



**CONGRESSIONAL BUDGET OFFICE
COST ESTIMATE**

August 20, 2018

S. 3143

National Quantum Initiative Act

*As ordered reported by the Senate Committee on Commerce, Science, and Transportation
on August 1, 2018*

SUMMARY

S. 3143 would establish an office and a program to advance research in quantum information science and technology applications. The bill would authorize appropriations for the National Institute of Standards and Technology (NIST) and the National Science Foundation (NSF) to carry out related activities. CBO estimates that implementing S. 3143 would cost \$450 million over the 2019-2023 period, assuming appropriation of the authorized and necessary amounts.

Enacting the bill would not affect direct spending or revenues; therefore, pay-as-you-go procedures do not apply.

CBO estimates that enacting S. 3143 would not increase net direct spending or on-budget deficits in any of the four consecutive 10-year periods beginning in 2029.

S. 3143 contains no intergovernmental or private-sector mandates as defined in the Unfunded Mandates Reform Act (UMRA).

ESTIMATED COST TO THE FEDERAL GOVERNMENT

The estimated budgetary effect of S. 3143 is shown in the following table. The costs of the legislation fall within budget functions 250 (science, space, and technology) and 370 (commerce and housing credit).

	By Fiscal Year, in Millions of Dollars						2019- 2023
	2018	2019	2020	2021	2022	2023	
INCREASES IN SPENDING SUBJECT TO APPROPRIATION							
National Institute of Standards and Technology							
Authorization Level	0	60	60	60	60	60	300
Estimated Outlays	0	46	59	60	60	60	285
National Science Foundation							
Estimated Authorization Level	0	50	50	50	50	50	250
Estimated Outlays	0	6	24	37	44	49	160
National Quantum Coordination Office							
Estimated Authorization Level	0	1	1	1	1	1	5
Estimated Outlays	0	1	1	1	1	1	5
Total							
Estimated Authorization Level	0	111	111	111	111	111	555
Estimated Outlays	0	53	84	98	105	110	450

BASIS OF ESTIMATE

For this estimate, CBO assumes the legislation will be enacted near the end of 2018 and that the authorized and necessary amounts will be appropriated in each year.

S. 3143 would authorize the appropriation of \$60 million annually over the 2019-2023 period for NIST to expand quantum research and advance commercial development of quantum applications. The bill also would direct the NSF to award grants to nonprofit organizations and institutions of higher education to establish up to five quantum research and education centers, and would authorize the appropriation of \$10 million annually for each center over the 2019-2023 period. Using information from the NSF, CBO expects the agency would support five centers under the bill; thus, CBO estimates that the bill would effectively authorize appropriations totaling \$50 million annually for the NSF.

According to a Congressional Research Service report, in recent years the federal government has spent between \$200 million and \$250 million annually on quantum information science research and development.¹ NIST and NSF received appropriations

¹ Congressional Research Service, *Federal Quantum Information Science: An Overview* (July 2, 2018).

in 2018 for such activities. Under current law, no specific sums are authorized to be appropriated to those agencies for those purposes.

S. 3143 also would direct the President to establish a national quantum coordination office to manage interagency activities and conduct public outreach. Under the bill, the office would be staffed by employees detailed from federal agencies such as NIST, the NSF, the Department of Defense, the Department of Energy, the National Aeronautics and Space Administration, and the Office of Management and Budget. Based on programs of similar size and scope, CBO estimates that the office would require five full-time employees annually at a cost of about \$150,000 each. The bill also would establish an advisory committee of representatives from industry, academic institutions, and federal laboratories, whose travel expenses could be reimbursed. CBO estimates that such expenses would be insignificant in any year. In total, CBO estimates that implementing those provisions would cost \$1 million annually.

Based on historical spending patterns for similar activities, CBO estimates that enacting S. 3143 would cost \$450 million over the 2019-2023 period.

PAY-AS-YOU-GO CONSIDERATIONS: None.

INCREASE IN LONG-TERM DIRECT SPENDING AND DEFICITS

CBO estimates that enacting S. 3143 would not increase net direct spending or on-budget deficits in any of the four consecutive 10-year periods beginning in 2029.

MANDATES

S. 3143 contains no intergovernmental or private-sector mandates as defined in UMRA.

PREVIOUS CBO ESTIMATE

On July 20, 2018, CBO transmitted a cost estimate for H.R. 6227, the National Quantum Initiative Act, as ordered reported by the House Committee on Science, Space, and Technology on June 27, 2018. The two bills are similar. CBO estimates that implementing H.R. 6227 would cost \$1.1 billion over the 2019-2023 period. The estimates differ because H.R. 6227 would authorize the appropriation of higher amounts for NIST and would authorize appropriations for the Department of Energy to carry out a quantum research program.

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