

## Key Programs Need Sustained Support

Optics and photonics – the science and application of light – benefit greatly from federal research and development (R&D) investments and, in turn, contribute to innovations that reach beyond scientific discovery. Photonics generates, controls and detects particles of light to advance manufacturing, robotics, quantum technologies, medical imaging, next-generation displays, defense technologies, biometric security, image processing, communications, astronomy and much more.

Now more than ever, it is important to maintain meaningful federal investments in photonics research to expand innovation, competitiveness and economic opportunity. Several science agencies and programs of interest to the NPI include:

### **NIST**

The National Institute of Standards and Technology (NIST) works with our nation's businesses and universities to drive American economic growth and job creation. Companies, academic institutions and other federal agencies rely on STRS programs to provide foundational research and material development for their products and programs. The National Quantum Initiative Act, which passed with overwhelming bipartisan support in 2018, includes NIST as one of three key agencies that will help ensure the U.S. remains a global leader in quantum.

We specifically recommend that Congress increase STRS funding by \$91 million over FY19 funding to further advance research projects in key areas, including quantum, cybersecurity, disaster resilience, internet of things, artificial intelligence and measurement science. Additionally, due to the ongoing need for repairs and maintenance at NIST facilities and its direct impact on NIST's ability to provide critical services to industry, we request \$44 million increase over FY19 funding for the NIST construction account.

***FY19 Appropriations - \$986 million***  
***FY20 Request - \$1.1 billion***

### **DOE Office of Science**

The Department of Energy's (DOE) Office of Science is the nation's largest funder of research in the physical sciences and plays a dominant role in underwriting engineering, mathematics and computer research. It supports discoveries in new fields such as quantum, biotechnology, nanotechnology and supercomputing – enabled by optics and photonics – and is critical to our nation's economy and competitiveness. The Office of Science has provided grants to researchers and facilities in all 50 states and the District of Columbia, to DOE's national laboratories and to more than 300 higher education institutions.

The National Quantum Initiative Act, which passed with overwhelming bipartisan support in 2018, includes DOE as one of three key agencies that will help ensure the U.S. remains a global leader in quantum. Therefore we specifically recommend \$120 million towards Quantum Research and an additional \$20 million per Center for 5 DOE Quantum Centers to satisfy the goals of this initiative.

***FY19 Appropriations - \$6.59 billion***  
***FY20 Request: \$7 billion***

## **DOE/NNSA Inertial Confinement Fusion program**

The nation's Inertial Confinement Fusion (ICF) program is critically important to our national security and to maintaining U.S. leadership in science and technology. Managed by the Department of Energy's National Nuclear Security Administration (NNSA), the ICF program is an integral part of the science-based Stockpile Stewardship Program (SSP). Major aspects of the ICF program include: Maintaining a safe, secure, and effective stockpile; Operating world-class facilities; Avoiding technological surprise; Investigating a scientific grand challenge – Ignition; Developing the next generation workforce; Ensuring a critical science and technology capability.

***FY19 Appropriations - \$545 million***  
***FY20 Request: \$565 million***

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## **NIH**

The mission of NIH is to seek fundamental knowledge about the nature and behavior of living systems and the application of that knowledge to enhance health, lengthen life and reduce illness and disability. NIH is the lead agency for cancer research and the BRAIN Initiative, which is authorized to fund increases over the next decade through the enacted 21st Century Cures Act.

***FY19 Appropriations - \$39.3 billion***  
***FY20 Request- Minimum increase 4% real growth***

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## **NSF**

The National Science Foundation (NSF) is a key funder of optics and photonics research. An example is the Laser Interferometer Gravitational-Wave Observatory (LIGO), which recently measured gravitational waves from a binary black hole merger. This discovery, enabled by photonics, confirms Einstein's Theory of General Relativity. Another example is work being done by researchers to make solar cells that can be used on almost any surface, including windows, walls, computer bags and clothing.

The National Quantum Initiative Act, which passed

with overwhelming bipartisan support in 2018, includes NSF as one of three key agencies that will help ensure the U.S. remains a global leader in quantum. Therefore we specifically recommend \$85 million towards Quantum Research and an additional \$10 million per Center for 5 NSF Quantum Centers to satisfy the goals of this initiative.

***FY19 Appropriations- \$8.1 billion***  
***FY20 Request- Minimum increase of 4% real growth***

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## **DOD's Science and Technology Program**

The Department of Defense (DOD) is a key federal supporter of research in the physical sciences. The R&D supported by DOD's Science and Technology Program plays a direct role in protecting and equipping our nation's armed forces to carry out their present and future missions and is the source of many of the innovations that drive our high technology economy. Defense S&T program funding provides important investments in future military scientific workforce development and helps sustain the research base of participants from the academic community.

***FY19 Appropriations - \$15.9 billion***  
***FY20 Request- Minimum increase 4% real growth***

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## **NASA**

NASA's long history of transformative advances in science and technology have positioned the U.S. as a world leader across many fields, driving strong U.S. exports, supporting jobs, and drawing the best and brightest students to American universities. As the nation addresses new problems and challenges, robust support for NASA is critical to fostering a 21st century economy and restoring America's global scientific and technological leadership. NASA science programs help us answer profound questions about Earth and our place in the universe. Discoveries and answers made possible from this directorate help inspire future generations to pursue careers in science, technology, engineering and mathematics (STEM) education.

***FY19 Appropriations - \$21.5 billion***  
***FY20 Request- \$22.575 billion***