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The Honorable Rosa DeLauro
Chair
Committee on Appropriations
H-305, The Capitol
U.S. House of Representatives
Washington, DC 20515

Dear Chair DeLauro

As the Chairwoman of the Science, Space, and Technology Committee, I am writing to encourage your continued support of our nation's science, technology, and innovation enterprise. The Commerce, Justice, Science, and Related Agencies appropriations account provides funding for a wide range of agencies that fall under the purview of the Science, Space, and Technology Committee. The sections below address the Administrations FY2022 Budget Request. I respectfully request that you consider the following funding for these agencies and specific programs within the agencies.

National Science Foundation

The Administration is requesting $10.17 billion for NSF in FY 2022, which represents a nearly 20 percent increase from FY 2021 enacted. The budget request includes increases for all of NSF's major accounts. I support all of these increases. NSF continues to play a central role in supporting the foundational science and engineering research that makes U.S. leadership in innovation possible. The agency plays an equally important role in ensuring a pipeline of talent to fill our nation's great research laboratories and high-skilled STEM jobs across all sectors of our economy.

In particular, I support the proposed increases for research on critical technologies, including a $122 million (20 percent) increase for investments in artificial intelligence, a $50 million (24 percent) increase for quantum science, a $37 million (28 percent) increase for advance wireless research, and a $92 million (32 percent) increase for biotechnology. I also support proposed

funding increases for research to address climate change, including through investments in clean energy technologies. All of these increases are consistent with legislation enacted or proposed by the Science, Space, and Technology Committee.

I also urge you to provide the requested increases in funding for broadening participation activities. The entire portfolio is increased by nearly $200 million (16 percent), with a $13.5 million (66 percent) increase for the HBCU-Excellence in Research program and a $26.5 million (132 percent) increase for INCLUDES. We must grow and expand the STEM workforce if we are to remain competitive and address society's most pressing challenges.

As the Committee on Science, Space, and Technology continues our bipartisan work to address legitimate threats to research integrity and security, I am committed to ensuring we do not waiver in our support for international collaboration and partnerships. We must continue to engage with our international partners to solve global challenges and enrich our own scientific enterprise. I enthusiastically support the $24 million increase to the Office of International Science and Engineering (OISE) in the request.

I also support the Administration's proposal to establish a Directorate for Technology, Innovation, and Partnerships (TIP). The time is right to push NSF to take on new challenges to maximize the return on its investments in research. I am very encouraged to see that the framing of the goals and proposed activities of the TIP Directorate closely mirror that of the new Science and Engineering Solutions directorate proposed in H.R. 2225, the *NSF for the Future Act,* which passed the House with a large bipartisan vote on June 28. I have full confidence in NSF's capacity to rise to this challenge, while continuing to fulfill its critical fundamental research mission, and I urge you to provide the necessary funding to get this directorate up and running.

I want to call particular attention to the proposed increase for the Agency Operations and Awards Management (AOAM) account. A few years ago, NSF staff, when briefing my Committee, would brag about their 6 percent overhead being the lowest in the Federal government. At 4 percent in FY 2021, it is nothing to brag about. The agency is struggling to maintain basic administrative and oversight functions. I whole-heartedly support the Administration's proposed 35 percent increase to the AOAM account. As Members, we want to be able to brag about how much money we've put into research, not how much we've put into agency operations. However, the path the AOAM account has been put on over the last few years is not sustainable.

National Institute of Standards and Technology

The National Institute of Standards and Technology (NIST) supports U.S. innovation and competitiveness by advancing measurement science, standards, and technology. As critical as NIST is to our economic and national security, it remains one of the most underappreciated agencies in our Federal government. After three years of flat funding, NIST lacks the resources and infrastructure it needs to both conduct important measurement research and support standards setting across all technologies and sectors, including important industries of the future. I urge you to fully fund the FY 2022 request for NIST. The truth is it is not enough given the needs and opportunities facing the agency, but it is an important start to right-sizing the agency's budget.

The Scientific and Technical Research and Services (STRS) account funds NIST's laboratory research, including collaborative research with industry. The Administration proposes a 16

percent increase to $915 million. I urge you, at a minimum, to fully fund this request. In 2020, the National Defense Authorization Act increased NIST's responsibilities in artificial intelligence, including the establishment of a research institute and a framework for trustworthy AI. Similarly, the National Quantum initiative Act, enacted in 2018, expanded NIST's role in quantum science. Unfortunately, both technology areas are currently funded well below authorized levels. NIST also plays a central role in supporting privacy and cybersecurity research, guidance, and standards development, but has been chronically underfunded given the scale and scope of the need. I also note the importance of continued or increased support for NIST's centers of excellence and activities related to environmental measurement ("Urban Dome"), biometrics testing, forensic science, disaster resilience, and plastics recycling. Finally, there is ever increasing urgency to support U.S. leadership in international standards development, especially in industries of the future. No agency in the Federal government is more central to this effort than NIST. I urge you to increase support for NIST to engage in international standards development and related activities.

On Feb. 3, 2021, the NIST Center for Neutron Research (NCNR) reactor experienced an event that forced the facility to shut down. While it is very fortunate that no personnel were harmed and there was no environmental damage, this facility remains shut down while NIST investigates the cause of the event. With the closure of this facility, there is now a single active neutron facility serving the entire U.S. academic and private sector community. I strongly urge you to provide additional funding to NIST to remediate the NCNR as well as to conduct a planning study on the future of the reactor after it is set to decommission in 2029.

NIST's Industrial Technology Services Account supports the Hollings Manufacturing Extension Partnership (MEP) and Manufacturing USA. As you well know, MEP has proven to be a successful model for federal-state partnerships with significant payoff in economic growth and job creation across our nation. The Manufacturing USA network is coordinated through NIST and develops partnerships between companies, academia, and entrepreneurs to develop and deploy manufacturing technologies. The current NIST-supported institute, the National Institute for Innovation in Manufacturing Biopharmaceuticals (NIIMBL), has played a vital role in pandemic response. The Administration proposes an additional $275 million to expand MEP and support two additional Manufacturing USA institutes. I support the $125 million increase for MEP and funding for NIST to award two new institutes.

Finally, I strongly support investing in NIST's construction account to modernize NIST's labs. Many of NIST's facilities are aging or outdated. Based on Department of Commerce standards, roughly 60 percent of NIST's facilities are in poor to critical condition. In addition, there are over $800 million in deferred maintenance projects. If NIST is expected to conduct important measurement research, it must have facilities that support precision. Unfortunately, the FY 2021 enacted budget cut NIST's construction budget to $80 million, a decrease of 32 percent. The President's FY 2022 budget request of $140 million is also insufficient. This level of funding covers some basic maintenance of NIST facilities but will not meet the agency's needs. I urge you to fund NIST's facilities and construction account at $200 million to help address NIST's long list of maintenance needs and to ensure that construction projects on both NIST campuses remain on track.

Economic Development Agency

In 2010, the Science, Space, and Technology led the development and enactment of amendments to the Stevenson-Wydler Technology Innovation Act of 1980, creating a new Office of Innovation and Entrepreneurship and the Regional Innovation Strategies (RIS) Program at EDA (P.L. 111-358). The President's budget request includes $45m for the RIS Program, now known as Build to Scale, an increase of $7 million from FY 2021. I support this increase.

National Aeronautics and Space Administration

I am pleased that the President is demonstrating his support for a crown jewel of the nation's Federal research and development enterprise, the National Aeronautics and Space Administration (NASA), through a proposed 6.6 percent increase over the enacted FY 2021 appropriation to $24.8 billion for FY 2022. The request includes proposed increases across NASA's portfolio to support priorities in Earth science and climate change research, sustainable aviation, and expanded diversity, equity, and inclusion in NASA's Office of STEM Engagement activities, among other mission activities at NASA. While the budget request for NASA is in general a strong one, I note several aspects of the request that are concerning.

I am a strong supporter of returning America to the Moon as a stepping-stone for the human exploration of Mars. That is why I have supported and continue to support robust investments in Orion, the Space Launch System, Exploration Ground Systems, and associated space technology activities. However, I remain concerned that the Artemis initiative put forth by the previous Administration remains a collection of activities lacking a strong architectural foundation, clear understanding of risks, a strong organizational and management structure, or an implementation plan with credible milestones. Returning to the Moon in preparation for human missions to Mars is a very consequential and visible national endeavor whose success or failure will significantly affect international perceptions of America's standing in the world. As such, I continue to believe strongly that critical enabling capabilities for that national endeavor need to be owned by the government, that the program needs to be adequately resourced, and that it needs to have its goals and priorities clearly articulated. While I am encouraged by the determination of the new NASA Administrator and his team to make Artemis a success, I believe that the Administrator needs to arrange for an independent review of the entire Artemis initiative as soon as possible and before any additional significant procurement actions are taken, so that potential problems like those already cited by the GAO and the Aerospace Safety Advisory Panel (ASAP) can be uncovered and corrective actions taken to put Artemis on a credible path to a successful outcome. Such a review need not interfere with the ongoing preparations for the Artemis 1 mission, and indeed will save both time and resources over the long run. I believe it is imperative that such an independent review needs to be completed if Congress is to have confidence that the budgetary resources it is being asked to commit to Artemis will be put to good use and not wasted.

The FY 2022 request proposes $2.4 billion, a 21.5 percent increase over the enacted FY 2021 appropriation, to maintain a Moon to Mars initiative and multiple development projects (e.g., Gateway, Human Landing System, Advanced Exploration Systems) under the *Exploration Research and Development* account. The complexity and magnitude of a Moon to Mars effort warrant the highest level of visibility, management, and systems engineering and integration functions to ensure that the Moon to Mars initiative is safe and has the highest likelihood of success. Both the Congressionally-chartered Aerospace Safety Advisory Panel (ASAP) and the

Government Accountability Office (GAO) have emphasized the importance of the systems engineering and integration function to Artemis, however, funding for this effort is included in the Advanced Cislunar and Surface Capabilities account and is not identified separately. To that end, I believe it is important to consider providing systems engineering and integration funding for Artemis through a separate budget line in the Human Exploration and Operations Mission Directorate so that this important function can be prioritized and funded appropriately.

Regarding the *Exploration Systems Development* account, I note that the FY 2022 request does not identify a funding level for the Exploration Upper Stage (EUS), which is included within the request for the Space Launch System (SLS). The EUS is an essential capability for an upgraded Block1B SLS configuration and will enable a higher level of payload mass to be transported to trans-lunar injection. In order to provide the capabilities that will be necessary to support a robust and efficient exploration initiative, I would urge you to provide sufficient resources for EUS in the SLS account with the goal of supporting the availability of EUS for an SLS Block1B configuration as soon as practicable.

The FY 2022 budget request for NASA proposes, as have prior budget requests, significant increases--$84 million or 494 percent over the FY 2021 enacted appropriation--for a *Commercial LEO Development* activity that would support the development of LEO supply capabilities such as commercial LEO platforms or commercial modules attached to the Space Station. The future of NASA and a U.S. presence in low Earth orbit is vitally important to the nation and to NASA's human exploration program. Future developments for low Earth orbit should be considered in the context of an ISS Transition Plan that identifies NASA's future needs and requirements in low Earth orbit requirements, milestones toward meeting those requirements, and identifies capabilities that may follow the ISS once it is no longer operational. I request that you not support the nearly 500 percent increase to the Commercial LEO Development account until such information has been provided to Congress.

NASA's FY 2022 budget request for the *Space Technology Mission Directorate*, proposes to support continued work on nuclear fission surface power development, however no funding is requested to continue R&D on nuclear thermal propulsion, despite Congressional interest in and prior appropriations for such activities. A 2021 National Academies of Science, Engineering, and Medicine report recommended that NASA invest aggressively now in technology development to focus on addressing challenges in both nuclear thermal and nuclear electric propulsion in order to support future human missions to Mars in the late 2030s. To that end, I urge you to consider including funding for nuclear thermal and nuclear electric propulsion R&D, consistent with the Academies' recommendations, at the level of at least $200 million for FY 2022.

Within the Science Mission Directorate, I note the proposed decrease of $70 million or 25 percent from the FY 2021 enacted appropriation to the heliophysics research program, only a small portion of which ($9 million) is transferred for the establishment of a new heliophysics technology account. I further note the proposed decrease of $15 million (60 percent) from the level appropriated in FY 2021, to the heliophysics space weather science and applications program. These accounts are important for advancing our nation's space weather research, monitoring, and predictive capabilities, as emphasized under the the Promoting Research and Observations of Space Weather to Improve the Forecasting of Tomorrow (PROSWIFT) Act. I respectfully request that you consider restoring this funding to ensure that NASA's important contributions to advancing space weather research and forecasting will continue.

Finally, I'm concerned that NASA's FY 2022 budget request proposes a decrease of about $55 million or 14.8 percent from the FY 2021 enacted appropriation for *Construction of Facilities* (CoF) even though NASA has repeatedly noted the agency's $2.6 billion deferred maintenance backlog and its more than 40-year old aging infrastructure. The *Institutional Construction of Facilities* account, which supports NASA infrastructure and facilities that enable work of Centers across multiple mission areas, would be reduced by $57 million or about 22 percent under the FY 2022 NASA budget proposal. These proposed cuts appear to be contrary to addressing the agency's more than $5 billion deferred maintenance, recapitalization, and modernization needs articulated by the NASA Administrator publicly. I urge you to consider providing increased funding to reduce the agency's $2.6 billion deferred maintenance backlog and to enable investments in recapitalization and modernization.

FAA Research, Engineering and Development

The FY 2022 request proposes an increase of $60.5 million or 23.4 percent to the FY 2021 enacted appropriations for FAA's Research, Engineering, and Development (RE&D) activities. I am pleased that the FAA budget request proposes funding for "a limited two year pandemic-related research effort to inform a system risk management analysis of infectious disease transmission in flight, and to establish a foundation for developing a cabin safety pandemic playbook for future use." Such work is important in light of the devasting impacts of the pandemic to our aviation sector.

Regarding specific elements of the FAA RE&D request, I note, for your attention, a significant cut of nearly $9 million or 88 percent to System Planning and Resource Management, which "leads the planning, coordination, development, presentation, and review of the FAA's research and development (R&D) portfolio"; a proposed cut of $2.4 million or 22 percent to Continued Airworthiness, which "supports the FAA's aviation safety oversight responsibility to ensure that aircraft maintain operational safety, as they age, or as new technologies are introduced," including generating data to support new standards for such technologies as urban air mobility, advanced air mobility, and unmanned aircraft systems; a significant reduction of 88 percent to Advanced Materials and Structural Safety, which "conducts research to support FAA safety and regulatory activities in the technical areas of composites and other advanced materials, and their impact on flight safety"; and a proposed cut of $3 million or 50 percent to the Air Ground Integration Human Factors account in light of the importance of human factors within the flight deck and national airspace system operations as well as the growing implementation of automation systems. Because the budget request provides limited information on the rationale for such cuts, I urge you to seek such supporting information and consider restoring the funds, where appropriate.

In addition, I urge you to consider increasing funding for IT and cybersecurity, which is flat-funded in the FY 2022 proposal, in light of increasing cybersecurity threats and incidents such as the SolarWinds hack. I also request that you consider increases to the Environment and Energy account, which would be essentially flat-funded in the FY 2022 request despite producing "data and knowledge that are the scientific and technical foundation for the development of cost-effective measures to mitigate the environmental impacts of aviation noise and emissions". The FY 2022 request articulates that "Environmental impacts, especially aircraft noise, are often the number one cause of opposition to airport capacity expansion and airspace redesign".

Finally, $50 million of the Administration's proposed increase to the RE&D account would be to support a new climate initiative, ARPA-C. While I am supportive of increased investment and coordination of federal resources in addressing the climate crisis, in the absence of further explanation by the Administration, I do not think the ARPA model is appropriate for the type of research this RE&D funding would support.

National Oceanic and Atmospheric Administration (NOAA)

I am very encouraged by the President's FY 2022 request of $6.98 billion, an increase of $1.54 billion from FY 2021 enacted levels, to support NOAA's critical mission of environmental science and stewardship. This budget helps enhance NOAA's climate research, observations, and forecasting, as well as support activities toward climate mitigation, adaptation, resilience, and equity. This increase will ensure that the data, tools, and services NOAA produces are publicly accessible to support climate services and decision-making. This budget also supports improvements to NOAA's observational infrastructure, including fleet support, existing and next-generation satellites, in situ buoys and other monitoring instruments, and space weather.

Given the climate science and services expertise housed at NOAA, the agency will be key in helping communities adapt and mitigate to climate change and in implementing Executive Order 14008, Tackling the Climate Crisis at Home and Abroad. The request to increase climate research by $112 million will go to support important existing programs like the Regional Integrated Sciences and Assessments, as well as new programs. However, $40 million of this increased climate research funding has been earmarked for the Administration's ARPA-C proposal to be housed at the Department of Energy. While I am supportive of increased investment and coordination of federal resources in addressing the climate crisis, in the absence of further explanation by the Administration, I do not think the ARPA model is appropriate for the type of research this funding would support. I also support the Administration's request for a $368.2 million increase for climate observations and forecasting to help NOAA expand and build upon their environmental observing and forecasting systems to better support weather readiness and climate change-related decision-making.

I am very supportive of the proposed increase for the Office of Oceanic and Atmospheric Research (OAR) to $816 million. Much of this additional funding is directed to establishing new climate research activities and bolstering ocean and coastal resilience programs. This increase includes a $7 million addition for the agency's Precipitation Prediction Grand Challenge. Additional funding to this program will further improve NOAA's capacity to predict heavy precipitation and drought in a changing climate. NOAA's ability to be at the forefront of predicting and forecasting weather, water, climate, and ocean phenomena depends on significant investments in global ocean observation systems, atmospheric observations, a seasonal forecast system, coastal ocean modeling, and aircraft observation capabilities. To meet the growing challenge posed by sea level rise and coastal flooding, the request also includes investments to build a coastal inundation outlook capability at climate timescales to better support high-tide flood risk forecasting, and nationwide improvement of the Flood Inundation Mapping program.

NOAA's data volume and data management needs are predicted to exponentially increase due to the increasing number of observations and utilization of autonomous capabilities. I am supportive of the proposed increases across various line offices to support data management,

processing, and cyberinfrastructure. These increases will help NOAA ensure that its data are publicly available and usable by the public for decision-making about climate change.

The enactment of the Promoting Research and Observations of Space Weather to Improve the Forecasting of Tomorrow, or PROSWIFT, act last year was a significant step in helping the U.S. improve forecasting of space weather events to better mitigate potential impacts to critical systems. I encourage the Committee to fund NOAA's space weather activities at the requested $5 million, a vital investment in the nation's space weather forecasting and prediction efforts.

I am pleased to see the proposed increased investments in wildfire research, development, and preparation, an issue of great importance. This $15 million increase will provide capacity for producing an integrated suite of fire prediction and decision-support tools that will allow fire managers to better plan for and respond to wildfires. The increase also allows for the establishment of a NOAA Fire Weather Testbed that will support impact-based decision support tools, products, and models.

I am also very supportive of the inclusion in the FY 2022 request of funding to support internal and external programs related to equity and environmental justice, including $57.9 million for new programs to build a more diverse and inclusive workforce and new efforts to increase the number of storm-ready communities, including those rural and underserved communities that are especially vulnerable to extreme weather.

This budget request includes some deficiencies in important ocean and weather research areas. The request for Ocean Exploration and Research essentially keeps funding at FY 2021 Enacted levels, which is insufficient to advance key national ocean mapping and exploration priorities described in the Ocean Policy Committee's National Strategy and Implementation Plan for Mapping, Exploring, and Characterizing the United States Exclusive Economic Zone of 2020. Additionally, the National Oceanographic Partnership Program was recently reauthorized and revitalized in Section 1055 of the FY 2021 National Defense Authorization Act and is a key partnership program for funding and advancing ocean research. It leverages funding and expertise across federal agencies including the Navy, as well as with academia and the private and philanthropic sectors. The budget request keeps NOPP funding at $3 million, which does not allow NOAA to participate in a manner commensurate with its role in the initiative. Another ocean research area deserving of increased funding is ocean acidification. The request keeps the Integrated Ocean Acidification funding at roughly the same levels as FY 2021 appropriations, at $15.6 million, which falls short of what is needed for NOAA to address the growing ecological and socioeconomic threats posed by ocean acidification.

It was also concerning to see the lack of a budget line for the Earth Prediction Innovation Center (EPIC), which was congressionally mandated in the National Integrated Drought Information System Reauthorization Act of 2018. EPIC will help NOAA improve its numerical weather models and forecasts by leveraging innovations from the external research community. NOAA announced in May that it had selected Raytheon Intelligence and Space to design and develop the center.

NOAA Office of Space Commerce

Regarding the NOAA Office of Space Commerce, I want to note the delays in implementation of a space traffic management pilot program. The enacted FY 2021 appropriations included

resources for a pilot with direction in the explanatory statement that the pilot program be carried out "in collaboration with industry, the Department of Defense, the Federal Aviation Administration, NASA, and other Federal partners, as appropriate, to develop STM technical prototypes, initiate an open architecture data repository, and perform STM demonstrations and experiments." I request that you encourage NOAA to put in place sufficient staffing to enable implementation of a space traffic management pilot program and to provide the Office of Space Commerce with the resources needed to continue the pilot during FY 2022. The implementation of the pilot will help inform the Science, Space, and Technology Committee's policy work on space traffic management and appropriate roles and responsibilities, as well as the ultimate scope and location of that activity.

Sincerely,

Eddie Bernice Johnson
Chairwoman
Committee on Science, Space, and Technology

Cc:

The Honorable Kay Granger
Ranking Member
Committee on Appropriations

The Honorable Frank Lucas
Ranking Member
Committee on Science, Space, and Technology

The Honorable Matt Cartwright
Chairwoman
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