

**NUCLEAR SCIENCE ADVISORY COMMITTEE
to the
U.S. DEPARTMENT OF ENERGY and NATIONAL SCIENCE FOUNDATION**

PUBLIC MEETING MINUTES

Virtual Meeting

September 28, 2022
NUCLEAR SCIENCE ADVISORY COMMITTEE
SUMMARY OF MEETING
Videoconference

The U.S. Department of Energy (DOE) and National Science Foundation (NSF) Nuclear Science Advisory Committee (NSAC) videoconference meeting was convened at 3:00 p.m. Eastern Time on Wednesday, September 28, 2022, via Zoom® by **Committee Chair Gail Dodge**. The meeting was open to the public and conducted in accordance with Federal Advisory Committee Act (FACA) requirements. Visit <http://science.energy.gov> for more information about NSAC.

NSAC Members Present

Gail Dodge (Chair)	Oliver Kester
Paulo Bedaque	Joshua Klein
Lee Bernstein	Cecilia Lunardini
Romualdo deSouza	Rosi Reed
Evangeline Downie	Fred Wietfeldt
Senta Victoria Greene (<i>ex officio</i>)	

NSAC Members Absent

Sonia Bacca
Nathalie Wall

NSAC Designated Federal Officer

Timothy Hallman, DOE, Office of Science (SC), Office of Nuclear Physics (NP), Associate Director

NSF Presenter

Allena Opper, NSF, Nuclear Physics, Program Director

September 28, 2022

Welcome and Introduction, Gail Dodge, NSAC Chair, welcomed attendees and asked committee members, NSF representatives, and DOE representatives to introduce themselves.

DOE Office of Nuclear Physics Overview, Timothy Hallman, Associate Director

Starting in FY21, DOE funding has not kept pace with the 2015 Long Range Plan's (LRP's) modest growth scenario. The FY23 President's Budget Request (PBR) also falls short, though the FY23 House Mark of \$780M and the FY23 Senate Mark of ~\$805M are closer to or slightly surpass the modest growth scenario, respectively. The Creating Helpful Incentives to Produce Semiconductors for America (CHIPS) and Science Act, recently passed by the House, authorizes funding targets greater than that of the modest growth scenario. DOE SC management have suggested using this authorization as guidance for the next LRP.

The Inflation Reduction Act (IRA) provided ~\$138M to the Electron-Ion Collider (EIC); \$7.7M to the Gamma Ray Energy Tracking Array (GRETA); and ~\$31.2M to the Measurement of Lepton-Lepton Electroweak Reactions (MOLLER) experiment. An additional ~\$8M+ and ~\$29.7M, respectively, will be issued to Ton-Scale Neutrino-less Double Beta Decay ($0\nu\beta\beta$) experiments and the High Rigidity Spectrometer (HRS) in October 2022.

The Facility for Rare Isotope Beams (FRIB) was completed in FY22 on budget and ahead of schedule. The Super Pioneering High Energy Nuclear Interaction Experiment (sPHENIX) was completed on time in FY22 and on budget. With the addition of Inflation Reduction Act (IRA) funding, GRETA and MOLLER will be fully funded assuming funding at the FY23 PBR level. GRETA holds Critical Decision 2/3 (CD-2/3) and has a total project cost (TPC) of ~\$58M. Completion is projected for 2028. MOLLER has achieved CD-1 and has a cost range of ~\$46M-\$57M. Completion is projected for FY27. The HRS also has achieved CD-1, has a cost range of ~\$85M-\$111M, and is substantially funded. Completion is projected for FY29. The Ton-Scale $0\nu\beta\beta$ program has received CD-0 with an estimated cost range of \$215M-\$250M. The EIC has achieved CD-1 with a total cost range of \$1.7B-\$2.8B and completion projected for FY33. EIC continues to prioritize making sufficient progress to be prepared for a performance baseline CD-2 review in FY24. IRA support and continued appropriations are important to avoid a large reduction in force and loss of needed skills in FY25, at the planned conclusion of the science program at the Relativistic Heavy Ion Collider (RHIC). At present, there are >1,350 EIC active users from ~270 institutions in 36 countries. The Science and Technology Facilities Council (STFC) of the United Kingdom and the Institut National de Physique Nucléaire et Physique des Particules (IN2P3) in France are exploring EIC-related commitments.

The Ton-Scale $0\nu\beta\beta$ program continues as an NP research focus with three proposed technologies. More than one Ton-Scale $0\nu\beta\beta$ experiment would enable contemporaneous verification of results. Another summit meeting with potential international contributors Italy, Canada, Germany, and other countries is in the planning stage.

On Monday, October 3, 2022, SC will roll out a new Diversity, Equity, and Inclusion (DEI) thrust for all SC proposals. Everyone has an important role to play in enhancing DEI.

Preparations for the next LRP exercise are underway. It is imperative the the NP community remain united in realizing current and future goals; division can set back the entire field.

Discussion

Klein asked about the FY23 Senate Mark and the CHIPS and Science Act. **Hallman** confirmed the FY23 Senate Mark does not fully meet the authorization in the CHIPS and Science Act. The CHIPS and Science Act is an authorization bill, which differs from an appropriations bill. An FY23 NP appropriation of at the Senate Mark of \$805M would match the modest growth scenario used for the 2015 Long Range Plan. The CHIPS and Science Act authorization for FY23 exceeds the Senate's FY23 Mark but does not guarantee a matching appropriation.

Bernstein revisited the CHIPS and Science Act in relation to NP research. **Hallman** remarked sections called out specific funding amounts for EIC, FRIB, and other efforts, but is unaware of other detailed guidance regarding NP research. The CHIPS and Science Act sets a target funding level under which NP and the community would determine the best way to optimize funding use. **John Wilkerson** (via chat, University of North Carolina) pointed to pages 221-223 of the CHIPS Act for NP authorization sums of \$840M in FY23 and \$976 M in FY24.

Harald Griesshammer (via chat, George Washington University) inquired about IRA funds for supporting theory. **Hallman** explained IRA funding is limited to projects. NP is aware there are research needs accompanying projects, but such needs would be covered by normal NP program funds.

NSF Nuclear Physics Overview, Allena Opper, NSF Program Director

NSF recognizes the 2.5-month shorter time period for the development of the 2023 LRP compared to that of the 2015 LRP and appreciates the hard work of all involved parties, including the American Physical Society Division of Nuclear Physics (APS DNP), DNP Town Hall organizers, and the nuclear science community. NSF relies on the LRP process to identify and communicate compelling opportunities, including major national facilities that enable high priority science in support of U.S. leadership in the field.

NSF programs supporting shovel-ready research infrastructure include Major Research Instrumentation (MRI), with costs ranging from \$100K to \$1M for Track 1 and \$1M to \$4M for Track 2. The CHIPS and Science Act recently waived MRI cost-sharing for PhD-granting institutions, meaning the amounts requested by proposals from these institutions are expected to increase by ~30%. The MRI budget, with few exceptions, has remained flat at \$75M annually since 2001. The Mid-scale Research Infrastructure (MsRI) program supports shovel ready projects between \$6M and \$20M for Track 1 and \$20M to \$100M for Track 2. The next set of MsRI solicitations are expected in FY23. Proposals to the NSF Division of Physics (PHY) Investigator Initiated Research are due on December 6, 2022.

Opper reviewed NSF personnel and highlighted potential employment opportunities.

Discussion

None.

Presentation of the Nuclear Data Interim Report, Lee Bernstein, Nuclear Data Subcommittee Chair

On April 13, 2022, the NSF and DOE jointly charged NSAC to form a subcommittee to assess nuclear data stewardship with results to be delivered in two reports. A 95-page first/interim report was delivered on September 15, 2022. This interim report detailed: 25 nuclear data achievements, including databases and tools as well as collaborative domestic efforts; international efforts and collaborations; nuclear data needs in basic sciences, energy, medicine, national security, nonproliferation, and space areas; and cross-cutting needs in workforce development, ongoing fission evaluation, accelerated decay data evaluation, improved reaction modeling via extended nuclear structure data evaluation, (n,x) data from thermal to 20MeV addressing reactions and structure, and high energy data as well as stopping powers. A new view of nuclear data's role is emerging, presenting an interconnected system among facilities and capabilities, codes, applications, and nuclear data itself. Several important topics (e.g., fusion, materials damage) were not covered due to limited time.

The second report, due January 30, 2023, will identify future nuclear data stewardship challenges; describe ways the nuclear data community can train and retain a diverse, equitable, and inclusive workforce; and identify access needs for facilities and instrumentation as well as crosscutting and/or collaborative opportunities with other federal programs, and domestic and international stakeholders. The NSAC nuclear data subcommittee, universities, and the U.S. Nuclear Data Program (USNDP) will help provide necessary information and insights. Much of

the information gathered for both reports will support the LRP process. Information may be solicited from the broader nuclear science and engineering community regarding workforce development and DEI.

Support has been received from the Quantum Chromodynamics (QCD) community to generate a draft Nuclear Data Initiative, which is already in progress.

Discussion of the Nuclear Data Charge

Dodge appreciated the tremendous amount of work accomplished by the subcommittee. The interim report is available on the NSAC website. Additional material can be added if needed.

Ramona Vogt (chat, Lawrence Livermore National Laboratory) indicated the QCD Nuclear Data Initiative charge was well received by survey.

Long Range Plan Update, Gail Dodge, NSAC Chair and Old Dominion University

At present, 57 individuals have agreed to serve on the LRP Writing Committee, including one international observer. A second international observer may be added. Anticipated subcommittees, in the process of being formed, include: QCD; Fundamental Symmetries; Nuclear Structure & Nuclear Astrophysics; Workforce Development, including education and DEI; Applications; International Context; Crosscutting/Interdisciplinary Scientific Opportunities; Impact and Synergies with Other Fields; and Budget.

The American Physical Society (APS) Division of Nuclear Physics (DNP) has organized three townhalls: one has taken place and two are planned for the coming months. A closed kick-off meeting will be held October 26, 2022, in New Orleans. White papers are due at the end of February 2023. Some white papers have already been written and are being used by DNP Town Halls. The Town Halls will also produce white papers, which may reference longer documents on specific topics. White papers promoting a particular initiative or recommendation are advised to be of modest length and/ or include an executive summary. All input is welcome. A resolution meeting will be held in the late spring/ early summer. Following this meeting, the LRP will be edited until submission in October 2023.

Discussion of the Long Range Plan

Bernstein indicated the Nuclear Data report will support some LRP subcommittee areas such as applications. However, synergies with other federal programs are an area in the Nuclear Data report requiring more input. Is there a list of individuals focusing on each topical area?

Dodge has compiled and will circulate information regarding individuals' preferred subcommittee assignments. Many are interested in serving on more than one subcommittee. Subcommittee task sizes vary. Subcommittee chairs and an LRP draft outline, respectively, will hopefully be identified and prepared for the meeting in New Orleans. It is important all review the prior two LRPs, which are well written.

Marcel Demarteau (Oak Ridge National Laboratory), inquired about publication and socialization plans for the LRP with regards to the report's impact, especially with members of Congress. **Dodge** appreciated this comment, noting a communications plan has been recommended, but its development has not yet begun. All suggestions are welcome.

Stuart Henderson (Thomas Jefferson National Accelerator Facility [TJNAF]) urged early consideration of a deliberate communications strategy. The way a report is rolled out can make a big difference in capturing the attention and imagination of stakeholders, including those

in Congress, and highlighting the field's unity and excitement. **Demarteau** encouraged subcommittees to consider production of one-pager documents that could eventually be compiled into a pamphlet or glossy five-pager document for distribution to many parties. Writing these materials is challenging.

Dodge sought examples of prior reports with successful communication plans. **Henderson** will provide examples. **Klein** highlighted efforts by the DOE Office of High Energy Physics (OHEP) with the previous Particle Physics Project Prioritization Panel (P5) Report, including a two-pager which was updated annually for several years following the release of the P5 report. **Demarteau** cited the impact of the HEP community's letter of support accompanying the P5 report. **Hallman** pointed to the successful rollouts of the HEP P5 Report and a National Academy of Science (NAS) study for the EIC.

Dodge asked how to engage communications support from NSF and DOE. **Hallman** indicated DOE SC has a Communications Office. **Opper** said NSF has a similar office. APS may also offer guidance.

Hallman encouraged collection of all LRP materials in one place. **Vogt** commented the APS Engage platform is open to everyone. If desired, select folders can be password protected and/or restricted to certain individuals, such as those on the Writing Committee. **Dodge** encouraged all to access APS Engage, noting this a place where white papers and other LRP information can be posted. **Brenda May** (NP) commented Oak Ridge Associated Universities (ORAU) can also provide selected access to an external site. **Opper** remembered the prior LRP process used an Argonne National Laboratory (ANL) website to list all white papers. **Donald Geesaman** (ANL) clarified the website contained both public and private access areas. It is important all LRP input received is publicly available. **Dodge** agreed all white papers should be accessible. Some papers are currently on arXiv. **Vogt** (chat) noted APS Engage can similarly provide public and private access.

Jay Benesch (TJNAF) recommended tagging LRP papers within the comments section in arXiv. Snowmass has taken this approach to enable searching. **Dodge** will ensure all white papers are ultimately in one place.

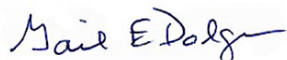
Dodge observed the European Union (E.U.) has an extra year to produce an analogous report, and the E.U. started before the U.S.

Public Comment

None.

Dodge adjourned the meeting at 4:43 p.m.

The minutes of the U.S. Department of Energy and the National Science Foundation/Nuclear Science Advisory Committee meeting, held on September 28, 2022, virtual by zoom are certified to be an accurate representation of what occurred.



Gail Dodge
NSAC Chair
Date: 1/3/2023