

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

PUBLIC MEETING MINUTES

**Gaithersburg Marriott Washingtonian Center
9751 Washington Boulevard, Gaithersburg, MD 20878**

March 8 - 9, 2013

**DOE / NSF NUCLEAR SCIENCE ADVISORY COMMITTEE
SUMMARY OF MEETING**

The U.S. Department of Energy (DOE) and National Science Foundation (NSF) Nuclear Science Advisory Committee (NSAC) was convened at 9:00 a.m. EST on Friday, March 8, 2013, at the Gaithersburg Marriott Washingtonian Center by NSAC Chair Donald Geesaman.

Committee members present:

Donald Geesaman, Chair	Joshua Klein	Patrizia Rossi
Robert Atcher	Zheng-Tian Lu	Robert Rundberg
Jeffrey Binder	Robert McKeown	Jurgen Schukraft
Jeffery Blackmon	Jamie Nagle	Matthew Shepherd
Alexandra Gade	Allena Opper	Julia Velkovska
Susan Gardner	Erich Ormand	
Peter Jacobs	Jorge Piekarewicz	

Committee members absent:

Vincent Cirigliano	Curtis Meyer	Raju Venugopalan
David Kaplan	Kenneth Nash	
Karlheinz Langanke	Kate Scholberg	

NSAC Designated Federal Officer:

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

Others present for all or part of the meeting:

Cyrus Baktash, DOE SC, Office of Nuclear Physics (NP), Program Manager, Low Energy Nuclear Physics
 Laura Biven, DOE SC, Office of the Deputy Director for Science Programs, Senior Science and Technology Advisor
 William Brinkman, DOE SC Director of Science
 Fleming Crim, National Science Foundation, Directorate of Mathematical and Physical Sciences, Assistant Director
 George Fai, DOE SC, Office of Nuclear Physics (NP), Program Manager, Nuclear Theory
 Marc Garland, DOE SC, NP, Program Manager, Isotope Facilities
 Jehanne Gillo, DOE SC, NP, Division Director, Facilities and Project Management Division
 John Harris, Yale University
 Robert Janssens, Argonne National Laboratory
 Bradley Keister, National Science Foundation, Program Director, Nuclear Physics
 Joshua Klein, University of Pennsylvania
 Alan Krisch, University of Michigan
 Richard Kouzes, Pacific Northwest National Laboratory
 Thomas Ludlam, Brookhaven National Laboratory
 Geoffrey Mills, Los Alamos National Laboratory
 Hugh Montgomery, Thomas Jefferson National Accelerator Facility
 Berndt Mueller, Brookhaven National Laboratory
 Robert Redwine, Massachusetts Institute of Technology
 Lee Schroeder, Lawrence Berkeley National Laboratory/TechSource Inc.
 Bradley Sherrill, Michigan State University
 James Sowinski, DOE SC, NP, Acting Program Manager, Heavy Ion Nuclear Physics

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MARCH 8, 2013

OPENING REMARKS

The Nuclear Science Advisory Committee (NSAC) was convened at 9:00 a.m. EST on Friday, March 8, 2013, at the Gaithersburg Marriott Washingtonian Center, in Gaithersburg, MD, by NSAC Chair **Donald Geesaman**. The meeting was open to the public and conducted in accordance with the requirements of the Federal Advisory Committee Act. Attendees can visit <http://science.energy.gov/np/nsac> for more information about NSAC. The meeting was presented via Webcast at <http://www.tvworldwide.com/events/DOE/130308/default.cfm?action=2> and is archived at this location.

WELCOME AND INTRODUCTION TO NEW MEMBERS AND APPRECIATION TO DEPARTING MEMBERS

Tim Hallman, DOE Office of Science (SC), Office of Nuclear Physics (NP), Associate Director, and **Fleming Crim**, National Science Foundation (NSF), Directorate of Mathematical and Physical Sciences (MPS), Assistant Director, presented certificates of appreciation to departing NSAC members Susan Gardner, Peter Jacobs, David Kaplan, Joshua Klein, Robert McKeown, Curtis Meyer, and Kenneth Nash.

Geesaman extended appreciation to current members and welcomed new members Vincent Cirigliano, Erich Ormand, Patrizia Rossi, Jürgen Schukraft, Matthew Shepherd, and Kate Scholberg.

PRESENTATION OF NSF NEWS

Fleming Crim provided an update on NSF and the MPS. Crim came to the NSF from University of Wisconsin Colleges of Letters and Science after 35 years. MPS is the largest and most diverse directorate, spanning multiple fields and disciplines. It was the original NSF, and for Crim, is the heart of the Foundation.

The character of MPS' divisions differs. MPS reflects a balance of individual researchers and multi-user facilities. It needs to be nimble in uncertain times, yet NSF pays attention to core fundamental research and where it connects with the Administration and Congress. This supports Crim's philosophy for NSF and MPS. The strategy to transform the frontiers of science and innovate for society happens by cutting-across the directorates and agencies, similar to the range of representation within NSAC.

In the short-term, NSF is dealing with sequestration. It will honor continuing obligations but the number of new proposals and grants it can fund is uncertain. Crim wants to meet obligations and keep programs that grow the workforce and support future scientists.

NSF is responding to recent interest in brain-mapping, and a White House Office of Science and Technology Policy (OSTP) memo about open access. Relative to publications, open access is not complicated and is trackable. The data part is complicated and MPS will seek public input.

Plans to deal with budget challenges are forming. Even with reports about Congress' views in publications such as the American Physical Society newsletter, Crim sees science as positively regarded and seeks to further this view.

Crim and Hallman have discussed their admiration for the community's ability to gather and discuss priorities.

Roundtable discussion

NSF is interviewing candidates for its open Director of the Division of Physics position. Crim believes that a new hire will be announced within six weeks. In response to Blackmon's question about this being a rotator position or Federal appointment, Crim could not share those details. A rotator can be a Senior Executive Service member who serves for a term or could be a faculty member and serve through the Intergovernment Personnel Act (IPA), also a rotator role. Crim believes that appointing someone for an indefinite term may not seem like a good idea to most. Deputy Division Directors give continuity and stability, and are in NSF for longer periods.

Jacobs shared concern about open access and asked who is pushing this initiative and the timeframe for issuing a response to OSTP. Crim noted that the community is pushing the publications side, but does not know who is driving the issue. It may be pushed by a public view that taxpayers ought to have access to data. In education, instructors use large data sets for teaching. NSF has to be sensitive to producing tax-funded data and accessibility. He thinks that NSF will have an interim steering committee and working groups within weeks, and will produce a plan in six months. The National Academies of Science will host a workshop on May 14 – 16 to solicit community input. Crim thinks that the timescale for data access is around one or two years. Data heterogeneity makes this complex, as do different methods of producing and recording data. The current discussion centers on conceiving plans that do not force communities into someone else's construct. Community input on data sharing is needed.

Jacobs raised the complexity of international collaboration on publications. Crim shared that the United Kingdom has a model but it may not work here as the agency pays for open access and not all in the U.K. have been following along. The economic model would be difficult for U.S. agencies. NIH is investing in a publications database. Hallman added that OSTP's memo is the driver. It directs all agencies to submit plans with specific timeframes for achieving open access. This is the six-month timeframe that Crim referenced.

Schukraft added that CERN is building an open access initiative on the nuclear side with U.S. participation. Intellectual copyright is a challenge, but this could be a model for the U.S. Crim asked about negotiations with publishers, and if work is being done through archives or traditional society. Archives are developed for standard use, Schukraft noted, adding that CERN has invested about \$10M and funds publishers to convert journals into electronic format. This is a pure open access system with copying and transfer that allows commercial use of publications. Publisher okay is not required, and there are also specific agreements for individual papers. Crim responded that negotiations on these types of arrangements would have to be made across the entire complex. He added that there are already inter-agency discussions, particularly with those that are active in this field. The OSTP memo gets everyone moving and is a good place to start. Opper shared that the NSAC was charged with working on public access about two years ago, and felt that the Committee and its community is a good place to start. Crim agreed.

Blackmon asked about plans to honor all commitments to funding, noting that not doing so could lead to wildly fluctuating success from year to year. Crim echoed the Director's belief that sequestration will lead to discontinuity. It is just a five percent reduction but would be multiplied by 12 7ths as it would be applied in the last seven months of the year. NSF would like to avoid fluctuations but would also like a bigger budget. Crim noted that he has been at NSF for just six weeks, and hence is not fully aware of all of the dynamics involved.

Public comments

None

PRESENTATION OF THE DOE OFFICE OF SCIENCE PERSPECTIVE

William Brinkman, DOE SC Director, thanked NSAC for its prior report on the prioritization of facilities. He shared the view that supporting all facilities is the right thing to do. SC is doing all that it can to try and determine how to do that.

At the same time, SC is awaiting details around sequestration. The consequences are not clear, but several laboratories have already had furloughs. It is likely that there will be fewer grants this year and other reductions. The sequestration will have a strong and negative impact.

The inability to move funding around is another challenge. Many things could be solved if funds did not have to stay in specific buckets. An example of fiscal challenges is the new facility being built a Brookhaven National Laboratory (BNL) that is coming off of construction this week. It is supposed to move from \$150M in funding to \$50M but the continuing resolution with sequestration pushes for \$145M. This does not make sense to Brinkman. SC has to control its own spending and budget and he hopes that SC will be able to do that.

Congress is moving to pass a continuing resolution to keep the budget going. Brinkman believes that it will pass but is unsure what it will say. He is hopeful for more flexibility to more things around to get things done.

The progress of other nations is a concern as many have more than caught up with the U.S. in science. According to recent studies, U.S. authors in Physical Review is down from 30% to 22 percent of papers being published. This will grow, Brinkman believes. One could argue that this is okay, but there are facilities starting up that rival those in the U.S. The U.S. has an X-ray free electron laser which we are very proud of, for example, but there four more such facilities are being built elsewhere. A synchrotron is coming online in China and they are building another with capabilities to rival the U.S. And, this is just in Basic Energy Sciences. The U.S. also faces tremendous competition in supercomputing.

Brinkman thanked the NSAC for its report on budget support of nuclear science calling it more than fair. He still sees international competition in this field. Work done previously in the U.S. is now moving to CERN. He sees that the U.S. needs to be competitive. Brinkman mentioned setting standards and specifically cited CP violation as being an area that is important. Efforts could focus on the decay of the Higgs boson but he sees that CP violation does not fit and determining the ratio of anti-matter is vital. He wants to develop a strong program with FNAL and leverage the Sanford laboratory in South Dakota. The community needs to rally behind this important direction.

The SC needs direction and values NSAC's advice on keeping facilities running.

DOE continues to support the ITER facility in France as it moves from a small program to a large construction project. It is an amazing facility and its use of magnets is impressive. Building the facility and office buildings have taken their toll on the DOE budget, which has caused the DOE to take money from other things.

From a U.S. program funding view in fusion, China, South Korea and Europe are making strong progress. China is building a new facility, South Korea is hard at work, and Japan has a large yield accelerator. The U.S. is trying but not keeping pace with the rest of the world. It does have the NSDX facility and device at Princeton and that is being upgraded. However, Brinkman sees that the Nation has some real problems and it needs direction in U.S. science.

There are efforts to establish open access policies. Brinkman and former NSF Director Subra Suresh are optimistic about the opportunity and feel that this should be done. The U.S. taxpayer

should have open access to literature. DOE has been reorganizing to do this and is working to create a meta-database that gives access to papers. OSTP is leading the Federal effort.

Physics has an atypical approach to information archival. Brinkman's colleagues start work in the morning and have open access to see what has been placed in the archive. He does not know if open access will have an impact in physics as it will in other fields.

On March 5th, Brinkman met with the House Appropriations Committee. It is a friendly environment and they shared their appreciation for science. Brinkman hopes that they will do something about this, but recognizes that they are very confined by the Budget Committee.

Round Table discussion

Geesaman expressed thanks that SC believes in funding all three nuclear physics facilities. The NSAC has worked hard to learn what it could do to support this conclusion. He appreciates that SC is taking this message forward.

Geesaman asked for comment on the charge to the facilities committee and for clarification on the SC's plan. Brinkman sees that people outside of nuclear science need to be convinced that there is a plan for the future. He knows that people would like to build additional facilities such as a facility at Berkeley, but contends that SC should do things for the right amount of money. He does not know what will happen with the budget and foresees that there will not be much funding in the next few years. The exercise has been helpful to SC in looking at the free-electron laser and its potential. It is a simple beam and different from an electron beam. It is an extremely expensive way to work with electrons but Brinkman sees that there are many ideas about magnets and other things that are new and different. SC needs to look at the future and technological aspects, and what can be funded.

Geesaman asked if SC will have a single plan and budget profile or alternate plans to fit several budget profiles. Brinkman pointed out that the last time such a plan was created for OS by Ray Orbach, it was not tied to a specific budget. Brinkman also is concerned that it is unclear if the U.S. can create an international facility in the U.S. He sees the advantages but the process within the government is very complex and budgets are decided year by year. That is not useful for international parties and a facility. A hope is that a domestic facility would draw international collaboration, but the Office of Management and Budget (OMB) and Congress and others are looking over DOE's shoulder and it is unclear how an agreement can be reached.

Piekarewicz pointed out that although the facilities report was based on the 2007 Long Range Plan (LRP) and 2012 NRC report, he is still concerned that the facilities charge was given out just a month ago yet asks for a plan that will last for the next 10 years. Brinkman's impression is that the NSAC weighed in the other reports and that answering the charge should not be hard to do.

Lu expressed appreciation for hearing mention of CP violation as an important part of nuclear physics and shared that this is being worked from several angles as researchers search for clues in neutrino physics.

Rundberg wondered about the budget, noting that Los Alamos National Laboratory (LANL) spends time working on regulations and the costs of the regulatory framework. Brinkman expressed that SC has been pushed on the regulatory side and filling out forms has become a dominant activity, yet thinks that progress has been made. SC is instituting the Portfolio And Management System (PAMS) to track the status of grants. The PAMS software allows the whole grants process to be electronic, moving a grant from submission to the appropriate program manager and into administration. SC is trying to simplify things, be more efficient, and has decreased the administrative side of the Office. The relationship between SC and

laboratories is good, and the host site office interacts with the laboratories. The community would point out other things that need to be improved.

Public comment

Thomas Ludlam of BNL asked about conference participation. The monster bureaucracy that has been created is not working, said Brinkman. DOE has to weigh many factors yet he would like laboratory directors to attend conferences. At one time, researchers had one budget and spent it on travel or other things at their discretion. OMB is pushing this issue and wants to cut travel whenever cuts need to be made. Brinkman contends that program managers (PMs) need to attend conferences to stay in touch with the field.

Hugh Montgomery of the Thomas Jefferson National Accelerator Facility (TJNAF) asked for an update on the Presidential Budget. The budget for FY14 is essentially done, Brinkman reported, and is with OMB. He is unsure when it will be released. Congress will go on recess soon and may have few hearings on the FY14 budget. He hopes it will come out this month.

PRESENTATION OF NEWS FROM THE NSF NUCLEAR PHYSICS

Bradley Keister, NSF, Program Director, Nuclear Physics (NP), shared an update on NP activities. Keister reviewed how the FY12 budget of \$48M was split between five areas of investment: NP experimentation, NP theory, Particle astrophysics and non-accelerator physics, Frontier Centers, and the National Superconducting Cyclotron Laboratory (NSCL). NP gives grants and supports infrastructure at facilities. That occurs through programs that NP supports directly and other programs in the division.

NSF's appropriation for Research and Related Activities (R&RA) increased by 2.8 percent in FY12, while NP and most other division programs were down by 3.5 percent from FY11. NSCL funding remained flat from FY11. The program continues to manage and distributed the impact of American Recovery and Reinvestment Act (ARRA) funds from FY09.

The Federal government is under a continuing resolution through the end of March 2013. MPS is the parent directorate for NP and seeks a 2.8 percent increase from the FY12 estimated budget of \$1.308B to the FY13 request of \$1.345B. All areas would see increases with the exception of Arctic Research. Keister noted that the percentage variations across NSF is a reflection of differing abilities of NSF divisions to map to Administration and White House priorities. Within MPS, the Division of Physics would see an increase of 1 percent from \$277M to \$280M. An increase of 1.3 percent to \$196M is expected for physics research with an emphasis on grant support.

The FY14 budget has not been submitted to Congress yet. The expectation is that it will be released in a few weeks.

Additional funding sources for nuclear physics include the Domestic Nuclear Detection Office. Keister believes that there will be another solicitation but the FY13 process has not started yet. The F13 request include funding support for Major Research Instrumentation (MRI). The deadline for this passed and proposal reviews have begun. The Physics Division is also planning for its next triennial competition for Physics Research Centers, with the pre-proposal process beginning in early Fall 2013.

The Physics Division continues to study NSF-wide initiatives for possible matches in terms of the budget process. One good match is Computational and Data-Enabled Science and Engineering (CDS&E), which may be reflected in future budgets.

The recent OSTP memo to all agencies on open access to data requires each agency to come up with a plan. NSF has had a data management plan (DMP) requirement in its proposal

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solicitations. This requirement is now in its second year. The judgment of the quality of proposers' plans is left up to proposal merit review committees. They have varying views in practice, but Keister shared that there is a growing sense of effective practices among those who do this. This is not just a U.S. issue; European agencies have indicated that they are dealing the same questions.

Keister reviewed changes in NSF personnel. NSF Director Subra Suresh will leave in a few weeks to become president of Carnegie Mellon University. There is no news yet about a candidate search. Denise Caldwell is the Acting Director for the Physics Division. A Division Director search is ongoing. In NSF NP, Gail Dodge heads the experimental side and Bogdan Mihaila has arrived to support Nuclear Theory and Computational Physics for at least year, and Alice Mignerey will be helping with the experimental program part-time.

Roundtable discussion

Piekarewicz noted Fleming Crim's earlier comments about funding for new proposals, and asked if such funding will be going down for nuclear physics. Keister said that NSF NP is thinking about this from a programmatic side, and that the review panel provides input on priorities for new investigators. The panel gives NP a system for ranking and prioritizing. NSF NP cannot say that it will fund a certain number of proposals per year.

Public comment

None

PRESENTATION OF NEWS FROM THE DOE OFFICE OF NUCLEAR PHYSICS

Tim Hallman, DOE Office of Science (SC), Associate Director, Office of Nuclear Physics (NP), shared an update on the activities of the DOE NP since the prior NSAC meeting in January 2013.

There is not much known about the FY13 budget. The House passed a bill that reflects its opinion on the budget and the possible impact of sequestration. The potential impact is reduction from a request of \$550M to \$523M. The FY12 enacted budget was \$547M and the FY13 request is \$527M. Hallman noted Brinkman's earlier comment that funding profiles are dynamic and that some things may roll off. Discretion is important. SC would like to move funding to mitigate impacts across the entire program. Hallman believes that the Senate will discuss the budget soon.

A Committee of Visitors (COV) for DOE NP was convened on January 7 – 9, 2013, and assessed the processes to solicit, review, recommend, and document proposal actions. It also reviewed the efficacy and quality of these and related processes, and the quality of the resulting portfolio, and its breadth, depth and international standing. John Harris of Yale chaired the COV.

Hallman announced personnel news. NP was unable to fill the vacancy for a Medium Energy Program Manager but will start that process again after March 15th. He asked that the community and NSAC identify and encourage candidates to apply. The application process will be open for 10 days. The process for selecting a Director for the Physics Research Division is ongoing. New personnel in NP include Kyungseon Joo who joined through the Intergovernmental Personnel Act (IPA) and Kawtar Hafidi who joined as a detailee.

NP will conduct a review of research efforts at laboratories and universities. Subpanels will be looking at the quality and merit of research in subfields, and NP will release a letter with instructions on what needs to be submitted in advance. The topics and tentative dates are:

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- Nuclear Structure/Nuclear Astro (May 20-24)
- Heavy Ions (May 28-31)
- Medium Energy (June 10-14)
- Nuclear Theory (June 17- 24)
- Fundamental Symmetries (June 25-28)

The NP Isotope Program will host a second Federal Isotope Workshop in Fall 2013.

Hallman announced that DOE NP will create a portfolio for Neutrons / Neutrinos and Fundamental Symmetries.

A pass back was expected on January 28th. Since then, negotiations on final budget numbers have occurred, and the FY14 narrative is in final preparation. A budget is expected within weeks.

The NP office retreat is March 13 – 14. Hallman thanked all laboratory managers and those who prepared spreadsheets. NP will discuss strategies on how to best support the community.

A review of the 12 GeV Upgrade will occur on May 7 – 9, 2013.

One-day site visits are planned for TJNAF, a science and technology (S&T) review for ATLAS, and a RHIC operations review.

SC and NP have discussed new construction starts with the FRIB project team and how to make progress in light of a mandate in the continuing resolution against new starts. All are working to start a CD2/3 review once NP can provide some budget insight.

The Early Career Award (ECA) selection process is in progress.

NP has nominated an attendee for the Nobel Prize meeting but is awaiting DOE conference approval. The topics are chemistry and the candidate is studying nuclear chemistry.

On March 20th, NP will discuss neutrino double-beta decay (DBD) experiments with the SC Office of High-Energy Physics (HEP). NP is seen as a steward for DBD. A strategy for possible down-selection large-scale experiments will be addressed if the science “demands” that a ton-scale $0\nu\beta\beta$ experiment be carried out and if resources are available. There is potential to reinstate the Neutrino Scientific Assessment Group (NuSAG) with members from NP and HEP to consider down-select criteria.

Hallman reviewed the charge from Brinkman to the NSAC on future facilities needed to support the SC mission. The charge held a short timeframe and a need to focus on prior reports, although that is certainly not the only source of input.

The National Defense Authorization Act (NDAA) for FY13 contains language that impacts the NSAC. It discusses improving the reliability of the medical isotope supply. The Secretary of Energy is directed to use NSAC to assess whether NNSA is achieving program goals in this area and recommend program improvements. This stems from improving the supply of molybdenum-99. NP is speaking to the right people about how this should be handled. This will mean additional work for NSAC.

Management priorities ahead include getting community input and moving the nuclear science community forward with the resources that DOE has available. Other priorities are:

- Establishing short-term and long-term program priorities amidst fiscal uncertainty
- Maintaining scientific productivity with reduced facility operations
- Managing construction funding profiles and addressing the impacts of the directed change in the 12 GeV CEBAF funding profile in FY2012
- Optimizing core national laboratory and university research within constrained budgets
- Equipment Disposition of HRIBF and transition of essential staff
- Nurturing the nuclear structure and astrophysics community prior to FRIB

- Meeting the stable and radioisotope needs of the Nation, and mitigating impacts, to the extent possible, of possible reduced production capability

Hallman shared that recipients of the report on implementing the 2007 LRP were very appreciative that the nuclear science community could complete it. This is a model for other communities.

Roundtable discussion

Jacobs suggested a new committee for Fundamental Symmetry, and that there is no laboratory hosting this effort or committee that follows this. There are many fundamental symmetry efforts and groups, but there is a need for overarching guidance. Jacobs added that there are projects of a large magnitude. Hallman shared that DOE NP does not have a specific plan for this at the moment. There is no standing committee that advises NP on how to proceed. Sometimes NSAC is asked to form a subcommittee to advise NP on how to proceed. He acknowledged that this is different from Jacobs' request but that this could be considered as well as getting community input to shape a long-term plan and how to prioritize.

Gardner wondered about the down-select process for DBD experiments and justifying more than one experiment. Hallman agreed that upon seeing a signal one would want to know the source and that there is a natural inclination for more than one experiment. There could be one U.S. experiment, but this would have to be balanced with other priorities and being able to afford more than one. The cost for experimentation is not yet known, there are competing technologies, and it is not known which would be best.

Blackmon asked about Yale disposition activities and the timescale. Jehanne Gillo commented that this refers to a distribution of equipment. There are negotiations in place and a solicitation will come out in two months that will ask for proposals on how to use equipment.

Nagle asked how people should view Brinkman's use of the word "few" in saying that the budget will be challenging for a few more years. DOE NP is a vibrant program and RHIC is producing results. Hallman explained that the budget is renewed one year at a time and the FY14 budget is not even known. SC knows that RHIC's physics program remains valuable and vibrant. He believes that Brinkman acknowledged that he would like to see that come to fruition. The comment is to affirm that the science program at RHIC remains compelling.

Nagle sees the facilities subcommittee charge as confusing, citing the request for multiple pieces of information including a third piece that looks at estimated construction costs. The subcommittee was only charged with two of three tasks. Nagle asked where SC will get data for the third and if that information would be publicly available when endorsed by the NSAC. Hallman described part three as an approximate level of understanding and not terribly precise. For FRIB, as an example, the costs are understood. The intent is to estimate but not in a way such that a timescale is given and costs provided, unless already understood. The request does not indicate needing a timescale, Nagle noted, and wondered if SC wants facilities to be prioritized. Hallman expressed needing to think about the question more, but responded that SC is always doing planning and that Brinkman has a rough scale of what is being discussed.

Jacobs agreed that the charge is confusing. He noted that Subcommittee Chair Bob Redwine would discuss what should be done. He wondered if NSAC should just accept the report and separate out a larger process for the prioritization of facilities. Nagle responded that one could view the charge as NSAC being responsible for the first two tasks and rankings in all three.

Public comment

Lee Schroeder, Lawrence Berkeley National Laboratory/TechSource Inc. asked about the future of ARRA funding going forward. Hallman shared that this depends on the details of the budget and sequestration. If a program does good work and can be continued, then SC will do so.

PRESENTATION ON THE REPORT OF THE 2013 COMMITTEE OF VISITORS

John Harris, of Yale University and the Chair of the 2013 Committee of Visitors (COV) presented a report on the COV visit held on January 7 – 9, 2013. The COV was asked to consider:

- a) The efficacy and quality of the processes used to solicit, review, recommend, monitor, and document application, proposal, and award actions; and
- b) The quality of the resulting portfolio, including its breadth and depth, and its national and international standing

Each DOE NP sub-program described how they work and break-out sessions looked at individual grant portfolios and individual Early Career Awards. The COV tried to evaluate if decisions were being made in a reasonable way. The COV drafted a report that includes recommendations.

Harris congratulated NP for its world-leading program and in operating three major facilities. This was the first evaluation of the DOE Isotopes Program. It is well-established with a confident and motivated staff. NP gives insight on domestic and international issues.

The COV made four major recommendations:

Reiterating recommendations from 2007 and 2010, NP needs a database to track relevant proposal and grant information. The PAMS system is expected to start in 2013. The COV found that the level and quality of documentation varied between PMs and there was some lack of uniformity. This made it difficult to conduct reviews and compare grant files. Interviews of PMs confirmed that handling grants requires repetition, so comments should positively impact monitoring and making decisions, and should enable more focus on decision-making and grant-monitoring. It should also help NP access and provide data to future COVs.

NP should track the participation of under-represented groups and make this data available. The COV urged that necessary authorization be obtained, consistent with Federal requirements, to track diversity and demographic information through the PAMS systems. The goal is not clear, but there is a need to involve under-represented groups in the field, especially women and minority groups under-represented in the field relative to the general population. The NP should encourage all levels of representation from undergraduate students through principal investigators (PIs). Through PAMS, it would seem possible to track this once the authorization is in place.

NP should increase its focus on timely delivery of reports, and the development of a set of guidelines of Laboratory Review Reports to streamline the process. The COV examined material from the Theory and Heavy Ion reviews from prior COV reviews. It looked at the Medium Energy and Low Energy Programs during the reporting periods. In cases where reports were not written, PMs issued information verbally and these figured into decisions. There were delays with reports. The Medium Energy report, as one example, was released 20 months after it occurred. The Low Energy report is still outstanding after 17 months.

The COV commented that annual laboratory management budget briefings and rotating program reviews give significant feedback to and from the DOE. The Directorate should give timely reports to allow laboratory management to decide on funding and personnel, and DOE needs timely data to make decisions. This also supports community buy-in. The relevancy of reports decreases over time.

NP should create detailed guidelines for roles and responsibilities for research and facilities PMs. Guidelines across the DOE NP portfolio could consolidate best practices. NP should clearly define tasks and responsibilities for PMs specifying their roles as program stewards based on strategic direction and peer review input. A common template could be used for PM reports.

The COV offered process-specific recommendations.

When soliciting and reviewing proposals, DOE NP should engage the community to enhance the peer review process for university grants such that while continuing to be fair, there can be more discrimination. NP could use a quantitative component in its grant evaluation process. The lack of any quantitative measure to comparatively rank makes it difficult to make tough decisions amidst tight budgets. NP relies on occasional comparative reviews for the entire research program. A comparative review is planned for this Spring. A quantitative review would permit NP to continually assess the quality of its grant portfolio. The introduction of structured reviews of grants in PAMS would allow PMs to compare the quality of grant applications, allow for the uniform implementation of decision criteria, and simplify the generation of documentation that supports grant decisions. PAMS should make things more efficient, reduce the time to funding decisions, and make the feedback to PMs more informative and uniform.

NP should give feedback to the ECA Program applicants on the relative competitiveness of their proposals, and relevance to NP program priorities. It should give potential alternative routes for funding declined proposals. The review criteria appear not to be disseminated effectively or at least widely. There is little constructive criticism to permit writing better future proposals and submissions. The unfunded ECA Program proposals cannot be directly considered for funding by the Program itself outside of the ECA Program. Separate proposals need to be written for this type of ONP consideration. The ECA has become an important factor in some academic departments and factors into promotion and tenure. Naming those proposals that are finalists could encourage and benefit young scientists. NP should advocate for improvements and commit to panel reviews, make a plan to support new investigators outside of the ECA, and create and promote new opportunities for young investigators.

The COV had other specific process comments for the solicitation and review of proposals but no specific recommendations. The COV did suggest that the Small Business Innovation Research and Small Business Technology Transfer (SBIR/STTR) program be developed by expanding the invitation to the annual SBIR meeting to laboratories. Specific to the Isotopes Program, there should be some confirmation that user facilities are able to support this work, if the isotope facility operates parasitically from the user facility..

The COV offered recommendations for project and program monitoring.

NP should fill the Research Division Director and Medium Energy Program Manager positions. This has been updated since the COV as there are efforts to fill the Director position. Not filling this position increases the Acting Director's workload, oversight, and day-to-day management of PMs. Harris added that the short timeframe allowed to advertise openings impacts the recruiting of quality candidates. SC standards may need to be changed. The COV noted that the Facilities and Project Management Division Director has used detailees to support division activities. It urged the Research Division to make more use of IPAs and detailees.

NP should define the process and timeframes for the major reviews including the 2013 Comparative Review, and make this known in the field as soon as possible. Hallman shared earlier that a comparative review of university and laboratory groups will occur this Spring. The COV noted that metrics of success can vary considerable across the subfields supported by NP.

NP should perform further analysis of workforce data and develop plans to mitigate the impact of potentially constrained budgets on the workforce. The NP staff and number of graduate students have grown since 2009, maybe due to NP budget growth, ARRA funding, and new initiatives. NP should be concerned about the impact on the workforce of significantly constrained budgets, and should mitigate budgetary impacts to the degree possible. A more in-depth analysis could be informative and understanding demographics would support planning.

NP should continue engagement with User Facilities to create performance metrics. There are some operational metrics used and some numbers about utilization of Accelerator Improvement Programs and other activities. RHIC continues to be under-utilized as shown by utilization hours, due to funding constraints, but its scientific productivity remains high. This chronic under-utilization highlights the constraints of the fiscal climate. One might wrongly conclude that RHIC's 33 percent utilization means that only 33 percent of the science is getting done but that is not true. Starting in FY14, OMB will no longer use beam performance metrics for accelerator user facilities. NP could be expected to monitor its facilities but cannot use a common set of metrics as the facilities are different. OMB's focus could allow for measure more closely tied to output.

NP should strengthen the coordination and exchange of information on accelerator R&D activities between SC offices. Comments support this recommendation and urge that accelerator R&D maximize facility performance. Maintaining the present level of accelerator R&D is important to maintaining the health of research.

The COV presented many findings for facilities and operations. Facilities use base operations funding to carry out short-term commissioning and performance-improving R&D activities, and R&D for next generation facilities. Accelerator R&D assessments are carried out during S&T reviews and other ways. The complete R&D program review was carried out in 2011 at the TJNAF S&T Review and an in-depth review of the RHIC accelerator program is planned for 2013. NP supports and oversees the operation of scientific user facilities with a high level of engagement with facilities management. HRIBF supported more than 150 users per year and had unique capabilities that now lay fallow with no plan for the transfer for these to other facilities. The COV added that the successful and efficient operation of facilities is central to NP's mission. It commended NP on the implementation of dedicated operations reviews and saw the use of S&T and operations reviews as robust. It was pleased to see that S&T reviews contain an assessment of previous review recommendations and responses for follow-through.

The COV found that the NP effectively monitors projects and has a successful record in contributing to SC achievements and improving on overall SC project success. NP is using tailored approaches to balance a need to maintain a successful project record.

The Isotopes Program is now well established and progress has been made to establish stable isotope supplies. Facility initiatives have been hampered by budget challenges. NP is strongly encouraged to consider these needs, and to continue the operational reviews of the production facilities and related processes.

There were no recommendations with regard to the effects of the award process on the breadth and depth of the portfolio. The quality of the science is high, and peer reviews ensure the breadth and depth of research in nuclear physics, which remains world-leading. ECAs are a strong encouragement for new investigators entering the field and should be promoted. Emerging

scientific opportunities require continued attention. There is obvious progress being made in implementing the NSACI report (Isotope report in 2009). Notable enhancements have been made to the Isotope R&D Program. In general, the move of the Isotope Program to NP has been successful and of major national importance.

The COV found that the standing of the portfolio is high as evidenced by the large number of international users of facilities and foreign investment in U.S. facilities. For experiments not established with large U.S. facilities, there is often competition internationally for the same of science. NP has been a strong partner with other countries in experiments hosted abroad. The Isotopes Office is important in leading national and international isotope production.

NP needs to do a systematic assessment of computational needs across all theoretical and experimental subfields, especially for smaller-scale projects in the Medium and Low Energy Programs to see if further coordinated effort with NP is needed. Computing resources are relied upon by many fields, and data from medium- to large-scale experiments requires reconstruction, processing, and matching Monte-Carlo simulations. There are currently no specific provisions for this except at the major facilities, TJNAF and RHIC. The Heavy Ion Program has recognized this need and marshaled significant resources.

A distinct neutrino, neutron and fundamental symmetries portfolio should be created. Based on Hallman's presentation, that is likely to happen.

NP should write a response to the COV recommendations within 30 days with a plan for addressing the recommendations. It should detail progress on the recommendations and be sent to NSAC at the time of charging the next COV. Harris noted that the response to the 2010 COV report was transmitted approximately nine months after receipt of the report from the NSAC.

Roundtable discussion

Binder suggested including medical isotopes, types of isotopes, and communities being served in the broad view of isotope delivery. Geesaman shared that the COV looked at Isotope R&D grants. These seemed to be effectively decided and facility operations were done appropriately. The COV did not ask for documentation of progress but pursued understanding and saw that progress is being made. Those focused on this were Geesaman and Kelly Beierschmitt.

Opper noted that HRIBF closed without consulting the community and NSAC, and that this did not result in a recommendation. Harris thinks that this is important but was unsure of the recommendation other than insisting it not happen again. The COV saw other community-related concerns as shown in its comments, but these did not lead to recommendations. Harris confirmed that there were things like the HRIBF closure that did not result in recommendations. Blackmon added that recommendations are things that NP has to respond to and the COV does not necessarily know how they would respond. That informed the rationale for the recommendations.

Piekarewicz was pleased that the COV recommendations may be implemented, perhaps by the end of year. He asked if the COV discussed what the quantitative measures could be that are used to evaluate grants. Blackmon sees this as a difficult issue and the COV response was that there is little discriminating power. It is difficult to discuss reviews that come back. He asked if reviews could be more quantitative and use NSF's model. The COV discussed the use of panels, among other things, but did not want to give a solution for something that needs more thought from NP. The COV suggests a quantitative component but not making it all quantitative.

The ECA accepts proposals, but as Piekarewicz sees it, the proposals not funded are put aside. Harris confirmed this, and pointed out the value in giving feedback on how they are being

evaluated. Geesaman added that the ECA is for a specific solicitation, and that applicants need to learn to turn this in as a regular research proposal. The ECA application cannot be considered for other grants or funding sources.

Jacobs noted a lack of clarity on the consequences of the low rate of high-quality grant applications that are not funded. Harris suggested that more feedback for proposers would help them come back and propose for a grant, as an example. The low rate probably reflects a high level of competition.

Nagle shared that more than 10 years ago, a particle physics study concluded that it was better to give more awards at lower dollar amounts since it was recognition that was more important. He sees the current amount as quite large as junior faculty also has start-up money, and asked if this can be investigated. OJIs used to be \$50,000 or less per year, and this is an issue for tenure. Harris added that this could be worth noting and that he has the same perception. He sees that getting recognized or likewise having a grant really makes a difference in promotion. Hallman responded that there has been an effort to standardize processes across SC programs in recent years. Currently, amounts are prescribed by SC management. This issue has been raised in SC and if funding amounts might be negotiable and have been prescribed since beginning the ECA. Nagle suggested that the COV might look at this as a recommendation.

Nagle suggested a more relative ranking approach for grant review. He suggested a real tracking system for how individual reviewers review individual grants. Harris views this as a big concern. In a review panel, all are looking at the same grants. Individual reviewers are assigned a specific number and the review relies on subjectivity.

Harris responded to Nagle's concern about getting a written response from NP within 30 days, noting that is an SC requirement that has not always been fulfilled. Nagle felt that the timescale could be revisited to ensure receiving more meaningful answers. SC is already working on a response and the COV was already two months ago, Harris shared. He sees that it is difficult to respond to some recommendations. Blackmon added that the COV discussed allowing a longer follow-up period. He believes that there is a lot of activity in response to a COV and then before the next COV convenes. This COV fell short of demanding reports at specific intervals but perhaps NP could give updates in NSAC meetings. Hallman responded that NP would be comfortable giving updates and he hopes that all understand the constraints that the SC is under.

Lu expressed concern about recommendation four to define the roles and responsibilities of PMs and guidelines across the portfolio. He questioned the need for rigidity and establishing one set of acceptable practices despite the need for effective practices. NP is not large and PMs have opportunities to discuss practices. He is concerned that this could lock PMs into practices and impede the ability to respond to situations. Harris is unsure if this would reduce flexibility, but shared his understanding that this stems from the Acting Director and Deputy Director understanding what PMs will produce and what is expected of them. Lu thought that in a small team this should already be clear. Harris agreed but does not think that this is necessarily true. Blackmon shared that the COV found variability in how things were handled, and that doing something in the Research Division, as was done in Isotopes, would make things easier. He sees these as guidelines, and Harris commented that expectations are not always straight forward.

Jacobs noted that the finding about projects seems to reflect a struggle with the dollar threshold for MIE projects. Order 413.B is required for TPC at or above \$10M, and the Office of Project Assessment (OPA) can choose to be involved for projects above \$2M and below \$10M. This says that there is a discretionary element but the COV report text on page 12 does

not reflect that discretionary element. Jacobs noted that this requires work from the offices and people doing the projects, and helps reduce risk. He wondered if the COV looked into the implementation of this now and if procedural changes should be made. Harris shared that this was discussed. Page 12 reflects that the COV understands the challenges with the \$2M threshold and this was in the comments. The possibility of raising the MIE budgetary threshold from \$2M to \$10M was noted and that was a comment from National Lab Directors Council (NLDC) to the DOE Chief Financial Officer in 2011. SC agreed to pursue legislative changes to raise the threshold. Jacobs felt that the comment did not reflect the discretionary element as shown in Harris' presentation slide. Geesaman added that the COV comments are for the OPA involvement, but that this is different than the \$2M for being mentioned in the Congressional budget on page 12. Gillo clarified that the \$2M is a budget threshold and is the level that Congress and OMB use as financial oversight. OPA gets involved at levels over \$10M. It is two different levels of assessment. Harris shared that the COV encourages and supports the change. Hallman clarified that the NLDC was asked to identify items for improvements and he did not know the status of this one. Hugh Montgomery noted that the NLDC came up with a list of around 130 ways that DOE could improve, 18 of which were given high priority consideration. He believes that there is no action on this item, and Harris added that the COV has asked NP to look into this. Gillo clarified that this is for OMB and the Chief Financial Officer and is outside of SC's purview. SC has tried to have it discussed. Jacobs asked Harris to insert some text to provide the context for this.

Velkovska asked for more information on how difficult it is to track the participation of under-represented groups, noting that this was in other COV reports. Harris responded that this is a two-part question that was a big part of the COV discussion. There are issues with logistically and legally collecting the data, and Gillo shared those with the COV. The collection is not done primarily because PAMS has not been launched. It is recommended that NP get authorization to collect the data and encourage under-represented groups to apply. Gillo confirmed the need for authorization and that SC is in the process of getting the okay from OMB. Providing data would be voluntary and informational only. SC has strict criteria that are published on how peer review processes are conducted. Grants.gov lists the criteria and SC cannot give preference to under-represented groups. It can collect data to know how groups are being supported and evolving in the national program. With authorization, SC can make this information publicly available within legal constraints and with the understanding that errors that could exist. Harris noted that the NP will respond to this recommendation and make annual updates on this, in response to Velkovska's question as to how to ensure that NP will follow-up.

Nagle commented that NSF programs target certain groups for solicitations. He pointed out that the COV suggested NP track its engagement with certain groups at the undergraduate and graduate levels, and determines if certain groups are making efforts to recruit under-represented groups. This is different from award funding to a PI. Klein pointed out that the proposal guidelines would need to note the inclusion of this component in advance. NP follows 10 CFR 6.5, per Gillo, and NP is getting authority to collect demographic information. Klein asked adding to the criteria the option to add an outreach component, and Gillo shared that it is feasible to add additional criteria and this would need to be approved up leadership and General Counsel. The addition of program policy factors does not need higher approval.

Opper noted that NSF collects demographic information as part of its review process and she believes that they have collection authorization. Criteria for NSF proposals include defining broader impacts, which is widely defined. Demographic information allows for identifying undesirable systematic things that may be occurring in the community. Without the info, there is

nothing on which to base decisions. Opper believes that collecting the information does not imply that it would be used in reviews. Nagle suggested that this all may depend on how explicit this component is in the criteria and how it is part of the process. Opper pointed out that NSF has two criteria that are well-defined and are part of the review process and you are supposed to assess that aspect of the proposal. Solicitations can have additional criteria such as educational components that are determined ahead of time.

Harris added that NP is seeking the authority to collect that information and PAMS will help them do it more efficiently. There was a lot of discussion about this in 2010 and in this COV.

Geesaman went around to each NSAC member for comments on the COV report.

Velkovska shared that she accepts the report. It was well-written and identified areas of need.

Shepherd agreed with the recommendations and the chance to ensure that the peer review process is fair and discriminating.

Schukraft brought up the need to balance facilities operation and future investments. Outside of NSAC, this balance is hard to understand especially when it comes to actual numbers, which ones show underuse, and how these numbers are determined.

Rundberg suggested that once PAMS is implemented, NP should go back to investigators to see if this was actually more efficient. He appreciates the attempt to improve procedures.

Rossi approved the report and found that the recommendations were good.

Piekarewicz accepted the report and hopes that the recommendations are followed.

Ormand is a new member and cannot accept the report, but felt that it was good. He likes the idea of quantitative review rankings. He also resonated with the need for a prompt response to the COV report. Ormand shared that the ECA is very successful and has gotten young researchers up and going, but is concerned that it is just used to qualify one for tenure.

Opper felt the report was well thought-out and she agreed with the recommendations.

Nagle agreed with the recommendation for evaluating the effectiveness of PAMS. He sees the usefulness in discussing the ECA, and that it could be useful for NSAC members to privately send some related language to the COV subcommittee. His comments were mostly about the amount of money awarded and the balance of simply getting recognition.

McKeown is *ex officio* but added that the ECA discussion was interesting. The thresholds may not be appropriate and that there are avenues for this to be discussed by SC leadership.

Lu thanked the COV for its work and reiterated reservations about defining detailed guidelines for the accountability of PMs. He is concerned that this will create barriers and PMs may become more timid, and it could impede collaboration, among other unintended negative consequences.

Klein expressed concern about the PAMS software working as planned. He also highlighted comments about finding ways to be more nimble in terms of getting projects going compared with colleagues who can more quickly start initiatives. He thinks that SC is restricted in this way.

Jacobs supports the report, and thanked the COV and NP.

Gardner accepted the report. She is concerned about differences in how the review process could be implemented and how reviewers would develop comparable quantitative results. She wants to see a quantitative component in the context of how the review process is done and suggested it could be used in a panel review.

Gade supported Nagle's suggestion to add a sentence about considering the amount of ECA awards and giving out smaller amounts.

Blackmon shared that SC is good at supporting young researchers and giving supplements. He is concerned about the disparity between the success rate of ECA awards and the funding amounts.

Binder accepted the report.

Atcher appreciated that it was well done.

Geesaman reiterated that the NSAC would like the COV to go back to look at evaluating the effectiveness of PAMS, ECA awards and funding levels, and defining PMs roles and responsibilities. He proposed that the COV consider these and report back by email within one week. There was strong agreement on the report but the NSAC was not ready to vote on it and will do so by email. Harris affirmed the plan to consider these changes.

Geesaman sent the report transmittal letter to the NSAC and it will be considered on day two.

Hallman thanked the COV and Harris for their work. The NP staff is very dedicated and hard-working, and to have that recognized is very gratifying. There are areas for improvement, some of which are not surprising. Some changes can be addressed by NP and others have external factors that constrain NP and are more challenging. Hallman sees the partnership with the community as very real, and it can be helpful on issues such as peer reviews. One challenge is sending out reviews and getting back reviews with comments that are not necessarily meaningful. Hallman commented that this is homework for all.

PRESENTATION OF THE SUBCOMMITTEE REPORT ON SCIENTIFIC FACILITIES

Geesaman passed the Chair to Peter Jacobs for this discussion since one of the facilities under consideration in the subcommittee report was at his home institution. Jacobs introduced Subcommittee Chair Bob Redwine to present the report on NP scientific facilities. The charge was issued to the NSAC on December 20, 2013, and asked for a prioritization of scientific user facilities to ensure optimal benefit from Federal investments. The report is due to SC by March 22, 2013. This is like an exercise conducted by former SC Director Ray Orbach that aimed to stay at the forefront of scientific capabilities and tools. The charge will support a 10-year outlook and help prioritize the tools that are needed.

The Subcommittee found the charge to be somewhat ambiguous and a little confusing. It went back to NP to confirm its expectations.

One main point of the charge was to comment on the science and the ability of a facility to contribute to world-leading science in the next decade, and to include existing and proposed facilities. The Subcommittee was to categorize each facility or upgrade as a) absolutely central, b) important, c) lower priority, or d) don't know enough yet.

For proposed facilities and upgrades, the charge asked for comment on the readiness for construction. The categorization for this was a) ready to initiate construction, b) significant scientific/engineering challenges to resolve before initiating construction, or c) mission and technical requirement not yet fully defined.

The Subcommittee was formed in January 2013, met once with representatives from the facilities on February 15th – 16th, and provided a draft report to NSAC on March 2nd.

Ground rules were that NP will share their lists of current and anticipated facilities and upgrades, including comments. The Subcommittee had the right to add or subtract facilities or upgrades. The estimated cost of facilities or upgrades must be \$100M or above. Redwine noted that there are many projects under \$100M that were not considered.

The Subcommittee used the 2007 LRP, the 2012 NRC report on nuclear physics, and the 2013 NSAC report on the implementation of the LRP. The list being considered was advertised

via the Division of Nuclear Physics of the American Physical Society and other venues. There were few responses and the Subcommittee decided that the list from NP was correct.

Current user facilities reviewed were the Argonne Tandem Linac Accelerator System (ATLAS), the Continuous Electron Beam Accelerator Facility (CEBAF) and Relativistic Heavy Ion Collider (RHIC), all operated by the DOE NP.

Proposed facilities and upgrades were the Electron-Ion Collider (EIC), Facility for Rare Isotope Beams (FRIB), and the ton-scale neutrino-less double beta decay experiments (NLDBD), the latter of which are currently being pursued by at least seven groups in the U.S.

Redwine reviewed the physics goals, key capabilities, and level of beam-time demand for each facility. They are discussed in alphabetical order.

ATLAS's physics goal describes all bound nuclear systems that have real predictive power. It is based on models that use realistic nucleon-nucleon forces and considered "absolutely central".

CEBAF's physics goals include studies of nuclear structure, the structure of hadrons, quark confinement, quark hadronization, fundamental forces and symmetries, theory and computation, superconducting accelerator science, and related subjects such as medical imaging. It is considered "absolutely central".

RHIC has physics goals that include the study of QCD phase transition in nuclear collisions over a wide range of initial temperature and baryon densities, and study of the spin content of the proton. It is considered "absolutely central".

EIC's physics goals include investigating how quarks and gluons propagate in nuclear matter and join to form hadrons. The Subcommittee feels that an EIC would be a unique and powerful microscope to provide a dynamical mapping of gluons in the nucleon and in nuclei. It would be a portal to an in-depth and fundamental understanding of gluonic matter and of QCD. It is considered "absolutely central" and its readiness was deemed as "significant scientific/engineering challenges to resolve before initiating construction".

FRIB has physics goals that focus on the study of exotic nuclei at the limits of nuclear stability. FRIB will address longstanding questions about the astrophysics origin of the elements and fundamental symmetries of nature. It could provide new isotopes for research related to societal applications. The physics importance of FRIB was ranked as "absolutely central," and its readiness was deemed as "ready to initiate construction".

The physics goal of NLDBD is to look for evidence of non-conservation of lepton number, which is required if NLDBD occurs. Experiments are operating using different isotopes as appropriate for DBD and operating at about the 100 kilogram scale. NLDBD's physics importance was ranked as "absolutely central" and the readiness of NLDBD experiments at the ton scale was deemed as "significant scientific/engineering challenges to resolve before initiating construction". Redwine cited earlier discussions about the number of experiments needed. Assuming that technology improves, there could be at least two experiments but they may not only occur in the U.S.

Redwine commented that the list of facilities is not long but it is a powerful list. For a long time, the community has had a rigorous system of setting priorities and making hard choices.

The Subcommittee's work supports the modest growth strategy from the NSAC Subcommittee report on implementing the 2007 Long Range Plan.

Roundtable discussion

Klein asked why the NLDBD was on the list if it will never be a user facility like the others. Redwine responded that the charge asked for identification of what was important for science

and would take a big investment over the next decade. The Subcommittee felt that this would require investments at this scale. Hallman added that the charge called for considering facilities and initiatives at more than \$100M. Klein noted that the criteria called for things that need R&D, that this will always be the case, and that NLDBD is at a disadvantage as it will always need investment versus facilities that can be funded then left alone for a while. He does not see anything in the text of the report to improve, but recognized that separating it out was not going to happen. Gardner remarked that there have been examples from literature on NLDBD that show that the experiment can also be used as a light-dark matter detector. This speaks to a larger purpose that the experiments could fulfill.

Schukraft discerned a mismatch of expectations for facilities as reflected in the grades. All are ranked “absolutely central”. If there is a similar selection process among the other subcommittees then there may need for more content in the transmittal letter and driving to a smaller set of facilities. Redwine felt strongly that these are the correct rankings, but is aware that this could be viewed by some outside the field as wrong. He saw another subcommittee’s list and the only ones that were not absolutely central were those already at risk. Jacobs noted that the letter could be expanded to make this point. Schukraft responded that if all go through the same process, then the letter must specifically make this point.

Schukraft recommended that the text equally reflect the number of users for facilities, as it has done for ATLAS and RHIC but not for CEBAF. The number for the NLDBD is less obvious.

Schukraft commented that the neutrino mass being investigated using accelerators may be argued by some outside of the field. He thinks that the evidence for dark matter is quite strong. Redwine shared that this is being discussed within NSAC, and there have been comments received since delivering the draft to NSAC on March 3rd. Comments will continue to be considered as there will another iteration leading to a final report.

Schukraft pointed out comments on having at least one experiment on reproducibility and that it is not known which step will reach reproducibility as an argument for having two NLDBD experiments. Redwine responded that reproducibility is one argument, but that it could be spelled out as different techniques and reproducibility could be of value once there is a positive result.

Blackmon asked who is going to propose a \$250M facility but regard it as not essential, believing that they all have to be seen as essential when proposed at this scale.

Piekarewicz found that each section on the facilities is good, but that there is not coherent connection between them. He recommended a common format or theme to describe all.

Nagle noted that all facilities have an “a” ranking, and that the transmittal letter should elaborate on the context for ranking. Redwine agreed that this can be done as there are sentences in the report that point out the differences.

Nagle noted that the field is framed by four broad questions in the introduction but these are not mentioned later on. Redwine does not feel that the questions are ignored and that the information later on is related. Nagle contended that that depends on who is reading the report.

The EIC is now viewed as a multi-stage project, Nagle noted, with stages that might occur much later. He perceived that the first stage would fit in the 2014 – 2024 timeframe, and noted that there may be different understandings of the stages. The EIC presentation in February shared that stage one is ready but the report says that it is not. Redwine responded that the Subcommittee read the charge and “ready to initiate construction” is interpreted as being ready now and able to contribute to physics by 2024. Nagle commented that a project could have no major technical issues, but that would seem to be ranked a “b (“significant scientific/engineering

challenges to resolve before initiating construction”). Redwine feels that it is logical to have a project rated highly and be on the list; if a project cannot contribute physics by 2024, then it should not be on the list. In the case of EIC, the Subcommittee felt that there were significant remaining construction issues. The energy recovery LINAC at BNL is a challenging project that goes well beyond what has been done so far. So the project was judged as being a “b”.

Jacobs noted that there are differing definitions such as ready to pass Critical Decision-3, or being functionally ready, or in stage one or two. He felt that these are related and need to clarify which relate to the letter grade. Redwine shared that he could bring in project experts to address this.

Nagle noted that it was odd to give a “b” grade if a site was ready to initiate construction for stage one. Thomas Roser of BNL described the EIC as ready to initiate construction. Redwine shared that the Subcommittee felt that it was not ready and that BNL did not seem to have a problem with that assessment. Jacobs offered that an offline discussion could help decide that.

Meyer indicated that an EIC white paper written by BNL and the TJNAF noted that the stages of luminosity of the EIC are defined as 10^{33} and 10^{34} . His impression of what happened in the Subcommittee was that, based on potential resources that might be available and timing of R&D, both laboratories gave a phased approach to reach stage one. He felt that BNL used nomenclature that is not consistent with the white paper, and believes that this led to confusion. Nagle asked if one would not want to initiate at TJNAF construction until 10^{34} could be demonstrated by 2016. Meyer’s view is that what is to be achieved by both facilities to reach stage one requires more R&D, and Nagle asked for clarification purposes that the facility would not be classified as ready for construction until 2016 by that definition. Meyer commented that this is the best estimate of the R&D needed before one could approve a construction project. Neither scenario being proposed has been reviewed but the Subcommittee made use of the best estimates in responding to the charge.

Klein noted that there is a wide gap between “a” and “b”. No one would disagree that FRIB is an “a,” for example, but there is no intermediate. Jacobs added that what would be built in the stages of the EIC needed to be clearly defined. Stage one and stage two are not defined in the report, but could be using the white paper. A description of the R&D needed to begin construction could give clarity.

Redwine responded that the Subcommittee did not view being categorized as needing more R&D before readiness as a bad thing but just a fact. It was important to respond honestly and completely to the charge. These are facilities that can do great physics, but the Subcommittee recognized that more needs to be done before facilities are ready.

Nagle asked if “a” and “b” needed to be defined, noting that a lot has gone into defining the machines for EIC. He felt that the report inferred that the estimating has not been serious. Redwine clarified that this was not the desire. Jacobs suggested that Nagle and Meyer modify the section and spend time on it tomorrow. It was suggested that Thomas Roser be involved.

Gillo explained for Rundberg the Government Performance and Results Modernization Act, describing it as focused on facilities and performance accountability. A website showed the performance ratings of various offices and they were defined as effective if able to meet certain milestones. OMB used this to influence levels of funding support and provided report cards indicating the achievement of performance goals. Redwine added that this was not just for DOE or NSF, but proposed broadly.

Geesaman noted that around 1999 – 2001, an NSAC subcommittee defined the basic parameters of FRIB and a second NSAC subcommittee reviewed the cost estimates. Earlier, an NSAC subcommittee had defined the parameters of the TJNAF. So this is one model of the way

that facilities have been defined. BES is looking at next generation light sources and neutron facilities and characterized four as absolutely central, but only two as ready for construction, thinking that the two others could still be initiated soon. This is one example of how other committees are viewing this.

Redwine responded to Gardner's interest in the test apparatus for energy recovery LINACs, explaining that while energy recovery LINACs do exist, this would push the technology. Meyer shared that TJNAF has demonstrated energy recovery technology and found other aspects that could push parameters beyond what others have tested. Another aspect is that for electron cooling scenarios and the cooling method, to some extent there is the ability to do energy recovery. A factor is addressing all of the pushes in energy recovery at the same time and cooling the ion beams.

Jacobs asked how cost impacted prioritization, and for insight on how costs will be assessed relative to DBD experiments. Redwine explained that the NLDBD costs are for establishing the project. Operating costs are an ambiguity in the charge. The Subcommittee decided that this is not part of the specific charge, and that it was not feasible to do anything related to those costs.

Hallman added that relative to construction, SC will consider this like a log scale. It is in the few hundred million scale or the billions class. For many things, the costs are now not well known. They may not have minute defined resolutions for costs. Jacobs added that there are a lot of variations possible, and Redwine shared that the report aimed for around \$100M.

Nagle noted that there is an estimate associated with NLDBD, and asked why there was no number for EIC. He found it odd that costs are omitted in some instances and asked why, if agencies are providing numbers, they were not included. Redwine responded that exclusion of any numbers was not intended.

Public comment

Ensuring the factuality of information is needed before the report is accepted, and there is uncertainty about the first stage of EIC. The white paper on EIC was written by scientists but community guidance would also be helpful for guiding how to proceed. This could help lay out more of the physics process that will determine what a facility should be or can be. Redwine commented that fact-checking will ultimately be up to the NSAC, and that the Subcommittee consisted of scientists with close connections to the facilities allowing for follow-up. He added that the Subcommittee did not have a long time to discuss the EIC. Since the 2007 LRP, there has been general interest in the EIC goals. However, defining what it would do and could be done has not been defined. The Subcommittee believed that the specific goals needed definition before moving to construction. The next LRP and not this month-long exercise should define these needs. His opinion is that the next LRP will focus on the EIC and how to achieve it.

Jacobs urged that the report be factually correct, before the NSAC vote on it and facilities review it. Hallman added that there should be sensitivity that experts could disagree on factors that need to be taken into account. Nagle added the need to distinguish between mistakes and differing interpretations. He had requested NSAC access to the facilities' earlier presentations. Redwine confirmed receiving this request and does not see why that cannot happen.

Nagle reiterated Redwine's opinion that the community understands that the physics to be done at facilities are important but that there is a gap between important and significant, and the second question of the charge should be judged on technical merit. Redwine asked that his use of the word important not be read into, noting that the Subcommittee felt that the physics impact of the EIC is very, very important and absolutely essential, and was rated as such. It received a "b" grade for readiness based on the Subcommittee's assessment of its status. Nagle asked that

this be parsed out to understand what should be achieved in the first stage, and Redwine responded that the Subcommittee should not supplant SC's goal in rating facility readiness.

Nagle noted that if the criteria for readiness are based on past documents, then the Subcommittee should not have rated readiness at all. The review would be based only on CD1, 2 or 3. Redwine does not believe that the Subcommittee was asked to interpret the charge that way. Jacobs pointed out that a need for sections on the facilities to be explicit at how rating was determined. Meyer added that the readiness criteria depend on what it to be built. There are requirements and specifications related to the first part of the charge, and a need for consistency in rating the importance in relationship to readiness.

Jacobs suggested adding a phrase to the transmittal letter to explain the ratings, and comments on the EIC and modifications. These can be addressed in the meeting tomorrow. The NSAC can also discuss the text for the letter. Jacobs suggested tabulating major changes to the report and discussing these. He does not expect a vote to take place, but it should sometime before SC's March 22 deadline.

NSAC members received the report draft. Given the volume and nature of the report and facts to be checked, Redwine asked that the draft be circulated to only those outside of NSAC who would do fact-checking.

PRESENTATION ON DATA MANAGEMENT PLANS

Laura Biven, DOE SC Senior Science and Technology Advisor, provided an update on the SC Statement of Digital Data Management. This was presented to NSAC in the Summer of 2011.

There will be a new policy on October 1, 2013. It will reflect OSTP guidance from February 22, 2013, to guide agencies on "increasing access to the result of federally funded research." The policy will focus on digital research data that is required to validate research findings. Data management reflects the entire data lifecycle, but is really focused on data sharing and policy. It will affect PIs but also the research community and PMs in their roles as reviewers. The policy will be taken into account as SC reviews research proposals.

This policy will exclude SBIR /STTRs and proposals for time at a user facility.

The approach taken in the last few years has been to have a policy specific to SC's mission and one that allows for maximum flexibility. Programs should have flexibility in how they store data, but SC also wants consistency with Administration guidance and input from the community and the public. SC also does not want to overburden researchers, nor be inconsistent with NSF or other agencies principles.

Principles for the policy dictate that a data management plan (DMP) should be part of research planning, that sharing and preserving data allow for replication and broadening other disciplines through access, and that the costs and benefits of data management should be considered in planning.

All proposals coming into the SC for research funding are required to have a DMP of about two pages. It should show how the results will be shared to enable validation, or how they could be validated if data is not shared or preserved.

A second requirement is that DMPs should indicate how data in publications will be available at the time that the research is published. This is from an SC report in 2011 that requested that all data be in digital format.

Researchers planning to work at an SC user facility should consult the data policy of the facility and reference it in their DMP. A facility's written approval is needed in instances where the DMP exceeds what is normally provided to approved users.

These requirements apply at an SC level and are for all DMPs coming into SC. There may be additional requirements in NP or other offices in SC.

Roundtable discussion

Biven confirmed for Klein that data availability should coincide with publication.

Biven confirmed for Jacobs and Opper that a number must be associated with a table or graphic, and that if there is a table, then the publication does not need the raw data. This also applies to an image and digital images.

Jacobs asked about the essence of the requirement since there are some experiments that produce terabytes of data. Klein responded that this was a policy from SNO that allows understanding data without having to go through the task of reinventing the data points from a plot. Schukraft added that one does not have to delve into an experiment to and try to replicate it.

Schukraft recommended a central repository. This could be beneficial on a global scale.

Velkovska shared that RHIC experimental data is posted and she is surprised that it is not useful. She suggested that some small figures do not need to be posted but you also do not want the reader to misunderstand things. The data points should include a proper explanation.

Biven responded to Jacobs' concern that this will require extra effort, sharing that SC's second requirement is intended to conveniently allow access to others' data. The first one intends to ensure data preservation. Hallman added that communities should understand their own standards and center on what constitutes value in preserving and providing data.

In response to Geesaman, Biven shared that SC does not have a timescale for how long data should be available. Peer review could define this, but it should be available when it is published.

Biven told Geesaman that there is intent to share practices on what constitutes a good DMP.

SC expects that proposals will specify a budget for DM and perhaps even someone to do this.

Opper commented that these recommendations are straight-forward and sensible.

Schukraft commented that preserving raw data could be a huge enterprise. If raw data is available, people may use it but getting there can be an enormous effort. Biven responded that along the spectrum of analyzed data and raw data, researchers can judge what needs to be preserved and the costs in doing so. Schukraft noted that everything is in between. He expressed that only nothing or all of the data is the approach to use to ensure use by outside people.

Hallman commented that within peer review, it is proposed that the community would define its own view. There is no mandate or requirement for this, but it is up to community standards.

Hallman added that the OSTP guidance and the memo on this have two components. One addresses data and has more points than are addressed by SC's policy. There are other points to be addressed as SC responds to the memo. The current draft is not a full response but a first step. The memo from OSTP is available at: www.whitehouse.gov/blog/2013/02/22/expanding-public-access-results-federally-funded-research

Hallman is very interested in knowing peoples' experience in working with NSF's plan.

PUBLIC COMMENT

Alan Krisch of the University of Michigan read a letter sent by DOE Secretary Chu to Senator Mikulski (D-MD) expressing concern about the closure of RHIC due to sequestration. Krisch believes that RHIC should be transferred back to the HEP where, in his opinion, it originated. RHIC is the world's leading spin facility and RHIC's injector, which is a world-class advanced energy system, was originally ISAbelle. Equipment in RHIC was funded by a \$35M grant from Japan and by a Stony Brook professor. Krisch encouraged NSAC not to repeat

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unwise decisions that he witnessed made by the HEP. He regrets that the RHIC would be cancelled after spending \$2.5B and it having produced six Nobel Prize winners.

Hallman appreciated Krisch's comments, and understands that the RHIC physics program is compelling. He was not familiar with the Secretary's letter but believed that the intent was to point out the risk in not continuing the ongoing run which is different from an overall risk to operations. The only impact of sequester that has been discussed for RHIC is the impact of the current data-taking run.

Velkovska asked Krisch to clarify the impact of transferring RHIC to HEP. Krisch shared that RHIC has one TeV center of mass energy and that the differences between HEP and NP are blurred, suggesting that merging the Offices is not a bad idea.

Berndt Mueller of Duke University thanked John Harris for the COV report, and noted that when visiting DOE NP, he was appalled by the stone age environment in which the organizations works. He noted a lack of urgency in getting PAMS operational, and urged the NSAC to offer support to get it working within the timeframe described. He suggested that the next COV assess the effectiveness and usefulness of PAMS.

Mueller noted quite a bit of rotation in office personnel.

Mueller commented that part of the DOE and NP mission is to develop the next generation workforce. He urged that grant proposals define how they intend to support this, and that it can be one way to bring under-represented students into the workforce and nuclear physics.

CLOSING REMARKS AND ADJOURNMENT FOR DAY ONE

NSAC Chair Geesaman adjourned the meeting for day one at 4:45 p.m. EST.

MARCH 9, 2013

The NSAC was convened at 9:06 a.m. EST on Saturday, March 9, 2013, by Chair Geesaman.

CONTINUED DISCUSSION OF THE SUBCOMMITTEE REPORT ON FACILITIES AND THE LETTER OF TRANSMITTAL

Jacobs asked Bob Redwine to discuss changes to the report presented from day one.

The EIC section was revised to only include the most relevant information and to reflect proposed information from BNL and TJNAF. McKeown noted that the sentence that describes a demonstration of cooling is expected should note that "cooling is expected". Redwine asked McKeown to send those changes by email and that specific edits would not be the focus of today's discussion.

Redwine clarified that wording revisions for EIC is from Nagle.

The Subcommittee is open to suggestions and will use these to revise a draft for NSAC approval. Redwine will strive to get comments back to the NSAC by March 12th.

Since day one, the plan for stages one and two for the EIC is clearer. Redwine plans to indicate that stage one refers to the description in the EIC white paper.

Hallman shared concern about budgets and outward mortgages in budgets across the Federal government. One of the readers will be OMB and he urged indicating that each stage of the EIC includes significant science if the prior stage is already built. Jacobs agreed that the report should be clear that both letter grades for the EIC refer to the white paper to avoid confusion.

Hallman's reaction to the text for stage one and two is that DOE has committed to building both stages. Redwine will keep this in mind as the report is refined.

The report will specifically refer to the LRP and include a link. There are currently links to the NRC report and Federal subcommittee report.

Redwine noted the need for a consistent structure. He will review this and make changes.

In response to Redwine's question about how to treat the number of DBD experiments, Klein shared that in addition to varying costs at the \$100M range, there will be different amounts of R&D required. The Subcommittee should note that some experiments need to scale and may be more expensive than others. All may have some significant challenges.

Redwine noted a spectrum of opinions on what is needed for NLDBD R&D. The Subcommittee thought that this may be best dealt with in a new committee that Hallman described. Klein is worried that OMB will view NLDBD experimentation as not needing attention for 10 years since things are not ready. Jacobs asked about a down-select in 2016, pointing out that the report does not mention a date. Redwine shared that the report does not mention a date as there was not enough information. The error bar on 2016 is significant. Klein responded that in looking at AGP and Dark Matter, assigning a specific date is unsafe. The time stamp can occur when there are enough experiments running to give conclusions. He is not bothered by a lack of a date.

Piekarewicz commented that the NLDBD section could conclude by suggesting that a second experiment is required. Redwine noted that the report does not ask for one, but that people may want more than one. Klein shared that the argument for more than one is not just technique-based, but also discovering background and other factors of NLDBD. Schukraft added that the justification could be more forceful if there is a positive result. He suggested noting that the possibility is important and adding a description of other experiments, and Klein responded that suggesting a date of 2018 or 2019 would force scrambling to prove this. Schukraft noted that this deals with the possibility of actually finding something and that the results of two or three experiments is better than one. Klein agreed but wondered if the world or the U.S. is ready to reproduce the results. Redwine noted that the Subcommittee talked about uncertainty and thought that positive results would encourage more effort. Geesaman suggested changing the sentence on reproducibility and from "will" produce results to "may" produce results.

Klein commented that coming up with positive results from NLDBD, experimentation is the actual mechanism. Even with a gigantic signal, there is a chance for a precision program that would change the game. Gardner added that for the sake of simply reproducing experiments, there are a lot of physics experiments for which there are known CP violated phases that only appear in DBD. It is only now known that they exist. Reliable theory is needed but there is also a lot of new stuff.

Jacobs thanked Redwine for the report and asked individual NSAC members for input. He confirmed that the NSAC will not vote on acceptance today but will do so by email.

Atcher reminded the NSAC that at the last meeting it discussed RHIC leveraging BLIP operations for the Isotope Program. The report only mentions FRIB in this regard. He would like it noted that an isotope program at FRIB would require manpower and accelerator capabilities.

Binder agreed with Atcher and can help with that language. He thinks that the report is fine.

Blackmon approved of the report pending wording changes.

Gardner agreed with the report pending minor changes.

Klein complimented Redwine on the report and its drafting in such a short timescale.

Lu enjoyed the report and supports it.

Nagle is fine with the report.

Opper looks forward to the changes.

Ormand expressed that the report is great and admired completion in the short time frame. Piekarewicz shared his thanks to the Subcommittee.

Schukraft commented that he is fine assuming that issues regarding the EIC will be handled. He pointed out the minor comment on neutrino mass and signals, with regard to NLDBD. Klein commented that there is justification for this type of physics at a higher mass scale. He responded to Schukraft's comment that this is the only definite signal, not that this has been observed in the laboratory. Schukraft commented that the sentence on this in the report could be read by some and deemed offensive. Klein noted that people in other groups will say that there is no signal but it has been observed in the laboratory and is something that is known to exist. Jacobs asked Redwine to explain this to the Subcommittee. Schukraft commented that this point needs to be reformulated as general physicists outside of the meeting may have trouble with it. Redwine will consult the Subcommittee.

Schukraft commented on reproducibility. Given that NP in general is not in a situation where it can give out resources, the report may need to make the point that positive results may be reproduced. Klein responded that a plan for success is needed and that preparation should be made so that if there is a signal then an experiment can be built from there. He agreed that the community and the DOE will have to decide on this. Jacobs commented that it seems that worldwide there will be more than one experiment, but there is an issue as to whether or not the U.S. will be involved in more than one. Klein commented that there is a risk in waiting to see if there is a result, and having OMB conclude to wait for a result before building an experiment. Jacob clarified that his question is whether or not U.S. involvement would occur.

Shepherd concurred with Schukraft on the statement about the neutrino mass model.

Velkovska had no additional comments.

Jacobs shared the transmittal letter and pointed out how it reiterates the charge, explains why the letter is from Jacobs, and describes the Subcommittee process.

The letter shares that the NSAC convened the Subcommittee under the purview of the SC Office of Nuclear Physics. It was chaired by Redwine and included membership from experts from all major areas of activity within the NP Office.

Jacobs noted the need to point out that this is the fourth exercise in a group of community exercises that including developing the 2007 LRP, the NRC report, and the NSAC Subcommittee report on implementing the LRP. These give a roadmap for the nuclear physics community in combination with this assessment of scientific achievements and the future promise of facilities.

Jacobs noted that with regard to future scientific impacts, the Subcommittee found that all six facilities would make absolutely central contributions to world-leading science in the next decade and thus receive an "a" grade. The scientific programs of the facilities have been discussed by the community and reviewed over an extended period. The Subcommittee found that all six are deserving of an "a" grade relative to future scientific impact and this is fully consistent with the findings of the NSAC and NRC reports.

Jacobs shared that regarding construction readiness of the three proposed facilities, FRIB is ready to initiate construction and that the EIC and NLDBD have significant scientific/engineering challenges to resolve before initiating construction. In the case of the EIC, the grade refers to readiness for EIC stage one, as defined in the recent EIC white paper.

Nagle commented that the letter conveys that all six facilities should get an "a" and that nuclear physics wants all six facilities. Jacobs suggested that the letter could address existing facilities first and then deal with proposed facilities. Klein is concerned that readers will see six "a" grades and that the NSAC has no ability to discriminate. He suggested stating that there are three current facilities and three upcoming.

Hallman commented that “facility” has a well-defined and specific meaning for Congress, OMB and the DOE NP Office. If a facility is not a facility, then it should be called something else. Gillo agreed, suggesting use of the word initiative.

Gillo commented on the EIC, noting that the concept of stages has not been formalized and may not be confusing to the reader. The value of describing the EIC this way is not clear and could infer that there are multiple projects versus one EIC. Doing so may be premature as the implementation of the EIC is not mature. He understands this idea and that the report may not want to describe stages.

Redwine is concerned about wording on initiatives and projects. Hallman responded that NP can look at how others refer to these, and suggested describing these as experiments and projects.

Hallman reflected on Nagle’s earlier comment. The report originated with a concern in SC about having the right number of facilities to fulfill its mission. This raises the question of proposing the right number. There has been the view that NP did not shut down facilities when it should have. Appearing to have a lot of facilities could support the view that there are too many.

Opper wondered about splitting-up paragraph descriptions of existing facilities and potential initiatives, noting Redwine’s comments from day one about cutting this back.

Nagle pointed out that the letter should not be as long as the document itself. There are three facilities proven to be absolutely essential. There are three other others. In some sense, this means that the overall NP portfolio would not contain additional facilities but is considering changing or upgrading them. The letter could include one sentence on how each could improve.

Blackmon commented that when it comes to a proposed facility, hard structures and signage are not absolutely essential to having a program. He added that with regard to staging, the point is not that a stage is ready to begin construction but how it got to that point.

Jacobs added that he liked Gillo’s comments about using care with the word “stages”. Gillo responded that the concept is that laboratories are exploring staged implementation. What needs to be considered is if there is value in referring to stages. She suggested talking about the implementing a staged approach. Geesaman understands this concern and suggested stating that there are minimum requirements as laid out in the EIC white paper without referring to stage one and stage two. Jacob shared that his concern is that EIC’s first stage is very precise and exists as parameters. Geesaman suggested referring to the stages as parameters and Redwine agreed.

Hugh Montgomery of TJNAF commented that this is not just about parameters. Jacobs responded that in light of these discussions, the letter should be precise and convey that there is a context for this. It could refer to the EIC white paper and avoid staging.

Montgomery commented that use of the word “proposed” for FRIB could be problematic, while wording LNDBD as “proposed” is problematic. Jacobs suggested that “future” or “new” is better than proposed.

Mueller suggested that the transmittal letter not refer to stages. An important aspect of the physics case that makes it compelling is that these facilities are not additions but ones that could carry the whole program into the future. The existing facilities will carry it into the near-term.

Jacobs heard no other comments and will prepare the next draft.

Blackmon commented that there are some sentiments that may carry over into the executive summary of the report. He and Jacobs will share comments with Redwine and the NSAC can give additional input.

Jacobs asked Redwine to provide a list of all of the changes that have been made when the draft is sent back to the NSAC. Redwine will send these and the letter to the NSAC next week.

Jacobs sent the report to experts for fact-checking, and notes on the EIC went to BNL yesterday. He will rely on the NSAC to give comments on the NLDBD.

Geoffrey Mills of the LANL noted that there was little discussion of the implications of international funding. He asked if the report could expand on this and discuss those possibilities. Redwine shared that the report has not been available to everyone for reading, and it does contain some references to international collaboration.

DISCUSSION OF THE COV SUBCOMMITTEE REPORT

Geesaman discussed the COV report transmittal letter. The NSAC will receive the COV report by email and will vote by email. He asked if the letter needs to highlight recommendations that are in the report. There were no comments from the NSAC on changes to the letter.

BOARD BUSINESS

Lu reflected on Redwine's earlier comment that Wick Haxton noted that positive signals were detected in the NLDBD that would spur the theorists to do a better job calculating the matrix element. That seems to indicate that if there were enough motivations they can really pin down the matrix element better. Lu asked why there should be a waiting period for a positive signal. The discussion centers around about \$100M and maybe two detectors at \$200M, plus decades of experimentation efforts. Lu suggested investing in the nuclear matrix element study and both the theory and nuclear structure experimental work now prior to the down select. About 10 percent of the detector cost, \$10 million or \$20 million, could be invested now so that they can pin down the matrix element better and help with down select.

PUBLIC COMMENT

Alan Krisch announced the upcoming CIPANP meeting in 2015 chaired by Bonnie Fleming and Wick Haxton.

BOARD BUSINESS

None

CLOSING REMARKS AND ADJOURNMENT

NSAC Chair Geesaman adjourned the meeting at 10:13 a.m. EST.

The minutes of the U.S. Department of Energy (DOE) and National Science Foundation (NSF) Nuclear Science Advisory Committee (NSAC) held at the Gaithersburg Marriott Washingtonian Center on March 8 – 9, 2013, are certified to be an accurate representation of what occurred.



Donald Geesaman
Chair, Nuclear Science Advisory Committee