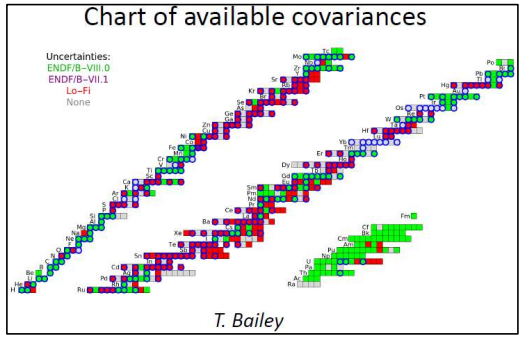
WANDA - Examples

- WANDA22 had a focus on nuclear data for space applications
  - Highlighted the need to expand out of "low energy"
  - Applications such as beam therapy also discussed
- Held mini-WANDA on uncertainty quantification and covariances
  - Led by Denise Neudecker (LANL)
  - Producers, users, Fed programs attending
  - Whitepaper output identifying top needs



Graphics from presentation by J. Norbury (NASA), WANDA2022





Graphics from presentation by D. Neudecker, WANDA 2021

WANDA – Funded Topics

NDNCA (2015) Cross-cutting recommendations		WANDA2019 Topics		WANDA2022 Topics	
Dosimetry Standards		Nuclear Data for Isotope Production	x	Reactions on Unstable Nuclei	
Fission	x	Safeguards	x	High Energy Ion Interactions and Secondary Particles	
Decay Data and g-Branching Ratios	x	Materials Damage		Neutrons as Secondary Particles and Interactions	x
Neutron Transport Covariance Reduction		Nuclear Data for Nuclear Energy	x	Photon Reactions and Transport	
Expanded Integral Validation		(n,x) Reactions	x	Stopping Powers, Energy Depostion and Dose	
Antineutrinos from Reactors	x	Atomic Data, NRF Data		Nuclear Data Adjustments and Impact on Applications	

NDEM (2016) Cross-cutting recommendations		WANDA2020 Topics	
Improving the Pipeline infrastructure	x	Covariance/Uncertainty/Sensitivity/Validation	
Improved Covariance Data		Nuclear Data for Isotope Production and Targetry Needs	x
Inelastic Scattering on actinides	x	Machine Learning/AI	
Capture gamma spectra	x	Detector Models, Atomic Data and Stopping Powers	
Improved Fission yields	x	Scattering, Transport and Shielding	x
Target Production to Support Nuclear Data Experiments	x	Neutron induced gammas and gamma decay	x

NDREW (2018) Topics		WANDA2021 Topics	
Uncertainty, Sensitivity, and Covariance		Advanced Computing for Nuclear Data	
Neutron Capture and Associated Spectra	x	Predictive Codes for Isotope Production	
Fission I, Independent and Cumulative Yields	x	Expanded Benchmarks and Validation for Nuclear Data	
Gamma-Induced Reactions	x	Nuclear Data for Space Applications	
Inelastic Neutron Scattering and Associated Spectra	x	Nuclear Data for Advanced Reactors and Security	
Fission II, Prompt Gammas and Neutrons	x	The Human Pipeline for Nuclear Data	
(α,n) Reactions	x		
Targets, Facilities and Detector Systems	x	WoNDRAM Topics	
Fission III, Decay Data	x	Reactor Antineutrino Source Term	x
Development of Benchmark Exercises		Antinneutrino Spectrum Calculations	x
Data Processing & Transport Code Needs		Detector Response	
Actinide Cross Sections	x		

The WANDA process works!

Slide courtesy of Cathy Romano

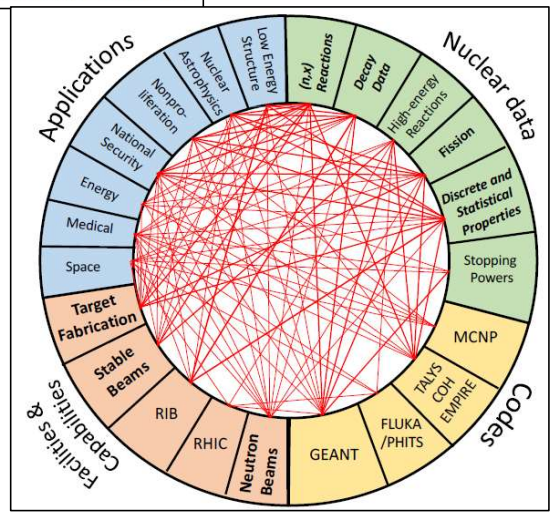
Nuclear Science Advisory Committee

- In April 2022, Office of Science/NP and the National Science Foundation (NSF) put forth a charge to the Nuclear Science Advisory Committee to look specifically at nuclear data
- Full charge letter, interim (question 1) and final (question 2) reports can be found here: https://science.osti.gov/np/nsac/Reports

1) Assess USNDP Status, which would include the following actions:
   a. Assess and document recent achievements in nuclear data and their impact.
   b. Survey current and future federal and non-federal needs for reliable, accurate, secure, accessible nuclear data.
   c. Assess the role, competitiveness, and importance of the USNDP in an international context.
2) Based on the USNDP Status Report above, provide recommendations for maintaining effective stewardship of nuclear data, which includes the following actions:
   a. Identify challenges for nuclear data stewardship in the future, including identifying and prioritizing the most compelling opportunities to enhance and advance NP stewardship of nuclear data and the impact if those opportunities can be realized.
   b. Describe possible ways the Nuclear Data (ND) community can work to train and retain a diverse, equitable, and inclusive workforce capable of sustaining the U.S. ND enterprise.
   c. Identify access needs for facilities and instrumentation, crosscutting opportunities with other federal programs, and potentially mutually beneficial interactions with other domestic and international stakeholders.

NSAC charge for Nuclear Data, April 2022

Report graphic highlighting the cross-functional nature of nuclear data

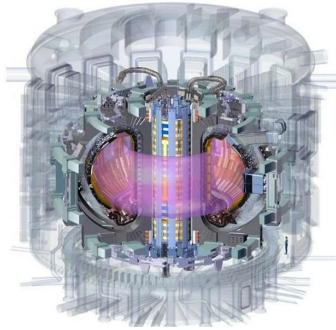


Upcoming Initiatives

- Nuclear Data for Fusion Energy Workshop
  - Initiated by Office of Science and Technology Policy
  - ND community, industry, universities
  - May 4, 2023
- Funding opportunity to increase nuclear data evaluator workforce
  - Capacity for international applicants too

DOE/SC/FES User Facilities

LLNL/NIF -
https://lasers.llnl.gov/



ITER - https://www.iter.org

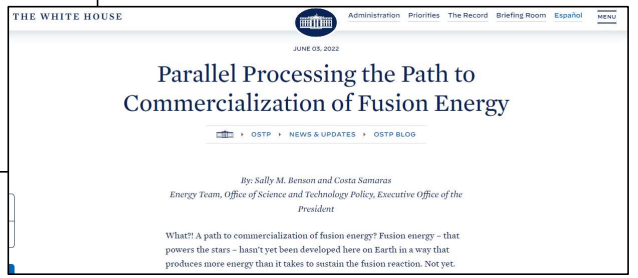

THE WHITE HOUSE

Readout of the White House Summit on Developing a Bold Decadal Vision for Commercial Fusion Energy

Executive Summary

The Biden-Harris Administration is developing a strategy to accelerate fusion energy– a clean energy technology that uses the same reaction that

March 2022


THE WHITE HOUSE

Parallel Processing the Path to Commercialization of Fusion Energy

By: Sally M. Benson and Costa Samaras
Energy Team, Office of Science and Technology Policy, Executive Office of the President

What?! A path to commercialization of fusion energy? Fusion energy – that powers the stars – hasn't yet been developed here on Earth in a way that produces more energy than it takes to sustain the fusion reaction. Not yet.

Find nuclear data needs now to have data ready for end users in fusion

Upcoming Initiatives

- Working to have better communication with international nuclear data communities
  - Let's start exchanging emails and see what type of collaboration is possible
  - National lab colleagues very involved in international collaborative projects – IAEA, NEA, JAEA, Korea
  - I'd like to see what is possible at a higher (government?) level

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Thank you!

Keith.Jankowski@science.doe.gov

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