

Vice President for Research

The Office of the Vice President for Research (VPR) is responsible for the stewardship of MIT's research enterprise. It seeks to foster strong, mutually beneficial relationships with research sponsor groups, including federal agencies, the US Congress, industry, foundations, and foreign governments. The VPR's responsibilities also include research administration, policy, and compliance—all executed in a manner to maximize effectiveness and minimize the burden on faculty and research staff. The Office of the Vice President for Research chairs the Institute Committee on Environmental Health and Safety and the Institute Committee on Conflict of Interest Policy. The office is also responsible for research computing, postdoctoral affairs, international scholars, and for relationships with the federal government.

In FY2019, MIT's campus research volume increased by 5.8% to \$774 million, compared to \$732 million in FY2018. Federal funding constituted 60% of campus research expenditures, with substantial support from industry and foundations continuing to supplement federal research awards.

Individual laboratories, centers, programs, and offices that report to the VPR have each submitted separate reports that outline the year's research accomplishments.

Highlights

In April 2019, an international team of more than 200 scientists, including researchers from MIT's Haystack Observatory and the MIT campus, announced that they had captured the first direct image of a black hole. The images were taken by the Event Horizon Telescope, a planet-scale array comprised of eight radio telescopes spread throughout the globe. Haystack engineers produced advances in digital systems so scientists could process the enormous data streams that the array of disparate telescopes would receive.

MIT and the US Air Force signed an agreement to launch a new program designed to conduct fundamental research directed at enabling rapid prototyping, scaling, and application of artificial intelligence algorithms and systems. The Air Force plans to invest approximately \$15 million per year on this collaboration, which is expected to support at least 10 MIT research projects addressing challenges such as disaster response and medical readiness.

In February 2019, the Research Laboratory of Electronics (RLE) and MIT Lincoln Laboratory launched the Center for Quantum Engineering. This center will unite the expertise, infrastructure, and resources of Lincoln Laboratory with the MIT campus to accelerate the development of quantum science and its application to quantum technologies, which have the potential of transforming applications in areas such as cybersecurity, drug discovery, machine learning, communications systems, magnetometry, and navigation. William Oliver, an RLE associate director and Lincoln Laboratory fellow, will head the center, which will be headquartered at RLE.

A team from MIT's Computer Science and Artificial Intelligence Laboratory and Massachusetts General Hospital created a new deep-learning model that can predict from a mammogram if a patient is likely to develop breast cancer as much as five years

in the future. Professor Regina Barzilay, senior author of a new paper about the project published in the May 2019 edition of *Radiology*, is also a faculty lead for the Abdul Latif Jameel Clinic for Machine Learning (J-Clinic). The J-Clinic was launched in September 2018. This new clinic will focus on developing machine learning technologies to revolutionize the prevention, detection, and treatment of disease, and is a key part of the MIT Quest for Intelligence

The Lustgarten Laboratory for Pancreatic Cancer Research at MIT was established in October 2018. The new lab, headed by Koch Institute director Tyler Jacks, reflects MIT's commitment to researching pancreatic cancer. Genetically complex and hard to detect in its early stages, pancreatic cancer is the fourth leading cause of cancer mortality in the United States. The lab's goals are to better understand the immunological conditions and genetic events that contribute to the development of pancreatic cancer, to study the disease on a single-cell level in both humans and mouse models, and to develop novel high-throughput tools for culture and drug testing using mini-organs known as organoids.

In coordination with the Industrial Liaison Program (ILP) and ILP member Patagonia, MIT's Environmental Solutions Initiative (ESI) held a January 2018 workshop to explore opportunities for MIT faculty to participate in the emerging arena of microfiber/microplastic research. ESI has provided modest funding to support three teams as they develop white papers to establish the foundation for future empirical work. Research areas include investigating new polymer design, exploring the development of sensing technology tailored to micro- and nano-scale plastic particles, and improving the modeling of the distribution and dispersion of microplastics in the environment.

The Office of the Vice President for Research launched an assessment of MIT's research administration infrastructure and established working groups to suggest ways to better support faculty in an evolving environment. MIT has seen increased development of complex, multi-investigator programs, is engaging more with international entities, and is growing its collaborations with corporate sponsors.

Finally, over the past year, the staff of the VPR office has continued to work tirelessly to address potential federal changes in immigration policy, as well as expectations regarding international collaborations and threats to research funding. A new process for "elevated-risk" international proposals was adopted. This process is designed to enable MIT to engage with the world effectively with responsible management of risks and in keeping with the values of our community.

The Vice President for Research is working together with other research institutions, professional associations, and national academies to make our voice heard. In Washington, DC, the VPR strongly advocated for the importance of supporting basic science for growth in technology and innovation. This is critical to our economy and the health and security of our nation and the globe.

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