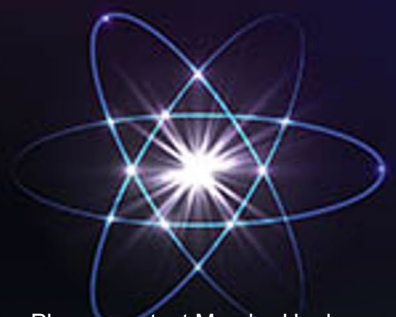
NCSP
NUCLEAR CRITICALITY SAFETY PROGRAM

NEWSLETTER

SPRING 2024

IN THIS ISSUE



Please contact Marsha Henley for information or contributions:

henleym@ornl.gov

DATES TO REMEMBER

Hands-On Training & Education Course Dates:
Two-week Practitioner Course Dates:
Aug 5 - 16, 2024

One-week Manager's Course Dates:
NCERC – Mar 18 - 22,2024, Dec 9 - 13, 2024
SNL – Apr 29 - May 3, 2024, Sep9 – 13, 2024

T&E Page: https://ncsp.llnl.gov/training-education

LINKS TO REMEMBER

NCSP Website
NCSP Program Management
NCSP Mission and Vision
NCSP Five-Year Execution Plan
NCSP Planning Calendar
Previous NCSP Newsletters
CSSG Taskings
Nondestructive Assay Program

A Message from the NCSP Manager

Happy Spring, members of the NCS community.

The NCSP conducted the TPR in February at Brookhaven National Laboratory. The NCS workshop was held at Oak Ridge National Laboratory, also in February. I am looking forward to following up with many of you on the suggestions and issues that came out of the meeting.

Please enjoy this edition of the newsletter.

Angela L. Chambers

NCSP
NUCLEAR CRITICALITY SAFETY PROGRAM

NNSA National Nuclear Security Administration

U.S. DEPARTMENT OF ENERGY

NCSP Technical Program Review Meeting

The 2024 Technical Program Review (TPR) and joint meetings were held February 20 – 23, 2024 in Riverhead, New York. Brookhaven National Laboratory hoted the meeting at the Hyatt Hotel. The agenda included a total of 81 presentations from NCSP site program managers, international collaborators, and technical principal investigators that covered that covered NCSP work for all technical program elements from FY2023 or invited talks for more recent work. Approximately 92 people attended the in-person meeting over the three-day period. Registration represented four foreign institutions (AWE, CEA (French Atomic Energy Commission), OECD Nuclear Energy Agency, and the Institut de Radioprotection et de Surete Nucleaire (IRSN)), ten national labs (Brookhaven, Lawrence Livermore, Los Alamos, MSTS, Naval Nuclear, Oak Ridge, Pacific Northwest, Sandia, Savannah River and Y-12), three universities (North Carolina State, Rensselaer Polytechnic Institute, and University of New Mexico), and the US Department of Energy. Dr. John Hill, Director of Science and Technology from Brookhaven National Laboratory gave the group a warm welcome. Later that evening, we enjoyed a group dinner at the Long Island Aquarium in the Coliseum Banquet Room with approximately 70 people who were able to attend.

The Nuclear Data Advisory Group (NDAG) meeting was also held on February 22 and led by Mike Zerkle, Naval Nuclear Laboratory (NDAG Chair). Agenda topics included new NDAG members introduction, Gd Evaluation, nuclear data requests, Y12 request, and review of the FY2025 NCSP proposal review process. The next NDAG/ND quarterly meeting will be May 1, 2024.

The 2024 TPR Presentations are now available with all the presentations approved for public distribution at this time. Several presentations are still under review and when they are available an announcement email will be sent to all attendees.

DOE Community of Practices Workshop on Nuclear Criticality Safety

Oak Ridge National Laboratory hosted a DOE Community of Practices Workshop on Nuclear Criticality Safety the week of February 12, 2024. This was the first community of practice meeting of this size held in many years. The workshop was organized by DOE-EM and NNSA and sponsored by the DOE Nuclear Criticality Safety Program. Federal employees and contractor personnel from the Office of Science, Office of Nuclear Energy, Office of Environmental Management, and the National Nuclear Security Administration met to discuss current operations and future NCS needs. Approximately 70 people from the NCS community attended in person with approximately 50 people attending via a virtual connection. DOE and NNSA leadership provided presentations on NCS within their organization. Each site then provided a joint field office/contractor presentation on their site including current NCS challenges, needs, and successes. CSSG Emeritus Member Jerry McKamy provided an excellent keynote address providing a historical perspective on NCS throughout the last several decades. CSSG Member Robert Wilson provided some remarks on the first Needs meeting from the 2011-timeframe. Staff members from the Defense Nuclear Facilities Safety Board offered some insights from their perspective. Topic areas needing further discussion were developed, and action items were assigned to team leads. Future meetings will be held to discuss these action items and continue the dialogue.

CSSG Happenings

The CSSG is working on ranking and prioritizing proposals for FY25 NCSP execution under Tasking 2024-01.

A New Member Committee has been formed to identify a replacement for a CSSG Member moving to emeritus status at the end of FY24.

The next face-to-face meeting of the CSSG will be in conjunction with the ANS Annual Meeting in June.

Nuclear Data Updates

The NDAG has recently had its membership updated. David Ames, Sandia National Laboratories, Matthew Devlin, Los Alamos National Laboratory, and Catherine Percher, Lawrence Livermore National Laboratory were welcomed as new members in February 2024. A list of the current members is found on the NCSP NDAG web page.

If you would like to submit a Nuclear Data (ND) Request, please review the ND request guidelines and the sample ND request form. Use the ND request form to submit your request.

WANDA 2024

The Workshop for Applied Nuclear Data Activities (WANDA) is designed to increase communication among nuclear data (ND) users in multi-disciplinary federal programs and ND experts. It also presents an opportunity to cross-pollinate ideas and introduce ND gaps identified by federal programs to ND experts and ND capabilities to the various federal ND users. WANDA 2024 included 5 sessions, 3 of which focused on Fusion Energy Sciences (FES):

1. FES Fusion Neutronics
2. FES Tritium Production

3. FES Material Damage
4. Isotopes and Targetry for Nuclear Data
5. Uncertainty Quantification

The FES sessions successfully brought new voices to the WANDA discussions, expanding the application space in which nuclear data is critical. FES programs need accurate nuclear data with realistic uncertainty quantification to properly estimate, among other things, shielding, activation, tritium production, helium production, structural material integrity, and superconducting magnet operation. This includes a variety of projectile (neutrons, photons, charged particles) and target atoms. One of the action items common to all the FES sessions was the need to perform sensitivity studies to identify the prioritization of nuclear data needs. The NCSP community is well-equipped to handle these studies.

The Isotopes and Targetry session highlighted the many capabilities available to produce high-quality targets for nuclear data measurements, including 3D printing with spherical powders, combustion synthesis coupled with spin coating & electro spraying, inkjet printing, and isotopic doping. These new methods open doors for more accurate measurement, but it was also stressed that sample characterization for any method of fabrication is of the highest importance to accurately interpret nuclear data measurement results. NCSP measurements have already benefitted from some of these methods of sample fabrication.

The Uncertainty Quantification session was broken into two categories: nuclear data UQ, and the use of that UQ. Thematic to the UQ session was the loss of information when going from nuclear data measurement, to evaluation, to evaluated file, to finally neutron transport calculations. Current formats for UQ are essentially just covariance, which assumes probability distributions are Gaussian. This can lead to negative cross-sections when attempting to sample the covariance in ENDF/B libraries. The covariance format, however, is very efficient in that a simple set of linear equations can transform uncertainty from parameters or cross sections to the application of interest. More communication is needed between nuclear data evaluators and nuclear data users to ensure that needs are being met.

The needs and capabilities of the NCSP share common elements with the needs identified for other programs in WANDA this year. This similarity represents an opportunity to increase the impact of NCSP nuclear data research by sharing our expertise with the wider community as well as an opportunity to validate current NCSP methods and data with new integrated testing from a wider variety of application spaces.

Revisiting Thermal Neutron Scattering Measurements for Carbon

By: Kemal Ramic, Iyad Al-Qasir, ORNL

From the early 1940s onward, researchers have delved into investigating the thermal and mechanical properties of different grades of nuclear graphite and how they evolve under exposure to high doses of radiation and extreme temperatures. Nevertheless, these inquiries have perennially encountered hurdles due to the inherent variations in nuclear graphite features arising from manufacturing processes, the anisotropy of the unit cell, microstructure orientation, purity levels, and porosity. The ORNL Nuclear Data group has the computational means and experimental setups at SNS/HFIR that allows investigating nuclear graphite interaction with neutrons at microscopic level. Recently, there has been a revived debate about the thermal neutron interactions in nuclear graphite which originate from the complex microstructure nuclear graphite possesses. The latest ENDF/B-VIII.1.b3 library contains five

thermal neutron scattering law (TSL) sub-libraires. Three of them to account for porosity level (10, 20 and 30 percent) in nuclear graphite. Recently, room temperature measurements of the phonon densities of states of two nuclear graphite grades with different porosity and different pore sizes, namely, G347A and a Pile Grade A (PGA) were performed using the time-of flight wide Angular-Range Chopper Spectrometer (ARCS) at the Spallation Neutron Source (SNS) at ORNL [1].

Figure1 shows these measurements and compare them to the phonon spectra used to create ENDF/B-VIII.1.b3 10%, 20%, and 30% porosity TSLs for graphite, as well as crystalline graphite TSLs. It is noticeable that there are no discerning differences between the measured phonon spectra, and that the crystalline TSL reproduces the shape of the measured spectra the best. Porosity as modeled in 10%, 20%, and 30% porosity could not reproduce the measured shape of the nuclear graphite phonon spectra as seen in Fig. 1.

Figure 2 compares the calculated and measured inelastic and total scattering cross sections at room temperature as a function of the neutron incident energy. In addition, small angle neutron scattering (SANS) cross sections for different grades of graphite are shown. It can be observed that none of the total cross section curves as calculated by different ENDF/B-VIII.1.b3 TSLs reproduce any of the total cross section measurements, especially below the first Bragg edge. This is due to missing small angle neutron scattering (SANS) cross section, which if accounted for leads to a better agreement with the measured total cross section.

In conclusion, various grades of nuclear graphite exhibit identical atomic vibrations, and porosity does not influence atomic dynamics. However, porosity is responsible for small-angle neutron scattering, which warrants comprehensive examination to comprehend its impact on the neutron scattering process in nuclear graphite.

ORNL Nuclear Data group on February 28th 2024 performed SANS at High Flux Isotope Research reactor at ORNL of 6 different types of nuclear graphite to accurately describe the effect of the porosity in graphite. Data analysis is in progress.

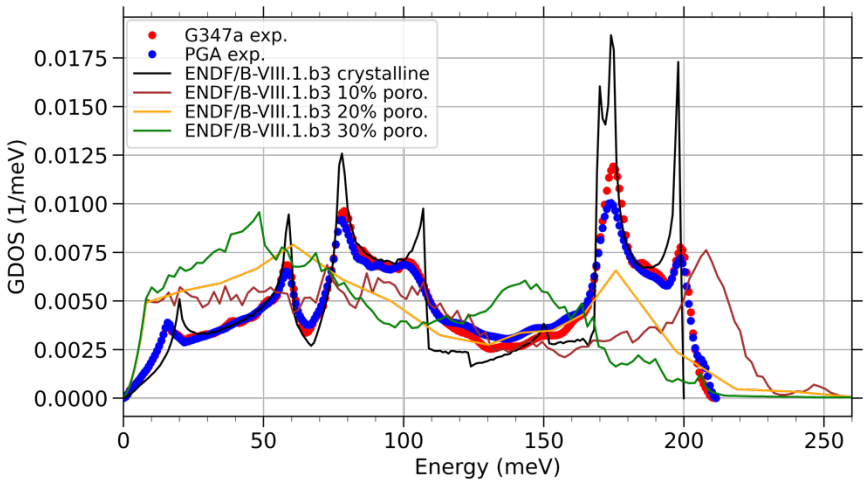


Figure 1: Phonon spectrum measurement from ARCS instrument at SNS

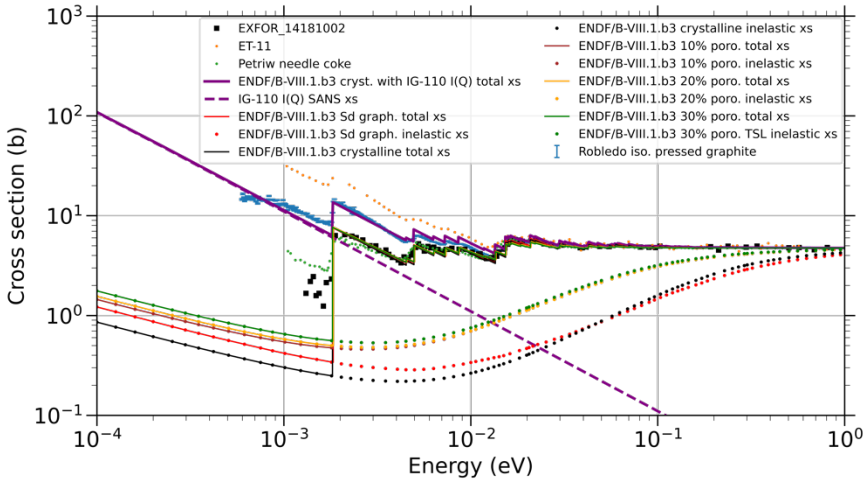


Figure 2: Comparison of ENDF/B-VIII.1.b3 with total cross section measurements

References

1. Iyad I. Al-Qasir, Yongqiang Cheng, Jiao Y. Y. Lin, Anne A. Campbell, G. Sala, Kemal Ramic´, Fahima F. Islam, Abdallah Qteish, Barry Marsden, Douglas L. Abernathy and Matthew B. Stone, “Neutron Thermalization in Nuclear Graphite: A Modern Story of a Classic Moderator”, Annals of Nuclear Energy 161 108437, (2021).

Prompt Fission Uranium Neutron Spectrum (PFUNS) Experiment Performed

LA-UR-24-21856
Authors: J. Hutchinson, T. Cutler, J. Goda, M. Gooden, T. Grove, J. Lee, D. Neudecker, R. Sanchez, R. Weldon, N. Whitman, N. Wynne

A longtime effort for the NCSP was completed in February 2024 with the successful execution of the Prompt Fission Uranium Neutron Spectrum (PFUNS) experiment. The experiment was performed at the DOE National Criticality Experiments Research Center (NCERC) at the Nevada National Security Site (NNSS). The objective was to determine the prompt fission neutron spectrum (PFNS) of the uranium isotope ^{235}U. To meet this objective, activation foils were placed in a central void region of a critical configuration consisting of concentric highly enriched uranium (HEU) metal hemishells. The set of activation foils were chosen based on threshold reactions to neutron energies across the fission spectrum.

In 2011, two experiments were proposed on parallel paths, a measurement at the Los Alamos Neutron Science Center (LANSCE) and an integral experiment at NCERC, to address uncertainty in the understanding of the shape of the prompt fission neutron spectrum. At that time, while the evaluations using ENDF/B-VII.0 nuclear data were considered to perform fairly well in many applications, there were suggestions of important deficiencies that needed to be resolved because of their impact on criticality.

The LANSCE experiment was performed a few years ago and published in 2022. It used the Chi-Nu detector, designed specifically for the measurement of PFNS, and a Parallel-Plate Avalanche Counter (PPAC) containing ^{235}U deposits, which was made at LLNL. As can be seen on the left in Fig. 1, Chi-Nu data (in blue) significantly improves the PFNS nuclear data from previous measurements up to 10 MeV. Above 10 MeV, model extrapolations are used which have very high model-predicted uncertainties. The complementary experiment at

NCERC with irradiation and counting of numerous threshold activation foils, many with threshold reactions above 10 MeV, can reduce the uncertainty.

Operations were conducted using the Planet critical assembly machine at NCERC over three weeks in February 2024. The PFUNS experiment (middle in Fig. 1) utilizes the Rocky Flats (RF) HEU hemishells. PFUNS has similarities to the Measurement of Uranium Subcritical and Critical (MUSiC) experiment, conducted at NCERC in 2021, which also used RF hemishells, but contains a large central cavity to allow for a sample plate (right in Fig. 1) to be inserted. This large void means that much more HEU is needed to achieve a critical configuration (108 kg for PFUNS versus 59 kg for MUSiC).

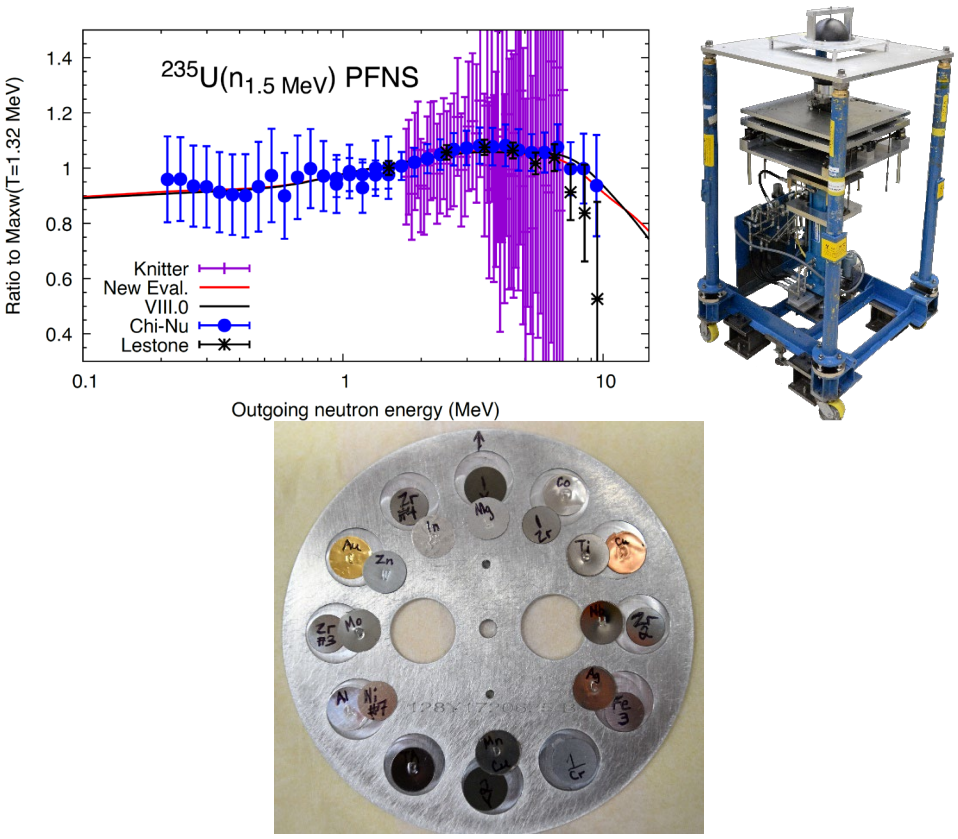


Fig. 1: Left - experimental and evaluated ^{235}U PFNS for E_{inc}=1.5 MeV. Middle – PFUNS experiment on the Planet critical assembly machine. Right – foil loadout for the 12-hour irradiation (22 total foils used).

Over the three weeks of operations, four different critical benchmark configurations were measured. Measurements with a Coordinate Measurement Machine (CMM) were performed (left in Fig. 2) to reduce positioning uncertainties when modeling the configurations. Measurements with four different organic scintillator systems, 12 detectors total, (right in Fig. 2) were performed to supplement the spectral measurements provided by the irradiation of activation and fission foils. These measurements will provide information on the energy of neutrons exiting the system, complementing the foil irradiation data which focused on neutrons at the center of the system. Very long measurement times were needed to detect neutrons from the high energy portion of the fission spectrum where few neutrons are emitted. The measurements were performed for a total of 15 hours over several days on the same configuration.

Fig. 2: Left – workers performing Coordinate Measurement Machine (CMM) measurements. Right – organic scintillator measurements of neutron leakage spectra.

The experiment culminated in two high-power irradiations with specifications given in Table 1. The first irradiation deployed 20 foils and primarily focused on fission foils. The fission foil data will be utilized to calculate reaction rate ratios for nuclear data validation. These ratios have been useful in nuclear data validation for decades due to the small uncertainties that result from the cancellation of errors in a ratio measurement. They provide spectra-dependent values that can be compared between critical systems. The second irradiation focused on activation foils with various high-energy thresholds. This irradiation was performed for 12 hours (left in Fig. 3) and required shift work for successful execution. The data from these foils will be utilized for spectral unfolding to reduce the uncertainty in the high energy PFNS for ^{235}U.

The foils from both irradiations are counted using High Purity Germanium (HPGe) gamma detection systems. The NCERC Count Room (right in Fig.3) has had numerous upgrades in recent years (both from NCSP and from Defense Nuclear Nonproliferation (NA-22) contributions). Five HPGe systems are being utilized in the NCERC count room for PFUNS. In addition to counting foils at NCERC, foils with reactions that have very long half-lives requiring counting over several months will be shipped to the LANL Chemistry-Nuclear Radiochemistry (C-NR) Count Room in New Mexico.

In 2022, the PFUNS experiment began at NCERC with two successful irradiations at lower relative power to determine scaling factors and to confirm neutron field symmetry with direct measurement. Unfortunately, electronic component failures prevented subsequent irradiations at the high power necessary to obtain data on high-energy threshold reactions. Additional work was performed between the 2022 and 2024 operations to ensure that a successful irradiation could be performed. This included permanent relocation of several electronic components further away (and out of line of sight) of the Planet assembly. In addition, a large shield wall was assembled to further reduce radiation dose to components. Over 60 thermoluminescent dosimeters (TLDs) total were deployed during the two 2024 irradiations to measure gamma dose and neutron fluence. Results will provide information about the irradiations but will also be very useful in planning future NCERC operations.

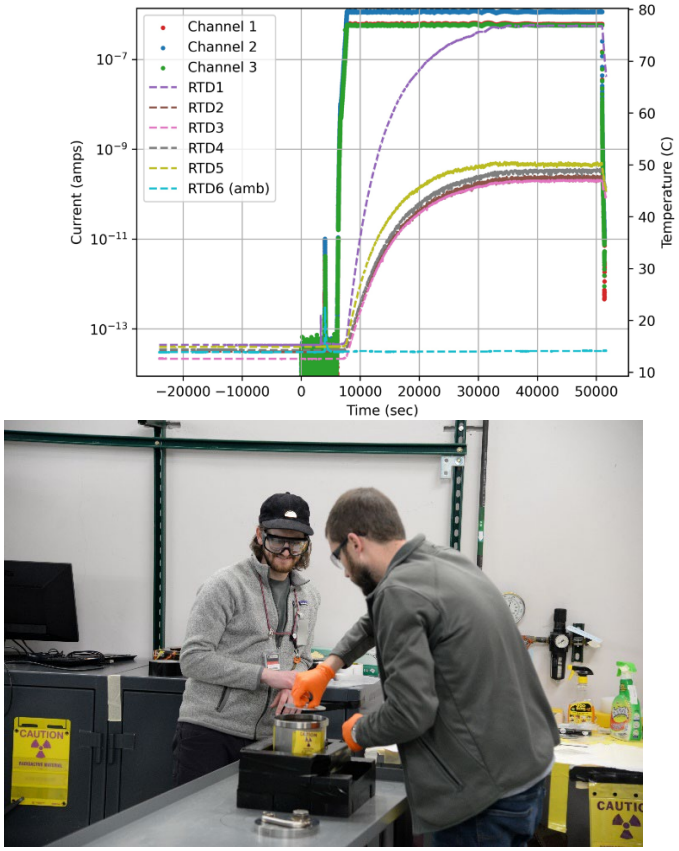


Fig. 3: Left - power and temperature data for the 12 hour irradiation.
Right – personnel unloading the foils after the irradiation and retrieval were performed.

Counting of activation and fission foils will continue for PFUNS and additional future work includes data analysis of the HPGe and organic scintillator data and benchmarking. PFUNS includes collaboration between NEN, NCERC-FO, C, and XCP divisions at LANL, along with facility support by Mission Support and Test Services (MSTS).

Table 1. PFUNS 2024 Irradiation Specifications

Date	2/20/2024	2/21/2024
Number of foils	20	22
Duration (hrs)	2	12
Energy (# fissions)	1.6E+16	2.1E+17
Power Level (Watts)	69	153
Temperature rise: center of assembly (ºC)	20.2	61.8
Temperature rise: outer surface bottom (ºC)	10.1	34.5
Temperature rise: outer surface top (ºC)	12.0	35.7

Acknowledgements

PFUNS is supported by the DOE Nuclear Criticality Safety Program, funded and managed by the National Nuclear Security Administration for the Department of Energy. This work was supported by the US Department of Energy through the Los Alamos National Laboratory. Los Alamos National Laboratory is operated by Triad National Security, LLC, for the National Nuclear Security Administration of the US Department of Energy under Contract No. 89233218CNA000001.

LaTeX Template for Criticality Safety Benchmark Evaluations

LA-UR-24-22148

A modern LaTeX template is now available to format benchmark evaluation documents for the International Criticality Safety Benchmark Evaluation Project (ICSBEP) Handbook. A team of contributors from Los Alamos National Laboratory (LANL) developed the template to streamline the preparation of new evaluations. The ICSBEP Handbook ensures the best data is available for criticality safety analysts, nuclear data evaluators and transport code developers around the world. It provides a trusted suite of experiments to validate criticality safety calculations, test analysis methods and evaluate nuclear data libraries. The submission of new benchmark evaluations is a vital step to preserve the data generated through new and historical experiments. Many critical experiments in the handbook were performed at the Los Alamos Critical Experiments Facility and LANL continues to perform new experiments at the National Criticality Experiments Research Center (NCERC) and to evaluate them for submission to ICSBEP.

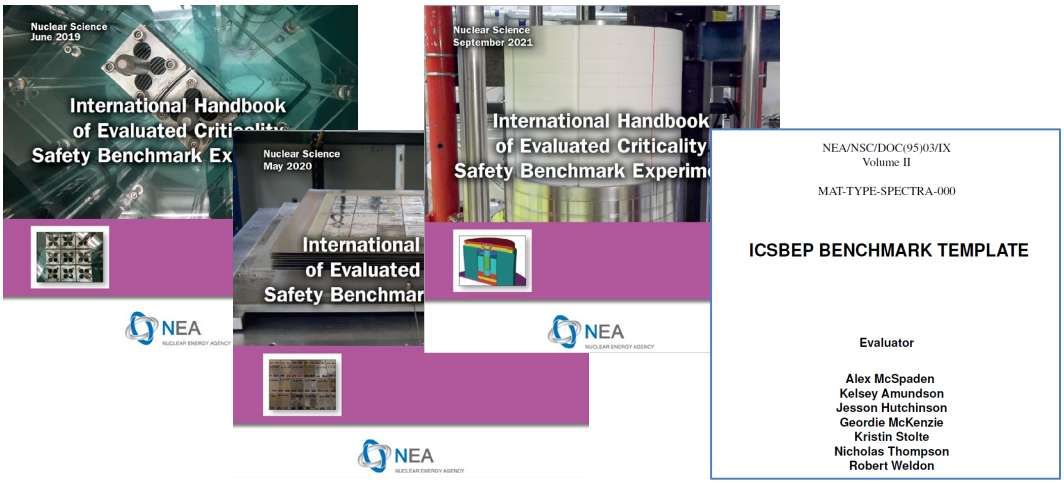


Figure 3. Recent Editions of the ICSBEP Handbook and a Title Page generated by the LaTeX Template.

As the ICSBEP Handbook has evolved, the rigor of evaluations has dramatically increased, and the complexity of the documents has followed the same trend. Using LaTeX will ease the formatting of the submissions, helping authors more easily manage the non-technical, but time consuming, aspects of preparing evaluations. This includes proper referencing of tables, figures, and source documents. As described by Wikipedia, "***LaTeX*** is a software system for typesetting documents. LaTeX markup describes the content and layout of the document, as opposed to the formatted text found in WYSIWYG [what you see is what you get] word processors like Microsoft Word,…" The new LaTeX template provides proper formatting for ICSBEP evaluations so authors can dedicate more of their time to technical analysis and documentation instead of tracking down editorial issues.

A wide team of contributors from LANL helped to develop the template and OECD NEA personnel contributed feedback. The template can be adapted for the International Handbook of Evaluated Reactor Physics Benchmark Experiments (IRPhE) and the Shielding Integral Benchmark Archive and Database (SINBAD) handbooks. The LaTeX template is available through the Organization for Economic and Co-operation and Development (OECD) Nuclear Energy Agency (NEA) website, www.oecd-nea.org, for those with access to the ICSBEP Technical Review Group workspace. It can also be requested from the LANL Library (ICSBEP Benchmark Template, LA-UR-23-33330).

FIESTA 2024

The Fission Experiments and Theoretical Advances (FIESTA) 3rd Edition School and Workshop will be November 18 – 20, 2024. FIESTA is a fission-focused school and workshop aimed at educating graduate students and postdocs conducting fission research, exposing them to new ares of fission that they might not have encountered before with some hands-on interactive experience, and providing a venue for active fission research to be presented to the community. For more information about the school and workshop, please visit the FIESTA 2024 website.

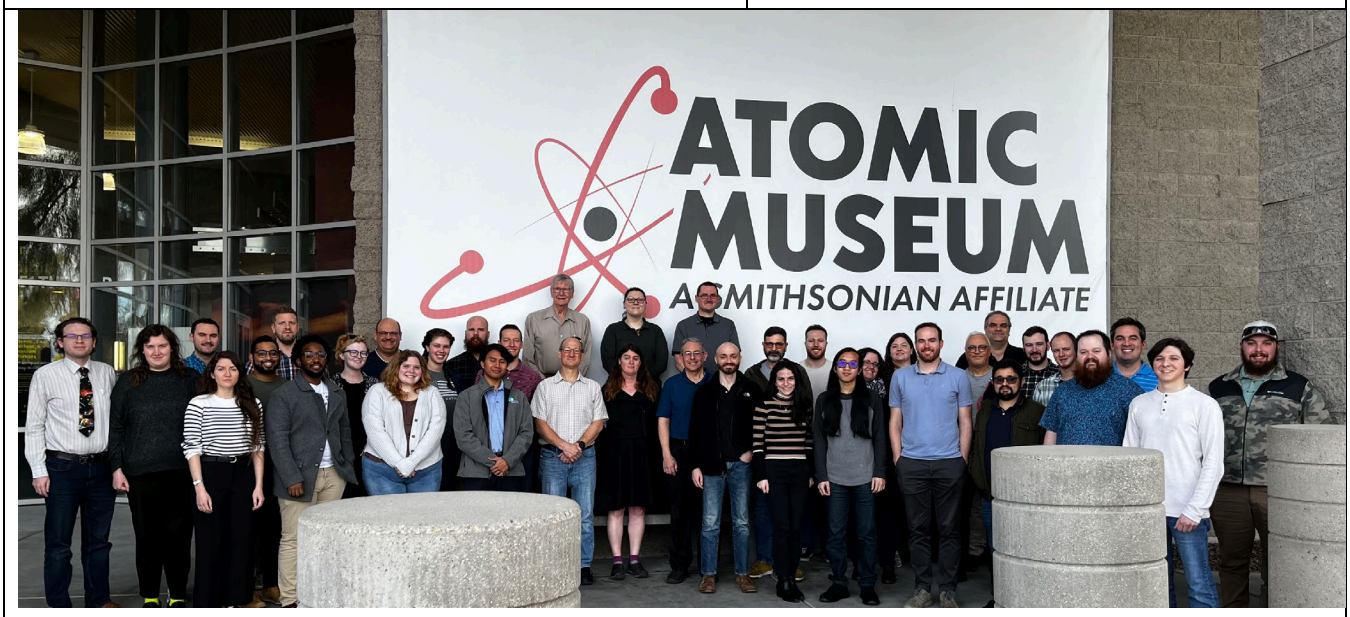
Training and Education

January 22 – February 2, 2024 Two-week Hands-on NCS Practitioner Course

The NCSP completed its first 2-week hands-on training course for NCS practitioners over the period Jan. 22-Feb. 2, 2024. This was the largest course we've had so far – 29 total students in the lecture portion of the course at the National Atomic Testing Museum with 16 students at Sandia and 15 students at the NCERC. Photos from each portion of the course are included below.

Sandia Students with SPR/CX

NCERC Students at Sedan Crater



Students at the National Atomic Testing Museum

Two-week Practitioner Course Dates:

- August 5 – 16, 2024

Registration is open (courses to be held in person)

The first week (lectures and workshops) will be held at the National Atomic Testing Museum (NATM), while the second week (hands-on portion) will be held at the National Criticality Experiments Research Center (NCERC) and Sandia National Laboratories. The courses are designed to meet the ANSI/ANS-8.26, "Criticality Safety Engineer Training and Qualification Program," requirement for hands-on experimental training. The NATM portion of the course involves virtual classroom lectures and workshops for NCS Evaluation development. The NCERC and SNL portions involve hands-on experiments with the critical assemblies. MSTS, LANL, ORNL, LLNL, SNL, Y12, and NFO staff participate in the course execution.

One-week CSO/Manager's Course Dates:

- NCERC CSO/Manager Course – March 18 – 22, 2024
- Sandia CSO/Manager Course – April 29 – May 3, 2024
- Sandia CSO/Manager Course – September 9 - 13, 2024
- NCERC CSO/Manager Course – December 9 - 13, 2024

Registration is open (courses to be held in person)

The courses are designed for fissile material handlers, process supervisors, line managers, and regulators with criticality safety responsibilities. MSTS, LANL, ORNL, LLNL, SNL, Y12, and Nuclear Facility Operator (NFO) staff participate in the course execution.

MCNP User Symposium

The 2024 MCNP® User Symposium (hosted by Los Alamos National Laboratory) will be held from **August 19 - 22** as a hybrid event. The in-person option will take place at the Los Alamos J.R. Oppenheimer Center while the virtual option will use the Cvent platform.

Registration is open and we are now soliciting abstracts for presentations. Information on both topics is available at www.lanl.gov/mcnp2024 and below. There are several important deadlines indicated below to be aware of as well.

Registration

Everyone who wishes to participate in the symposium must register at **www.lanl.gov/mcnp2024.** This includes both in-person and virtual attendees.

The fee for in-person registration is $200.00. There are a variety of ways provided to pay this registration fee. Note the following:

- In-person attendees will have access to events and sessions not available virtually. We will post an overview agenda soon that will indicate what will only be available for in-person attendees.
- **Early registration for in-person is encouraged**, as we could be subjected to numerical limits.
- There is a reduced fee for students.
- Travel information, including room blocks, is available on the website.

There is no registration fee for virtual attendees, but registration is still required.

Registration Deadlines

Non-US Citizens:

Non-US citizens must register and provide the following information no later than June 14, 2024.

- Resume where required information must be provided. A downloadable sample resume is available on the website.

- LANL foreign national visitor information form. It is available on the website.
- Picture copy of a valid passport. An expired passport is acceptable if you are attending the Symposium virtually.

Non-US citizens should submit this required information to Glenda Sanchez at ggsanchez@lanl.gov. Failure to do so will risk a delay in approval or result in denial to attend.

Non-US citizens working at LANL do not need to provide the additional information but must have their hosts ensure that their FVTS includes MCNP in their approved work scope.

US Citizens:

- **The deadline for US citizen registration is August 12, 2024.**

Call for Abstracts

To be considered for a presentation, please submit an abstract. An abstract template is available on the website. The information requested is fairly minimal: name(s), institution, proposed title, a short abstract, suggested session topic(s), and presentation time requested. **The abstract from LANL authors must have been approved for public releases with LA-UR numbers.** The information below is also available by clicking the "Presenter Information" link at the top of the landing page.

We expect to incorporate presentations that range from 15 minutes to 30 minutes, depending on the type of content. For example, a presentation focusing on a large and complex MCNP application having unique requirements and challenges that had to be overcome (or may still remain) could require 30 minutes. A presentation suggesting a new MCNP capability motivated by a specific application might require less time. A similar comment could be made about a presentation that in effect concludes by asking the entire community (developers and other users) for advice on solving a problem. The audience would be particularly interested in clever uses of the code (sharing tricks – user presentations are not just for developers but for other users as well), whether the focus be related to physics, variance reduction, parallel computing, set-up or visualization, etc. Presentations that include input on MCNP nuclear data libraries and adjacent software tools such as Whisper, MCNPTools, ISC, MAKXSF, and mcnp_pstudy are also welcome.
The past Symposia have included sessions on the following topics:

- Fusion Applications
- Reactors and Criticality
- Unstructured Mesh and CAD
- Accelerators
- Experimental Design
- Data and Physics
- Shielding
- Transport Methods and Statistics
- Space and Earth Science Applications
- Tools

We anticipate similar but not necessarily identical topics for the 2024 MCNP User Symposium. **Do not feel limited by the above topic list. Feel free to suggest others with your abstracts.**

Abstracts should be submitted to mcnp2024abstracts@lanl.gov. The deadline for submitting abstracts is June 28, 2024. While we will strive to incorporate all submissions

into the agenda, we cannot guarantee that will be possible. We will notify all submitters by **July 26, 2024,** as to the disposition of their proposed presentations.

For general comments or questions, please email mcnp2024@lanl.gov

MCNP® Courses

Class Information: https://mcnp.lanl.gov/classes.html

Fees and Registration Information: https://mcnp.lanl.gov/class_registration.html

April 8 – 12, 2024	Intermediate MCNP6 (Online)
April 29 – May 3, 2024	MCNP6 for Nuclear Safeguards Practitioners
May 20 – 24, 2024	Practical MCNP for the Health Physicist, Radiological Engineer, and Medical Physicist
June 3 – 7, 2024	Criticality Calculations with MCNP6
June 17 – 21, 2024	Introduction to MCNP6 (online)
Aug 26 – 30, 2024	Using NJOY to Create MCNP ACE Files and Visualize Nuclear Data
September 30 – October 4, 2024	Intermediate MCNP6
Oct 21 – 25, 2024	Introduction to MCNP6 (online)
Dec 2 – 6, 2024	Variance Reduction with MCNP6

SCALE Users' Group Workshop

We are pleased to announce that the 8th SCALE Users' Group Workshop will be held as a hybrid meeting on June 5–7, 2024. Registration for the workshop is now open at https://scalemeetings.ornl.gov/register-scale/. Details will be available at https://scalemeetings.ornl.gov/.

You are invited to participate in the meeting and contribute with presentations and discussions on impactful and innovative applications of SCALE. Under the SCALE Open Mic technical session, users are invited to discuss their work challenges and achievements, with no formal presentation required, however, presentation slides are welcome. Contributions to the SCALE Model Contest session require only a single page showing one or more images of a SCALE model. Participants will have 5–10 minutes during the session to provide background on the

model, present additional information as desired, and answer questions. The best models will be showcased in a 2025 SCALE calendar. In-person participants will have the opportunity for individual user support from SCALE developers and expert analysts during a SCALE one-on-one session. Additionally, three technical tours are offered to in-person participants.

Fifteen hands-on tutorials will be presented: twelve virtual only and three hybrid, as specified on the agenda at https://scalemeetings.ornl.gov/agenda/. Virtual tutorials have unlimited participation. The hybrid tutorials are limited to 75 in-person participants with unlimited virtual participation. To be able to participate in these tutorials, registrants must have a user license for SCALE 6.3.1 or 6.2, as required for the tutorial. Before registering for any tutorial, please verify that you have or are eligible to request the SCALE license that is required for that tutorial. See https://www.ornl.gov/content/how-order-scale on details on how to request a SCALE license.

In-person participants will have the opportunity for individual user support from SCALE developers and expert analysts during a SCALE 1x1 session.

Please email scalehelp@ornl.gov with any related question or suggestion.

For details on the sessions organized in 2023 and other previous years, please see https://scalemeetings.ornl.gov/previous-workshops/.

SCALE Courses

The next training block will be held in person at Oak Ridge National Laboratory February 25 – March 22, 2024. There will be no virtual or hybrid option for the courses. Registration fee information is available here. The Registration will be open by the end of January. More information about the courses is found at https://www.ornl.gov/scale/training.

March 18 – 22, 2024	SCALE/ORIGEN Standalone Fuel Depletion, Activation, and Source Term Analysis

Nuclear Energy Agency (NEA) Courses and Workshops

Information about Nuclear Energy Agency (NEA) courses is found at https://www.oecd-nea.org/dbcps/training-courses/.

16-17 April 2024	FRENDY
13-17 May 2024	PHITS
21-24 May 2024	FUDGE/(MC)GIDI/GNDS
18-20 June 2024	FISPACT-II