WANDA Goals and Successes

K. Kolos
kolos1@llnl.gov
Lawrence Livermore National Laboratory

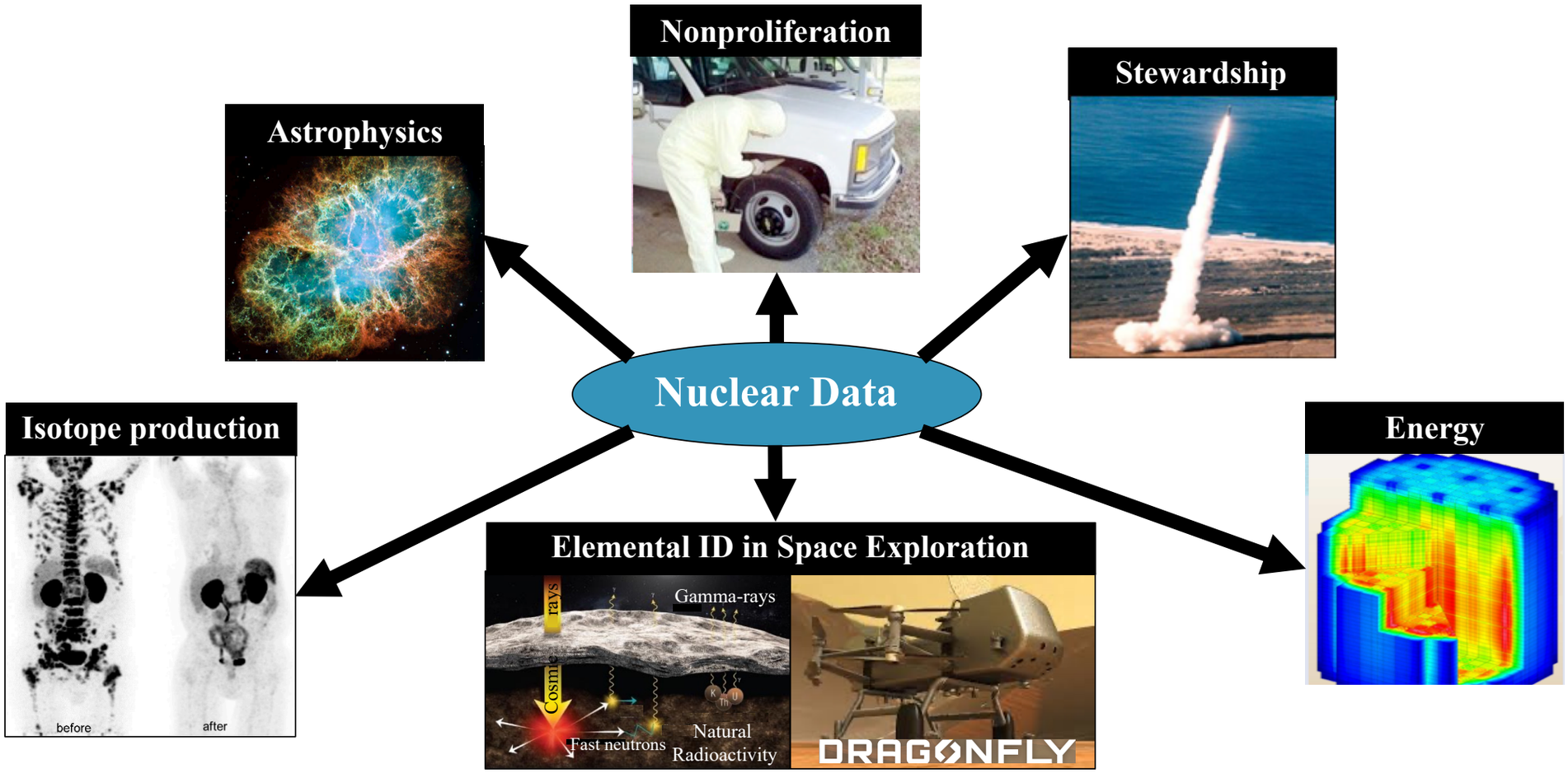
WANDA 2021 Workshop

January 25, 2021

LLNL-PRES-818533
This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under contract DE-AC52-07NA27344. Lawrence Livermore National Security, LLC

Lawrence Livermore National Laboratory

There is a Renewed Need for Quality Nuclear Data



→ Many types of Nuclear Data are cross-cutting for numerous application

→ Sophistication of applications has grown to the point where precision data are needed

→ Computational capabilities have reached a level where nuclear data often drives uncertainties

Workshop for Applied Nuclear Data Activities

Sponsored by the Nuclear Data Interagency Working Group

→ The annual workshops that serve as a forum for **nuclear data (ND) providers, users and evaluators**

→ Learn about the **Program Missions**

→ Provide **guidance to Program Sponsors** on cross-cutting ND needs

Meeting Goals

- Discuss mission-driven nuclear data priorities
- Determine where needs overlap with other mission spaces
- Share ideas on how to tackle them
- Ensure that nuclear data are available to users

The Main Goal of WANDA is to Bring You All Together

Nuclear Data Producers - Experiment/Theory

Nuclear Data Users

Program Managers

Nuclear Data Evaluations/ Processing

National Labs, Universities, Industries, National and International Collaborations

The Main Goal of WANDA is to Bring You All Together To Discuss Cross-Cutting ND Needs

Program Managers

Nuclear Data Producers - Experiment/Theory

Nuclear Data Users

Nuclear Data Evaluations/ Processing

The WANDA approach is centered on topical breakout sessions led by subject matter experts

→ Present and Discuss Nuclear Data Needs

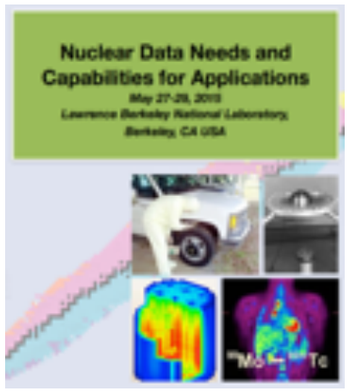
→ Prioritize these Needs

→ A Plan to Address the Needs

A final product is a written document!

Physical Review Research
Chief editor R. Vogt (LLNL)
Co-editor M. Smith (ORNL)

The Ever-Growing Nuclear Data Timeline



2014

NDWG Nuclear Data Working Group (C. Romano)

2016

USNDP Nuclear Data Program Review

2017

First Nuclear Data Interagency Working Group (NDIAWG) FOA

2018

NDREW Nuclear Data Roadmapping Enhancement Workshop

Second NDIAWG FOA

2019

WANDA Workshop for Applied Nuclear Data Activities 2019

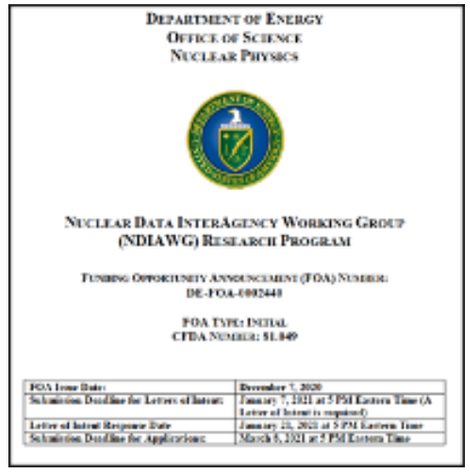
Third NDIAWG FOA

2020

WANDA 2020

Fourth NDIAWG FOA

2021



DEPARTMENT OF ENERGY
OFFICE OF SCIENCE
NUCLEAR PHYSICS

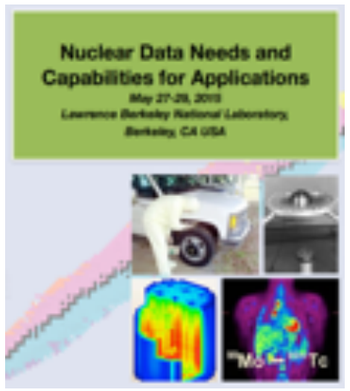
NUCLEAR DATA INTERAGENCY WORKING GROUP
(NDIAWG) RESEARCH PROGRAM

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 22, 2021 at 5 PM Eastern Time
Submission Deadline for Applications:	March 8, 2021 at 5 PM Eastern Time

The Ever-Growing Nuclear Data Timeline



2014

USNDP Nuclear Data Program Review

2016

NDWG Nuclear Data Working Group (C. Romano)

First Nuclear Data Interagency Working Group (NDIAWG) FOA

2017

NDREW Nuclear Data Roadmapping Enhancement Workshop

Second NDIAWG FOA

2018

WANDA Workshop for Applied Nuclear Data Activities 2019

Third NDIAWG FOA

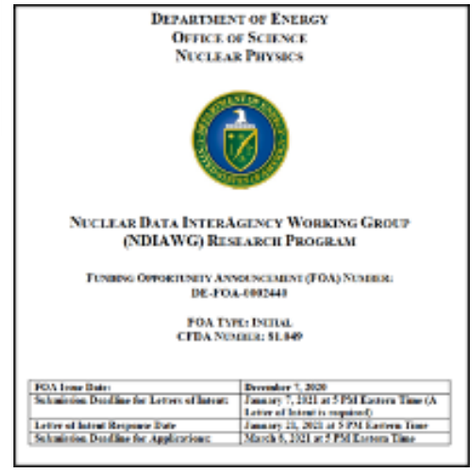
2019

WANDA 2020

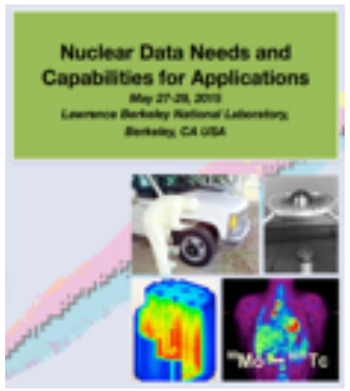
Fourth NDIAWG FOA

2020

2021



The Ever-Growing Nuclear Data Timeline



2014

USNDP Nuclear Data Program Review

2016

NDWG Nuclear Data Working Group (C. Romano)

First Nuclear Data Interagency Working Group (NDIAWG) FOA

2017

NDREW Nuclear Data Roadmapping Enhancement Workshop

Second NDIAWG FOA

U.S. DEPARTMENT OF ENERGY
Office of NUCLEAR ENERGY

2018

WANDA Workshop for Applied Nuclear Data Activities 2019

Third NDIAWG FOA

2019

WANDA 2020

Fourth NDIAWG FOA

2020

2021

First (last?) "Virtual" WANDA

We are looking forward to fruitful discussions of cross-cutting nuclear data needs!

NEUP Nuclear Energy University Program
U.S. Department of Energy

The Growing Nuclear (Data) Family

Nuclear Data Needs and Capabilities for Applications (NDNCA)

101 participants from 30+ institutions

Workshop for Applied Nuclear Data Activities (WANDA 2019)

139 attendees from 50+ institutions

Nuclear Data Roadmapping Enhancement Workshop (NDREW)

128 attendees from 30+ institutions

Workshop for Applied Nuclear Data Activities (WANDA 2020)

150 attendees from 50+ institutions

The Growing Nuclear (Data) Family

Nuclear Data Needs and Capabilities for Applications (NDNCA)

101 participants from 30+ institutions

Workshop for Applied Nuclear Data Activities (WANDA 2019)

139 attendees from 50+ institutions

Nuclear Data Roadmapping Enhancement Workshop (NDREW)

128 attendees from 30+ institutions

Workshop for Applied Nuclear Data Activities (WANDA 2020)

150 attendees from 50+ institutions

These Workshops Produce Whitepapers that Have an Impact on Future Efforts

Nuclear Data Needs and Capabilities for Applications (NDNCA)

Nuclear Data Roadmapping Enhancement Workshop (NDREW)


WANDA 2019 Final Report

Final Report for the Workshop for Applied Nuclear Data Activities
January 22-24, 2019
George Washington University
Washington, DC

Contributions from Lee Bernstein[1], Catherine Romano[2], D.A. Brown[3], Robert Casperson[4], Marie-Anne Descalle[4], Matthew Devlin[5], Chris Pickett[2], Brad Rearden[2] and Cristiaan Vermeuelen[5]

[1]Lawrence Berkeley National Laboratory/U.C.-Berkeley
[2]Oak Ridge National Laboratory
[3]National Nuclear Data Center/Brookhaven National Lab
[4]Lawrence Livermore National Laboratory
[5]Los Alamos National Laboratory

LLNL-PROC-769849

Workshop for Applied Nuclear Data Activities (WANDA 2019)


OAK RIDGE NATIONAL LABORATORY

ORNL/TR-2019/1

Proceedings of the Nuclear Data Roadmapping and Enhancement Workshop (NDREW) for Prioritization

Date Published: April 24, 2019

Prepared by
UT-BATTELLE, LLC

Prepared for
DEPARTMENT OF ENERGY

Workshop for Applied Nuclear Data Activities (WANDA 2020)

Previous Meetings Reports can be found at https://www.nndc.bnl.gov/ndwg/workshops.html

These Meetings and Reports Lead to Multiple Coordinated Efforts to Address Nuclear Data Needs

NDNCA Cross-cutting recommendations (2015)	Funded
Dosimetry Standards	
Fission	x
Decay Data and g-Branching Ratios	x
Neutron Transport Covariance Reduction	
Expanded Integral Validation	
Antineutrinos from Reactors	x
NDREW Topics (2018)	
Uncertainty, Sensitivity, and Covariance	
Neutron Capture and Associated Spectra	x
Fission I, Independent and Cumulative Yields	x
Gamma-Induced Reactions	x
Inelastic Neutron Scattering and Associated Spectra	x
Fission II, Prompt Gammas and Neutrons	x
(α,n) Reactions	x
Targets, Facilities and Detector Systems	x
Fission III, Decay Data	x
Development of Benchmark Exercises	
Data Processing & Transport Code Needs	
Actinide Cross Sections	
WANDA2019 Topics (2019)	
Nuclear Data for Isotope Production	x
Safeguards	x
Materials Damage	
Nuclear Data for Nuclear Energy	x
(n,x) reactions	x
Atomic Data, NRF Data	
WANDA2020 Topics (2020)	
Covariance/Uncertainty/Sensitivity/Validation	
Nuclear Data for Isotope Production and Targetry	x
Machine Learning/AI	
Detector Models, Atomic Data and Stopping Powers	
Scattering, Transport and Shielding	**x**
Neutron induced gammas and gamma decay	x

Areas where work has been supported

Currently Funded NDIAWG Efforts
Novel Approach for Improving Antineutrino Spectra Predictions for Nonproliferation Applications
Improving the Nuclear Data on Fission Product Decays at CARIBU
^{238}U(p,xn) and ^{235}U(d,xn) $^{235\text{-}237}$Np Nuclear Reaction Cross Sections Relevant to the Production of ^{236g}Np
State-of-the-art Gamma-ray Spectroscopy to Enhance the ENSDF database
Beta-strength function, reactor decay heat, and anti-neutrino properties from total absorption spectroscopy of fission fragments
Improving the ^{238}U(n,n') cross section using neutron-gamma coincidences
Integral Measurements of Independent and Cumulative Fission Product Yields Supporting Nuclear Forensics and Other Applications
Evaluation of Energy Dependent Fission Product Yields
Measurement of Independent Fission Product Yields
Independent Fission Product Yields from 0.5 to 20 MeV
Energy Dependent Fission Product Yields
Modernization and Optimization of the Evaluated Nuclear Structure Data File
Fission product yield measurements using ^{252}Cf spontaneous fission and neutron-induced fission on actinide targets at CARIBU
Neutron Scattering Cross Sections: (n,n'), (n,n'g), and (n,g) Measurements
Scoping Study of the Impact of (alpha,n) Reactions and Yields of Nonproliferation Applications
Assessment of Nuclear Data Needs for Neutron Active Interrogation

Multiple Cross-Cutting Efforts to Address Nuclear Data Needs

→ 16 funded multi-institutional projects that address needs in fission, decay data, neutron scattering, database modernization and much more

Don't miss the **Funded Projects' Reports session on Wednesday February 3rd 11AM (EST)**

Currently Funded NDIAWG Efforts
Novel Approach for Improving Antineutrino Spectra Predictions for Nonproliferation Applications
Improving the Nuclear Data on Fission Product Decays at CARIBU
^{238}U(p,xn) and ^{235}U(d,xn) $^{235\text{-}237}$Np Nuclear Reaction Cross Sections Relevant to the Production of ^{236g}Np
State-of-the-art Gamma-ray Spectroscopy to Enhance the ENSDF database
Beta-strength function, reactor decay heat, and anti-neutrino properties from total absorption spectroscopy of fission fragments
Improving the ^{238}U(n,n') cross section using neutron-gamma coincidences
Integral Measurements of Independent and Cumulative Fission Product Yields Supporting Nuclear Forensics and Other Applications
Evaluation of Energy Dependent Fission Product Yields
Measurement of Independent Fission Product Yields
Independent Fission Product Yields from 0.5 to 20 MeV
Energy Dependent Fission Product Yields
Modernization and Optimization of the Evaluated Nuclear Structure Data File
Fission product yield measurements using ^{252}Cf spontaneous fission and neutron-induced fission on actinide targets at CARIBU
Neutron Scattering Cross Sections: (n,n'), (n,n'g), and (n,g) Measurements
Scoping Study of the Impact of (alpha,n) Reactions and Yields of Nonproliferation Applications
Assessment of Nuclear Data Needs for Neutron Active Interrogation

There is a national nuclear data plan and it is growing

The Real WANDA Success is in Bringing Together the Nuclear Data Community to Address Crosscutting Needs

Program Managers

Nuclear Data Producers - Experiment/Theory

Nuclear Data Users

Nuclear Data Evaluations/ Processing

→ New collaborations formed

→ New data becoming available

→ New people joining the effort

→ We continue increasing mutual awareness and understanding of different stakeholder segments of the nuclear data community

→ The meetings have led to new efforts in addressing nuclear data needs

Thanks to Our WANDA 2021 Sessions Co-chairs

Predictive Codes for Isotope Production:
Susan Hogle (ORNL), Ellen O'Brien (LANL), Andrew Voyles (UCB)

Expanded Benchmarks & Validation for Nuclear Data:
Jesson Hutchinson (LANL), Catherine Percher (LLNL), Mike Zerkle (NNL)

Advanced Computing for Nuclear Data:
Dave Brown (BNL), Bethany Goldblum (LBNL/UCB), Ben Loer (PNNL), Matt Mumpower (LANL), Nicolas Schunck (LLNL), Michael Smith (ORNL)

Intro to Nuclear Data for Space Application:
Mary Burkey (LLNL), Lawrence Heilbronn (UTK), Patrick Peplowski (JHUAPL)

Nuclear Data for Advanced Reactors and Security Applications:
Mohamed Elsawi (PNNL), Nick Thompson (LANL), William Wieselquist (ORNL)

The Human Pipeline for Nuclear Data:
Lee Bernstein (UCB/LBNL), Yaron Danon (RPI), Libby McCutchan (BNL), Jo Ressler (LLNL)

→ Topical Sessions stating on Wednesday January 27th 10:30AM (EST)

You can watch Introductory Videos posted on our **WANDA 2021 Website**!

Special thanks

Program support and speaker recruitment:

Tim Hallman, Keith Jankowski, Donny Hornback, David Matters and Bert Garcia

Meeting organization support/ND 101 Lecture:

Lee Bernstein, Libby McCutchan, Jo Ressler, Cathy Romano, Patrick Talou, Ian Thompson, and Ching-Yen Wu

Report editors:

Ramona Vogt and Michael Smith

Thank you!

Workshop Coordinator:

Julie Marchand

From Kay and Vlad