

**OFFICE OF SCIENCE ADVISORY COMMITTEE
to the
U.S. DEPARTMENT OF ENERGY**

**PUBLIC MEETING MINUTES
March 27, 2026**

**Hybrid Meeting
Capital Hilton, 1001 16th St NW, Washington, DC**

DEPARTMENT OF ENERGY OFFICE OF SCIENCE ADVISORY COMMITTEE SUMMARY OF HYBRID MEETING

The U.S. Department of Energy (DOE) Office of Science Advisory Committee (SCAC) convened a hybrid meeting on Friday, March 27, 2026, via Zoom and at the Capital Hilton, 1001 16th St NW, Washington, DC. The meeting was open to the public and conducted in accordance with the requirements of the Federal Advisory Committee Act (FACA). Information about SCAC and this meeting can be found at <https://science.osti.gov/About/Federal-Advisory-Committee/SCAC>.

SCAC Members Present:

Persis Drell, Chair, Stanford University
Drew Endy, Stanford University
Suresh Garimella, University of Arizona
Makoto Gonokami, Riken
Anna Grassellino, Fermi National
Accelerator Laboratory (Fermilab)
Supratik Guha, University of Chicago,
Argonne National Laboratory (ANL)
Eric Isaacs, Research Corporation for
Science Advancement (RCSA)
Lara Jehi, Cleveland Clinic
Pushmeet Kohli, Google DeepMind
Tammy Ma, Lawrence Livermore National
Laboratory (LLNL)

Michael Mahoney, University of
California, Berkeley;
Lawrence Berkeley National
Laboratory (LBNL)
Nadya Mason, University of Chicago
Mark Papermaster, Advanced Micro Devices
(AMD)
Mayly Sánchez, Florida State University
Martin Schmidt, Rensselaer Polytechnic
Institute (RPI)
Edward Seidel, University of Wyoming
David Siegel, Two Sigma
David Spergel, Simons Foundation
A.N. Sreeram, Dow
Derek Sutherland, Realta Fusion

SCAC Members Absent:

Cynthia Friend, The Kavli Foundation

Designated Federal Officer:

Linda Horton, Associate Deputy Director for Science Programs; Acting Associate Director,
Office of Fusion Energy Sciences (FES)

Office of Science (SC) Management Participants:

Hal Finkel, Acting Associate Director, Office of Advanced Scientific Computing Research
(ASCR); Director, Computational Science Research and Partnerships (CSRP) Division
Dorothy Koch, Associate Director, Office of Biological and Environmental Research (BER)
Harriet Kung, Acting Director, SC; Deputy Director for Science Programs
Matt Lanctot, Acting Director, Research Division, FES
Paul Mantica, Director, Facilities and Project Management (FD), Office of Nuclear Physics (NP)
Regina Rameika, Associate Director, Office of High Energy Physics (HEP); Acting Director,
Accelerator and Technology Division (ATD); Acting Associate Director, NP
Andy Schwartz, Deputy Associate Director, Office of Basic Energy Sciences (BES); Acting

Director, Materials Sciences and Engineering (MSE) Division; Acting Director, Scientific User Facilities (SUF) Division

SCAC Committee Manager:

Katie Runkles, Program Analyst for the Deputy Director for Science Programs

Friday, March 27, 2026

Drell, SCAC chair, called the meeting to order at 9:01 a.m. Eastern Time (ET) to an audience of approximately 128 in-person attendees and 774 virtual attendees. The purpose and charter of SCAC was shared. SCAC members introduced themselves.

Perspectives and Vision from the Under Secretary for Science, Darío Gil

Gil emphasized the importance of basic science research, noting that it has led to transformative technologies, the creation of new industries, and improvements in quality of life. Government support of this research is a necessity for sustained progress and global competitiveness. The question presented to SCAC is how to best leverage and maximize these public investments in science, with the SC standing at the forefront of this critical national endeavor.

The SC will continue in its mission to advance foundational research to support U.S. prosperity and security. Two examples of this research were shared; the Legacy Survey of Space and Time (LSST) Camera began surveying the Southern Hemisphere sky in late 2025, with its images revealing cosmic changes in near-real time. The National Ignition Facility (NIF) at LLNL achieved the first example of laboratory fusion ignition in 2022. Both successes illustrate the value of DOE's sustained support of scientific research, which will continue through \$320M in total funding for 217 projects, spanning topics such as materials science, nuclear and particle physics, fusion energy, and quantum information science (QIS).

The SC's second mission is to build and operate world-leading research infrastructure, which is evident in its 28 scientific user facilities. The Relativistic Heavy Ion Collider (RHIC) at Brookhaven National Laboratory (BNL) was highlighted for its final particle collision in February 2026, marking the end of 25 years of operations. The facility produced major discoveries regarding the building blocks of matter and proton spin, along with advances in accelerators, detectors, and computing.

The SC's third mission is the stewardship and oversight of its ten national laboratories. The national laboratories demonstrate the power of focused research and collaboration to address complex challenges. One such example is the partnership between the University of Missouri Research Reactor (MURR) and Oak Ridge National Laboratory (ORNL), which has begun routine production of gadolinium-153 (Gd-153), a critical radioisotope essential for calibrating diagnostic imaging machines. Following Russia's halt in the production of Gd-153 in 2023, this partnership serves as the sole domestic producer.

The Protein Data Bank (PDB) illustrates these three missions coming together. This is a

repository of over 200,000 protein structures, nearly a third of which were generated using SC-supported synchrotron light sources and structural biology beamlines. The SC's investment in the basic research, user facilities, and the extensive datasets held in the PDB provided the foundation for the efficient and accurate predictive artificial intelligence (AI) models used in the AlphaFold and RoseTTAFold software, whose creators were awarded the 2024 Nobel Prize in Chemistry.

The Genesis Mission aims to replicate and accelerate the success of AlphaFold and RoseTTAFold across many scientific fields. Created by executive order (EO) in November 2025, it is a national initiative to build an integrated scientific discovery platform, pairing researchers and tools across disciplines to rapidly solve complex problems. DOE has been tasked to lead this effort in collaboration with industry, academia, philanthropy, and other federal agencies. The resulting platform will connect supercomputers, AI, and next-generation quantum systems with advanced scientific instruments to double the productivity and impact of American science and engineering within the next decade. To support this effort, the Genesis Mission Consortium has been created to provide model intellectual property (IP) agreements and dedicated resources for accelerating partnership formation. In February 2026, 26 National Science and Technology Challenges were announced to advance the mission's goals.

QIS is a top priority of the Trump administration, underscored by renewed funding for the five National Quantum Information Science Research Centers (NQISRCs), first established under the National Quantum Initiative (NQI) Act in 2018. These centers will support the goal of deploying the first generation of fault-tolerant quantum computers capable of scientifically relevant quantum calculations by 2028, which will enable gate depths in the millions, and quantum bit (qubit) counts sufficient to carry out complex scientific simulations. To advance this vision, DOE aims to establish a national quantum supercomputing user facility and develop new algorithms to enable transformative scientific applications.

Gil concluded by asking SCAC to create two subcommittees. The first, the AI for Transformative Science Subcommittee, is charged with creating a decadal roadmap for the SC to achieve the Genesis Mission and accelerate AI across research facilities and workflows. The second, the Facilities of the Future Subcommittee, is tasked with reviewing and prioritizing proposed SC facilities in order to ensure continued international leadership over the next decade.

Discussion

Drell looked forward to accepting the charges and asked how SCAC could best support the success of the Genesis Mission and the SC more broadly. **Gil** emphasized that the Genesis Mission is meant to be science-first and not AI-first, with each program office empowered to let its communities pursue its most important research questions while integrating new computing capabilities. In this context, SCAC is being asked to identify the gaps in scientific infrastructure and advise on the optimal portfolio balance between the future of the SC user facilities and the success of the Genesis Mission.

Ma solicited comments on how DOE could further strengthen public-private partnerships. **Gil** explained that the Genesis Mission prioritizes public-private partnerships by

facilitating cost- and time-efficient pathways to establish and scale these collaborations.

Garimella inquired about the role universities might play in convening and facilitating partnerships within the Genesis Mission. **Gil** described universities as central to this effort and mentioned a request for information (RFI) solicited in January around innovations for forging research partnerships, noting a strong response from universities. The SC is currently working through the responses received in that process.

N. Mason commended the goal of developing a fault-tolerant quantum computer by 2028 and asked how DOE fits into the broader ecosystem of organizations pursuing a similar objective. **Gil** explained that DOE intends to lead this pursuit in partnership with others and reiterated the goal of creating a quantum supercomputing user facility to make these computers available to the wider scientific community.

Spergel asked how SCAC should be thinking of the Genesis Mission in terms of other federal agencies, such as the National Science Foundation (NSF) and the National Aeronautics and Space Administration (NASA). **Gil** encouraged committee members to think beyond DOE. The National Science and Technology Council (NSTC) was created by President Trump, with one of its subcommittees dedicated to advancing the Genesis Mission; as a result, there are federal leads from each agency dedicated to this effort. Further, the National Science and Technology Challenges will be expanded to include the missions of each federal agency.

Sutherland sought clarification on the vision to move fundamental science research into the commercial sector. **Gil** pointed to the role of DOE's Office of Technology Commercialization (OTC) in this area. It was also noted that the results of the Genesis Mission are expected to lead to broader scientific capabilities and commercial applications.

Sánchez inquired about DOE's role in advanced computing workforce development. **Gil** agreed with the importance of building human capital and mentioned reexamining the role of graduate curricula and fellowship programs in response to the Genesis Mission.

Guha was curious about how the DOE might advance international collaborations. **Gil** confirmed the plan for bringing on international collaborators, which has long been a priority of the SC.

Grassellino sought guidance on how SCAC could help develop the vision for a quantum supercomputing user facility. **Gil** emphasized the importance of articulating a clear implementation pathway and noted that SCAC's expertise will be critical in that effort.

Siegel asked about how SCAC should think of the balance between speed and efficiency, particularly in the context of difficult-to-solve scientific problems. **Gil** saw both considerations as important, noting equal excitement for solving scientific problems faster and for finding solutions to problems that were previously unsolvable.

Papermaster mentioned significant funding provided by the Creating Helpful Incentives to Produce Semiconductors (CHIPS) and Science Act and wondered how DOE might collaborate with the Department of Commerce in light of that funding. **Gil** highlighted his close working relationship with Commerce Deputy Secretary Paul Dabbar, citing shared priorities and the desire for continued collaboration.

Kohli asked whether about quantitative metrics that might indicate the success of the Genesis Mission. **Gil** agreed on the importance of tracking progress and asked SCAC members to recommend appropriate quantitative measures.

Overview of the Office of Science, Harriet Kung, Acting Director, Office of Science; Deputy Director for Science Programs

Kung announced an organizational realignment designed to create a more streamlined, efficient, and agile SC capable of responding to an evolving scientific mission. Functions that are similar or adjacent have been consolidated. The separate Offices of High Energy Physics and Nuclear Physics have been merged into the Office of High Energy and Nuclear Physics (HENP), comprising of three divisions: Physics Research, Accelerator and Technology, and Facilities and Projects. Other divisional changes were also shared: within BER, the Biological Systems Science Division (BSSD) and Earth and Environmental Systems Sciences Division (EESSD) have been consolidated into a single Research Division, and a separate Facilities and Enabling Technologies Division has been created. Within FES, the three existing divisions have been consolidated into two: Fusion Energy Research and Enabling Technologies and Partnerships.

Personnel changes were shared. Dr. Jean Paul Allain was appointed the inaugural Director of the Office of Fusion (OF), which operates separately from the SC within the Office of the Under Secretary for Science (S4). As a result, Dr. Linda Horton will serve as the Acting Associate Director of FES. Dr. Regina Rameika will serve as Acting Associate Director of NP during the finalization of the merger into HENP.

In financial year (FY) 2026, the SC received \$8.25B in base funding and \$150M from the Infrastructure Investment and Jobs Act (IIJA), for a total of \$8.4B. The IIJA funding is directed primarily towards the High Flux Isotope Reactor (HFIR) and Spallation Neutron Source (SNS) user facilities within BES. Overall, the SC budget is either unchanged or has grown modestly over recent years, in contrast to reductions seen at other offices and federal agencies. While the SC saw significant budget growth from FY17 through FY23, funding levels have remained relatively static since then. Within the portfolio, facility expenditures have increased, while research and project funding have gradually declined in recent years.

Details about the two SCAC charges were reviewed. The Facilities of the Future charge asks SCAC to prioritize resources and identify gaps to support the current needs of the scientific community and remain competitive in the global landscape over the next decade. This same question was asked of the SC advisory committees in 2003 and SCAC was encouraged to consider those earlier findings. The AI for Transformative Science charge requests input in prioritizing SC resources to accelerate the application of AI for transformative scientific and engineering discovery. In light of this charge, the SC's commitment to AI and quantum computing was reiterated, with examples of ongoing projects from the national laboratories in these areas highlighted.

Discussion

None.

Updates from SC Program Offices, Hal Finkel, Acting Associate Director, ASCR; Andy Schwartz, Deputy Associate Director, BES; and Dorothy Koch, Associate Director, BER

Finkel emphasized ASCR's mission to enable scientific breakthroughs and push innovation in high-performance computing (HPC), through research, facilities, and partnerships. Two key elements of the ASCR portfolio were highlighted. The first is AI, in which investments span hardware, algorithms, and computational science, with the goal of impacting the physical world through edge computing and advanced robotics. The second element is QIS, with ASCR's full spectrum of investments in the area through fundamental science, advanced testbeds, and user access programs.

ASCR's budget has trended upward over the past 20 years; however, the research program has lagged behind when compared to the increases in facilities funding. Despite this, there remains a robust research portfolio, many of which focus on partnerships. ASCR is investing in national laboratories through its Competitive Portfolios program, supporting key long-term research in emerging areas and encouraging university and industry partnerships. FY26 funding opportunities were also shared. Many of the previous individual solicitations have been consolidated into the ongoing ASCR open call and the Genesis Mission request for applications (RFA).

The importance of ASCR's facilities was underscored, as demonstrated by DOE supercomputers securing the top three positions on the TOP500 list of the world's fastest supercomputers. These cutting-edge resources are made available to the broader scientific community. ASCR's public-private partnerships with industry leaders such as NVIDIA, AMD, and Intel were also highlighted for enabling advances in computing technologies that support the scaling of AI applications. Finally, the Advanced Computing Technologies (ACT) Division was called out for its role in taking basic research and bridging the computing technologies readiness gap towards production-ready technology solutions.

Schwartz described BES as supporting an integrated ecosystem for both foundational research and multi-disciplinary team science in areas such as materials, chemistry, geosciences, and physical biosciences. Further, BES is organized around three divisions: Chemical Sciences, Geosciences, and Biosciences (CSGB), MSE, and SUF.

The BES budget was also shared. While the total budget has increased slightly over the past four years, the facility operations allocation has increased, and the research and projects allocations have declined slightly. In light of these trends, BES faces the ongoing challenge of balancing the near-term operational needs of its user facilities with long-term investments in research.

The 12 BES user facilities were collectively highlighted, and the AI Facility Pathfinder Call was discussed. This solicitation invited proposals from the user facilities to create collaborations that leverage experimental and simulation data to accelerate AI-driven discovery. Three projects have been funded and are being included in the Genesis Mission as seed projects, addressing scientific problems in the areas of catalysis, microelectronics, and quantum materials.

Lastly, details regarding the BES facilities portfolio were shared. Several facilities projects are complete, including the Advanced Photon Source upgrade at BNL, while others have completed critical decision (CD)-2, marking the approval of the performance baseline. Other projects are in earlier stages: some are pre-CD-2, such as the HFIR pressure vessel replacement at ORNL, and others are pre-decisional, like the Low Emittance Injector (LEI) at the Linac Coherent Light Source II (LCLS-II). Moving forward, steps are being taken to characterize a large-scale, AI-enabled BES user facility.

Koch outlined the mission of BER, which seeks to achieve a predictive understanding of complex biological, earth, and environmental systems. The new BES structure was reiterated: BSSD and EESSD have been consolidated into a single Research Division, which will allow more integrated science to take place. More attention will be given to facilities via the newly created Facilities and Enabling Technologies (FET) Division. Budget details were also shared. Overall funding has declined in the past three years, from \$900M in FY24 to \$854M in FY26. Approximately 27% of the budget goes toward user facilities operations, a smaller fraction than other SC offices, but it is anticipated that the creation of the FET division will create positive change towards rebalancing the portfolio.

Two visions for BER's future were shared. The first focuses on integrating biological research expertise with AI and automated laboratory systems to accelerate the understanding of biological principles and enable biological design. Implementation of this vision is already underway and will be further enhanced through the Genesis Mission. The second vision centers around an integrated earth-biology-energy science network combining AI-driven modeling with field research to deliver predictive capabilities essential to the advancement of national energy interests. This difficult task will be made possible through interagency collaboration under the Genesis Mission. BER is also contributing to several of the Genesis Mission National Science and Technology Challenges. Within the *Scaling the Biotechnology Revolution* challenge, BER has been instrumental in facilitating biological data coordination and creating a platform for autonomous laboratories, laying the groundwork for a successful ecosystem of partnerships moving forward.

Planned projects were highlighted: the Microbial Molecular Phenotyping Capability (M2PC) at the Environmental Molecular Sciences Laboratory (EMSL); the Plant Transformation Capability (PTC) at the Joint Genome Institute (JGI); the Drizzle, Aerosol, and Cloud Observation (DRACO) chamber at the Atmospheric Radiation Measurement (ARM) facility; the BER Data Facility; and the forward-looking Integrated Mobile Field Facility. These projects are vital in achieving the BER mission and are in various stages of CD and execution.

Discussion

Drell expressed surprise at the small number of ASCR partnerships associated with the Genesis Mission shown in the presentation and asked whether more were anticipated. **Finkel** said the graphics shown did not match the true scale of the partnerships but stressed their importance moving forward.

Further discussion was held until the conclusion of the remaining program office updates.

Drell dismissed the meeting at 11:17 a.m. for a break and reconvened the meeting at 11:33 a.m.

Updates from SC Program Offices, Linda Horton, Acting Associate Director, FES; Matt Lanctot, Acting Director, Research Division, FES; Regina Rameika, Associate Director, HEP / Acting Associate Director, NP; and Paul Mantica, Director, FD, NP

Horton briefly outlined the twofold mission of FES: to drive the scientific and technological foundation for a fusion energy source and to support the development of a competitive U.S. fusion energy industry. The enacted FY26 budget of \$806M will support more than 650 research activities across national laboratories, universities, and industry. FES operates two user facilities, the Doublet III-D (DIII-D) National Fusion Facility and the National Spherical Torus Experiment-Upgrade (NSTX-U), along with two active construction projects. In 2025, the SC released the *Fusion Science & Technology (FS&T) Roadmap*, which outlines the key gaps that must be addressed in achieving fusion energy; these will be jointly addressed between FES and the OF moving forward.

Lanctot provided more details about the *FS&T Roadmap* and its particular challenge areas, which range from structural materials science and technology to fusion plant engineering and systems engineering. Several of these challenge areas within the roadmap have direct connections to the Genesis Mission. The theory and simulation area is one such example, with a fusion-specific graphics processing unit (GPU) cluster being built at the Princeton Plasma Physics Laboratory (PPPL). Similarly, the *Accelerating Delivery of Fusion Energy* is one of the National Science and Technology Challenges which directly aligns with the priorities outlined in the *FS&T Roadmap*. To address this challenge, FES is leading the development of an AI-Fusion Digital Convergence Platform (DCP), integrating novel algorithms, HPC, foundation models, and digital twins.

The status of planning and construction for FES facilities was shared. Several small- to medium-sized test stands are being planned. These early research activities can serve as facility precursors and derisk facility alternatives. International Thermonuclear Experimental Reactor (ITER), a collaborative international “megaproject” under construction in southern France, will explore the burning plasma regime. It is 55% complete as of February 2026. The Material Plasma Exposure eXperiment (MPEX) at ORNL will advance the science of plasma-material interactions (PMI) and materials discovery for plasma facing components. It is 83% complete as of January 2026, with operations expected to begin in 2027. The Fusion Prototypical Neutron Source (FPNS) has been proposed to predict and control materials degradation under extreme neutron irradiation, with its current activities related to mission need and cost reviews.

Rameika specifically spoke on behalf of HEP, noting that the merger into HENP occurred too recently to be reflected in the update. The enacted HEP FY26 budget is \$1.235B, with funding roughly distributed across three areas: research (\$430.6); facility operations (\$392.1M); and projects (\$412.4M). HEP activities are similarly organized into three areas: particle physics research; accelerator research and stewardship; and emerging technology research. Through a longstanding strategic planning process, HEP has established a particle

physics roadmap structured around the energy, intensity, and cosmic frontiers, with key scientific drivers and fundamental questions guiding priorities within each.

At the energy frontier, HEP supports research at the European Organization for Nuclear Research (known as CERN) through participation in two experiments at the Large Hadron Collider (LHC): the ATLAS and CMS. Within the intensity frontier, HEP supports several smaller international efforts, along with the flagship Deep Underground Neutrino Experiment (DUNE). At the cosmic frontier, experiments are carried out in partnership with NSF and NASA. Beyond the three frontiers, HEP also advances QIS through the Superconducting Quantum Materials and Systems (SQMS) Center at Fermilab and Q-NEXT at ANL.

HEP facilities and construction projects were outlined and two examples were shared. The first is the Proton Improvement Plan II (PIP-II) at Fermilab, expected to be completed in FY33. The second is DUNE, currently the largest domestic project in the SC portfolio. DUNE will send neutrinos from Fermilab, enabled by PIP-II, to an underground particle detector located at the Sanford Underground Research Facility (SURF) in South Dakota. Looking towards the future, HEP is contributing to the planning efforts for the Future Circular Collider (FCC) at CERN, which would be the largest accelerator and detector ever constructed.

Mantica spoke on behalf of NP, sharing an overview of the office and its mission. NP seeks to understand all types of nuclear matter by leveraging its four user facilities. The enacted FY26 NP budget is \$866.1M, with approximately 23% of the funding allocated to research, 57% for facilities operations, and 20% for construction. Like HEP, the research community's priorities are established through a strategic planning process and are documented in the *2023 Long Range Plan for Nuclear Science*.

NP research activities are organized under three pillars: probing proton substructure; exploring the isotope landscape; and studying rare decays. Five national laboratories maintain these core capabilities for nuclear physics: ANL, BNL, LBNL, ORNL, and the Thomas Jefferson National Accelerator Facility (TJNAF). Within NP subprograms, researchers have been leveraging AI extensively to further their fields, and the Genesis Mission will allow those activities to be integrated together. These efforts align with two National Science and Technology Challenges: *Unifying Physics from Quarks to the Cosmos* and *Enhancing Particle Accelerators for Discovery*. NP is also active in QIS through the Co-design Center for Quantum Advantage (C2QA), focused on developing quantum sensors and scaling quantum qubits.

NP supports three accelerator-based user facilities: the Facility for Rare Isotope Beams (FRIB) at Michigan State University; the Argonne Tandem Linac Accelerator System at ANL; and the Continuous Electron Beam Accelerator Facility (CEBAF) at TJNAF. As previously noted, RHIC at BNL was a fourth NP user facility that ceased operation in February 2026. Construction projects were shared and the Electron-Ion Collider (EIC) was highlighted. This facility will collide electrons with protons and nuclei to study their fundamental structure. Although operations are anticipated to begin in FY36, the EIC user group has more than 1,500 members in 42 countries. Another key NP priority is the search for neutrinoless double beta

decay (NLDBD). Through international collaboration, this topic will be studied via the Large Enriched Germanium Experiment for Neutrinoless Decay (LEGEND)-1000, to be built in central Italy.

Discussion

Spergel asked about the role of stellarators. **Lanctot** responded that stellarators are part of the conversation around advancing confinement concepts, with significant progress made on stellarator physics in recent years. Digital engineering and high-fidelity codes will continue to optimize magnetic configuration and plasma turbulence in these concepts.

Ma inquired about HENP's plans to strengthen workforce development, particularly for graduate students and postdoctoral researchers. **Mantica** emphasized the importance of supporting the highest-priority science while maintaining strong workforce development within budget constraints.

Mahoney wondered whether applying AI and machine learning (ML) to specialized areas like NLDBD would require stress testing in ways that off-the-shelf solutions wouldn't be able to provide, and whether such efforts could serve as a testbed for broader applications. **Mantica** mentioned that ongoing NLDBD experiments are already leveraging AI methods to reduce backgrounds and increase sensitivity. While scientific AI models are tailored to specific domains, the American Science Cloud (AmSC) provides a clear way in which HENP can integrate different models to increase discovery opportunities.

Sreeram discussed the complexity of materials design and the extremely large design space it creates; how can DOE's HPC assets be best used and improved to guide search with the massive number of variables? **Schwartz** emphasized the need to collectively integrate the domain and computing aspects in a way that addresses the scale challenge and identifies the problem space. **Kung** felt encouraged by the advances already happening across all fields, which will be unified through the Genesis Mission and the new modes of thinking it will encourage. **Gil** mentioned the curse of dimensionality when doing *ab initio* simulations and suggested that the key to answering this question would be through the exploration of information representation. With AI and QIS, this exploration might occur through the inherent compression and semantic connectivity within neural networks and within the Hilbert space. Similarly, when high-fidelity simulation codes are used to train neural networks, the resulting surrogate model can provide a highly efficient way to explore parameters, provided it is within the prediction space.

Isaacs sought details on the future direction of particle physics in the U.S., especially in terms of facilities and workforce development. **Rameika** emphasized the U.S. as a current leader in the area, citing our role in the LHC process at CERN. Planning is occurring for the next major experiment there and the U.S. is highly engaged and at the forefront. In this context, emerging researchers are required to both help build facilities and analyze data, a balance which is an integral part of fostering talent.

Guha asked whether BER work in microbiome research and genomic analysis is currently being connected with human and mammalian biology research. **Koch** said BER is working to make the right connections to create a common platform between these areas.

Grassellino questioned how the SC might be further integrated. **Kung** stated the formation of SCAC from six separate advisory committees speaks to that integration. It is important that the individual programs have a line of sight to their communities, but further bridges can be built between the offices through efforts like SCAC.

Garimella wondered how data associated with the Genesis Mission might be kept safe with its many partnerships. **Gil** called out the efforts by the Genesis Mission platform team to create a federated data approach, with a hierarchy around the different classifications of data. There will also be working groups within the Genesis Consortium focused on best practices. Recommendations regarding metadata requirements will be shared with the scientific community to facilitate future data collection, with the goal that this data will be tokenized through a hierarchy of experiments. This will create a unification of scientific knowledge that is coded in AI models and ultimately connect the dots across disciplines in a way that is not currently possible. **Garimella** appreciated the comments and encouraged making that message as accessible as possible to the public.

N. Mason questioned how AI might be used to ask the right scientific questions. **Gil** anticipated AI touching all areas of the scientific method, including hypothesis generation.

Seidel mentioned the previous plans for an integrated data ecosystem, with the High Performance Data Facility (HPDF) as the centerpiece. What is its status? **Kung** said the HPDF is still an important part of the ASCR portfolio, adding that the Genesis Mission is allowing for a reexamination of where it stands today versus when it was conceptualized in 2023.

Siegel asked how research reproducibility might be improved in a more software- and data-driven world. **Gil** reiterated the importance of reproducibility and spoke about the need for frontier open-source models for science. These allow for the interrogation of data in ways that opaque models do not.

Drell dismissed the meeting at 12:29 p.m. for lunch and reconvened the meeting at 1:36 p.m.

Genesis Mission Panel Discussion, Panelists: Hal Finkel; Harriet Kung; and Kam Moler, Professor, Stanford University

Kung introduced the other panelists. Within the SC, Hal Finkel is the platform lead for the Genesis Mission. Kam Moler leads a special study project funded by the SC and convened the Genesis Mission University / Science Philanthropy Summit in February 2026.

Finkel spoke on the Genesis Mission platform, which will integrate computing infrastructure with scientific instrumentation and other DOE assets. These platform capabilities are being developed collaboratively with the National Nuclear Security Administration (NNSA) and others. Within the platform, the Transformational AI Models Consortium is developing core capabilities in the following areas: multimodal reasoning; AI self-improvement; agent orchestration; model evaluation; safety and security; and AI-driven data preparation. The AmSC team is responsible for the underlying framework for the federated infrastructure, including data and model services, scaling, federation authentication, and user management.

The innovations driven by existing partnerships around HPC resources are not sufficient

to provide the capabilities required under the Genesis Mission. As a result, new partnerships are being established with AMD, Oracle, and NVIDIA to deploy next-generation computing systems across the national laboratories. These partnerships will provide 10,000 to 15,000 GPUs in the near term and approximately 100,000 GPUs over the long term, sufficient to support the entire DOE complex for the Genesis Mission. The Genesis Mission Consortium was also discussed. It was created with three purposes in mind: enabling partnerships within the mission through contractual vehicles; hosting working groups focused on key questions; and identifying and facilitating collaboration.

Kung explained that DOE was required under the Genesis Mission EO to report agency-wide National Science and Technology Challenges to the White House and has identified 26 such challenges to date. It is anticipated that additional challenges will be added as interagency collaborations progress. The Genesis Mission: Transforming Science and Energy with AI RFA was highlighted. Phase I awards will range from \$500K to \$750K over a nine-month project period and phase II awards will range from \$6M to \$15M over a three-year project period. The RFA is a cross-DOE solicitation; however, the NNSA will address security-focused challenges under a separate mechanism.

Moler asked SCAC to participate in “futurecasting” to envision what the research ecosystem might look like over the next decade, especially in light of AI’s transformative effects on science. The committee was asked to consider two archetypes in this context: first, the chief scientific officer of a fusion energy startup, who relies on data and models in areas such as plasma physics and confinement; and second, the early career researcher in an area such as drug discovery or quantum materials, studying candidate molecules and materials more rapidly and comprehensively through AI. For both, SCAC was encouraged to consider what information the DOE should provide to these individuals and what role AI should play in these efforts.

Discussion

Schmidt said these advances will dramatically reshape the physical infrastructure required at universities and emphasized the need for thoughtful planning ahead of these changes. **Moler** agreed and sought feedback on the opportunities a network of autonomous laboratories might provide to less well-funded universities. **Schmidt** highlighted the democratizing effect of such a network and noted its impacts on the university footprint and the resulting culture shift.

Seidel spoke on connecting small-scale university efforts to long-term DOE investments and asked about the expected commitment from universities as part of the Genesis Mission. **Finkel** confirmed the intent to connect autonomous laboratories to university resources, noting ongoing conversations with the NSF regarding its existing portfolio of computing resources and autonomous laboratories. The Genesis Consortium aims to define and connect these resources together across federal, university, and private sector assets. **Kung** emphasized the ideas generated at the previously mentioned Genesis Mission University / Science Philanthropy Summit. The response to the RFI soliciting public and private sector input on strategies for meeting the technical challenges of the Genesis Mission was also noted. Over 270 responses were received and are currently being analyzed, with the findings expected to shape the

engagement strategies with universities and other partners.

Sutherland asked whether funding access to privately built computing resources might be considered as an alternative to DOE building new supercomputers. **Finkel** expressed openness to a wide range of partnerships, including those involving new form factors and performance characteristics. He noted that such partnerships can create feedback loops that support the development of testbeds and large-scale systems, in order to maintain leadership in technology development and deployment. However, there are advantages to locating computing resources in close proximity to physical DOE resources, including the high bandwidth and low latency connections that enable AI-driven innovation.

Endy inquired about perspectives on interoperability and the terms and conditions related to foundation models developed with industry partners. DOE's past role in generating new data types was also noted – should SCAC be thinking about the Genesis Mission in terms of new data types that currently do not exist? **Finkel** emphasized the need for uniformity in technical and legal standards that will enable efficient progress. Each community has unique requirements that call for openness and flexibility, but the platform must also incorporate crosscutting reproducibility. **Moler** cited the complexities and expense associated around storing and curating heterogeneous data sets. While there is mature thinking on the best practices in this area, it is unclear whether there is funding for them to be implemented.

Siegel expressed doubt about the current ability to build digital infrastructure that significantly improves researcher productivity and wondered how the Genesis Mission might change this. **Finkel** explained that almost all aspects of the scientific workflow involve computing, but in some elements, like physical experimentation and the exchange of ideas, its role is less direct. However, the entire research cycle must be considered to improve productivity and not every piece needs to be accelerated; attention should focus on the key components deemed most relevant by the scientific community. This approach will enable the rapid and continuous improvement of productivity. **Kung** raised the scenario where, with enough data, AI-driven inference could eliminate the need for resource-intensive experimental validation. Because this extreme scenario seems unlikely, we must consider what type of essential physical infrastructure cannot be replaced by AI. SCAC's input is needed around finding balance in this area and determining what the ultimate endpoint might be.

Garimella inquired about expanding the Genesis Mission to include a workforce development component, suggesting that the NSF Graduate Research Fellowship Program (GRFP) might be expanded into the AI space. Support should extend beyond PhD students to include undergraduates and teachers. **Kung** stated the need to address the full spectrum of developing the AI-ready workforce at scale, emphasizing the importance of training opportunities spanning kindergarten through twelfth grade (K-12), community colleges, and vocational programs. **Gil** stressed the importance of formulating a workforce development strategy that capitalizes on current momentum and enables collaboration between federal agencies, the private sector, and philanthropic organizations. **Garimella** encouraged dialogue with the Departments of Labor and Treasury as they take on functions formerly carried out by the

Department of Education.

Mahoney noted that industry is not monolithic, with large companies tending to be more risk-averse when compared to startups, which often push boundaries even when they fail. In that context, how do you navigate this dynamic within the Genesis Mission?

Papermaster sought clarification around whether the Energy Grand Challenge includes efforts to drive more efficient computing. **Moller** confirmed this and expressed that increasing the scientific computing energy load would indicate positive progress.

N. Mason asked whether committee members would have access to the community feedback submitted through the RFI and the Genesis Mission University / Science Philanthropy Summit. **Kung** said the SC is working on organizing the feedback in a way that can be most effectively used by the committee.

Isaacs emphasized the need for a roadmap and greater clarity around the roles of foundations, encouraging further conversation around capabilities and common goals. **Moller** asked what a shared understanding would look like in form of a product that goes beyond conversations. **Kung** agreed on the need for a roadmap to clarify where the mission is headed, the level of effort required, and the expected time commitment. Without it, earning the trust and support necessary for the mission's success will be very difficult.

Finkel addressed several of the previous comments by expounding a core philosophy of the Genesis Mission: do not admire the problem – bring together a coalition and solve it. Across all the mission challenges, diverse partners must come together under an inspirational goal to realize its vision. This includes both small and large organizations within industry, academia, nonprofits, and philanthropy, all of which will contribute something different. Crosscutting all of this is the need for improvements in computing efficiency; making advanced computing and AI the key enabler within the scientific workflow requires data centers, modeling at scale, edge computing, and robotics, none of which will be possible without greater efficiency.

Quantum Information Science Panel Discussion, Panelists: Tanner Crowder, Senior Technical Advisor, ASCR / QIS Lead, SC; Anna Grassellino, Director, SQMS Center, Fermilab; and Whitney Mason, Director, Microsystems Technology Office (MTO), Defense Advanced Research Projects Agency (DARPA)

Crowder shared that DOE's QIS portfolio takes on a multimodal approach, supporting large centers, single investigators, small teams, enabling infrastructure, user facilities, and testbeds. Over the past eight years, DOE has invested \$1.6B in QIS, which has been catalyzed by the NQI Act. Since 2019, investment has doubled to support the development of a comprehensive and integrated, department-wide approach. The five NQISRCs were highlighted. Since their creation in 2020, these centers have produced significant breakthroughs, including the first quantum computer to simulate materials with the results validated by a neutron scattering experiment. In November 2025, \$625M in funding was announced to renew the NQISRCs for an additional five years. The 28 SC user facilities were also mentioned for their importance in these efforts and were called out as the "north star" in guiding efforts towards establishing a national quantum supercomputing user facility.

Grassellino spoke about the NQISRCs in more detail. The centers bring together multi-institutional and multi-disciplinary teams to address major crosscutting issues in the field. These issues span the science and technology (S&T) innovation chain, starting with materials and moving up to high-coherence devices, systems integration, new platforms, and applications. Each center addresses at least three levels of the innovation chain in its work. There are also three key focus areas: overcoming errors, unlocking scaling, and enabling applications. Following the renewal of the centers, the distinct and complementary roles of the five centers are becoming more clearly defined.

The role of the national laboratories within this context was highlighted, especially their experience in leading the kind of large collaborations common at NQISRCs. The infrastructure and technology, including accelerator and computing facilities, are also essential to QIS progress. As a result of these efforts, the centers are showing tangible progress in the development of industry quantum processor prototypes, which is an important step towards fault-tolerant quantum computers.

W. Mason spoke about the Quantum Benchmarking Initiative (QBI), a program that came out of two efforts within DARPA's Defense Sciences Office (DSO). The first, the Quantum Benchmarking (QB) program, began with the assumption that there is no commercially rational reason to build a quantum computer. The second, the Underexplored Systems for Utility-Scale Quantum Computing (US2QC) program, extended that premise by asserting that even if a commercially rational case existed, none of the current technological approaches were likely to succeed. The result is a program that brings together experts to assess the concepts and efforts made by commercially funded companies working to build a utility-scale quantum computer (defined as its computational value exceeding its cost).

The QBI has been subdivided into three sequential stages. In Stage A, companies must provide a comprehensive description of their proposed utility-scale quantum computing concept. In Stage B, they are required to submit a detailed research and development plan outlining technical risks, mitigation strategies, and the prototype systems necessary to validate their approach. In Stage C, companies must demonstrate that their system can be constructed as designed and operated as intended. To date, 11 companies have advanced into Stage B, and two companies, Microsoft and PsiQuantum, have moved into Stage C. Based on these results, DARPA believes it is more likely than not that there will be at least one demonstration of a utility-scale quantum computer by 2033. Considering this, the QIS community needs to prepare from both a logistics and use case perspective as we move towards this development.

Discussion

Isaacs asked about how success might be defined in quantum computing, noting the difference between building a more generalized quantum platform and developing systems that specifically address difficult scientific questions. **Crowder** noted that while we have a good sense of the types of difficult problems that might be solved by quantum computers, it is very likely that their most promising applications have yet to be discovered. **Grassellino** added that many particle physicists expect quantum computers as potentially the only way to answer

specific questions in the field, which is a common sentiment shared in other disciplines. The quantum computers that exist now are already scientifically useful and will become increasingly so as the technology continues to advance. **W. Mason** speculated that the difference between scientifically relevant and utility-scale quantum computers will not be as big as originally anticipated.

Seidel mentioned NSF-hosted competitions in the early 1990s that aimed to determine the types of scientific problems best suited for parallel computing, and asked whether quantum computing might be ready for something similar. **Crowder** responded that we may be nearing the right time to host something similar.

Jehi noted the absence of biological applications in the quantum computing discussion, especially due to the usefulness of quantum sensing, and asked how ongoing QIS efforts might be coordinated with the Genesis Mission. **Crowder** commended the exciting work BER is doing around quantum sensing and stressed the importance of connecting domain scientists with quantum information scientists to translate quantum systems into practical end-use applications.

Papermaster inquired about how interface standards between quantum and classical computing might accelerate progress. **W. Mason** described challenges around integration and ecosystem development. Peripherals should be included as part of the overall quantum system, but it remains unclear how to do so.

N. Mason was curious about how AI might be integrated into the NQISRCs and what overall changes could be expected in the second stage of funding compared to the first. **Grassellino** said the centers are more focused in the second phase, reflecting the natural evolution that comes from the downselection of research topics. For example, SQMS is concentrating more towards scaling, when previous efforts were focused on quantum building blocks.

Mahoney asked whether the mechanisms used in QBI could be applied to AI and ML at DARPA. **W. Mason** mentioned the uniqueness of QBI as a program. While the MTO focuses on hardware, the Information Innovation Office (I2O) at DARPA has begun to ask whether it needs to engage more in the AI ecosystem.

Sánchez hypothesized two possible futures: one in which a customized quantum computer is required to solve each type of scientific problem, and another in which more general-purpose quantum computers can address a broad range of applications. Which scenario is more likely? **Crowder** stated that a significant amount of work remains before it becomes clear what quantum computing platform will ultimately have the most scientific relevance and industrial utility. Although the challenges are substantial, the community is well positioned to overcome them.

Guha wondered about the role DOE might play in supporting quantum startups and the broader ecosystem. **Crowder** described DOE's role as accelerating quantum technologies, bringing them to user communities, and helping to cultivate and expand that community.

Kohli inquired about the scaling laws related to the number of qubits potentially becoming available over the next five years. **Grassellino** shared that industry leaders anticipate

reaching the 100 logical-qubit scale by 2028. That could correspond to somewhere between 100 to 10,000 times as many physical qubits, depending on how the current research progresses.

Kohli then asked how many qubits would be required to produce transformative science.

Crowder anticipated transformative science requiring between 100 and 300 logical qubits and around 100 million operations.

Siegel asked how competitive the U.S. is internationally in quantum computing.

Crowder saw the U.S. as very competitive, remarking on its strong ecosystem around research and partnerships. **W. Mason** commented on the competitive international landscape. **Grassellino** said the previously mentioned ecosystem is our competitive edge.

Public Comment

Sarah Eno (University of Maryland) serves as Chair of the American Physical Society Division of Particles and Fields (DPF) and spoke about the consensus building process of the organization. The process begins with the Snowmass study, which convenes particle physics experts to collectively develop a long-term vision for the field. The outcomes of Snowmass inform the *Particle Physics Project Prioritization Panel* (P5) report, most recently issued in 2023. That report was delivered to the High Energy Physics Advisory Panel (HEPAP) to help set priorities for HEP and the NSF Division of Physics (PHY). With the creation of SCAC as an office-wide advisory committee, the American Physical Society is excited and prepared to provide SCAC with the best possible information to advise the SC on how the U.S. can remain a global leader in physics.

Jae Yu (University of Texas at Arlington) noted that many of the comments and questions about AI focused on technical issues. The human dimension must also be considered in this push, particularly the need to train the next generation to remain relevant in an increasingly technology-driven society.

Fernanda Psihas (Franciscan University of Steubenville) encouraged the committee to consider how funding structures and other safeguards could be designed to ensure that AI tools developed within the field are broadly accessible to the wider research community.

Drell mentioned the email for submitting community input (scac@science.doe.gov) and adjourned the meeting at 3:55 p.m.

Respectfully submitted on April 10, 2026,

Drew Nitschke

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