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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2024 Office of the Secretary Of Defense **Date:** March 2023

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide / BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603330D8Z / <i>Quantum Sciences Technology</i>
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COST (\$ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	-	-	-	75.000	-	75.000	100.000	100.000	100.000	100.000	Continuing	Continuing
444: <i>Quantum Transition Acceleration</i>	-	-	-	75.000	-	75.000	100.000	100.000	100.000	100.000	Continuing	Continuing

**Note**

New Start (Y/N): Yes

**A. Mission Description and Budget Item Justification**

This program supports the Department's initiative to Build Sustainable and Long-Term Advantage.

Quantum Technology is approaching a tipping point that will determine how quickly it can make an impact. If the United States can stay on pace, many important outcomes for the Department of Defense (DoD) can be realized including robust position, navigation and timing for DoD freedom of operations with precision strike even with contests in spectrum, space, or cyber operations. Also, greatly enhanced capabilities in the spectrum giving the DoD significant advantages for Electronic Warfare (EW), Command, Control, and Communications (C3) and Intelligence, Surveillance, and Reconnaissance (ISR). Finally, quantum computation allowing rapid advances in materials and chemistry for advanced energetics, propulsion, and platform coatings, possibly optimization for stealth properties, logistics, and machine learning.

Without deliberately addressing these challenges, we risk slowdown of technological maturity. Two challenges and barriers to implementation are: component and supply chain maturity of bleeding edge capability in photonics, including lasers, active light manipulation, light delivery, and packaging; and misalignment of government with industry regarding quantum technology development priorities, maturity time-line realism, and technology protection strategy.

This effort's funding will improve quantum supply chain maturity and accelerate DoD priority quantum technology.

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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024 Base</b>	<b>FY 2024 OCO</b>	<b>FY 2024 Total</b>
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	0.000	75.000	-	75.000
Total Adjustments	0.000	0.000	75.000	-	75.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Program New Start	-	-	75.000	-	75.000

**Change Summary Explanation**

As a new start in FY 2024, the \$75.000 million will develop critical components and supply chain for quantum technology while simultaneously accelerating quantum devices toward commercialization and operational capability.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2024 Office of the Secretary Of Defense										<b>Date:</b> March 2023		
<b>Appropriation/Budget Activity</b> 0400 / 3					<b>R-1 Program Element (Number/Name)</b> PE 0603330D8Z / <i>Quantum Sciences Technology</i>				<b>Project (Number/Name)</b> 444 / <i>Quantum Transition Acceleration</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024 Base</b>	<b>FY 2024 OCO</b>	<b>FY 2024 Total</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>FY 2027</b>	<b>FY 2028</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
444: <i>Quantum Transition Acceleration</i>	-	-	-	75.000	-	75.000	100.000	100.000	100.000	100.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Department of Defense (DoD) has pioneered and advanced classical sensor technology for decades. Over the past years, quantum sensing technology has shown the ability to meet program level metrics throughout DoD R&D programs. In order to sustain technological superiority, the Department must continue to work to transition sensor research and development for United States Air Force, Army and Navy applications.

This funding will mature, demonstrate, and transition emerging quantum sensing and quantum navigation technologies to rapidly address warfighter problem sets. This work will include testing and evaluation, device integration, and application analysis to aid in future acquisition and sustainment of innovative technologies developed in DoD research programs.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>
<b>Title:</b> Quantum Sensors	-	-	45.000
<b>Description:</b> The Department of Defense's (DoD) research and development of quantum technologies is critical to maintaining the Nation's technological superiority. This effort focuses on maturing, demonstrating, and transitioning quantum inertial sensors, gravity sensors, atomic clocks, and quantum electro-magnetic sensors. The specific quantum technologies developed will be sourced from existing projects that have already demonstrated performance advantages.			
<b>FY 2024 Plans:</b>			
- Start Modeling and Simulation (M&S) of quantum technology in operational scenarios while comparing to commercial alternatives if available.			
- Measure quantum sensor environmental capabilities in various operationally relevant situations.			
- Initiate size, weight and power (SWaP) redesign of quantum sensors, ensuring the future quantum sensors are compatible with current/future military applications.			
- Conduct initial systems requirement review (SRR) with industry contractors outlining integration plan for quantum sensors into specified applications.			
- Initiate documentation of military-grade technical data package outlining the specifications for quantum sensors.			
<b>FY 2023 to FY 2024 Increase/Decrease Statement:</b>			

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>
PE 0603330D8Z increase of \$45.000 million between FY 2023 and FY 2024 will commercialize priority quantum technology and mature it for DoD operational needs.				
<p><b>Title:</b> Quantum Supply Chain</p> <p><b>Description:</b> This effort focuses on identifying, developing and maturing critical components supporting technology for atomic clocks, quantum sensors, and quantum computers; Supports aligning and leveraging multiple organizations for DoD needs across academic institutions, national laboratories, non-profits, and private industry. This effort will accelerate the transition of laboratory-scale systems to manufacturable commercial products.</p> <p><b>FY 2024 Plans:</b></p> <ul style="list-style-type: none"> <li>- Initialize critical technology identification and assessment procedure with stake-holders across government and industry.</li> <li>- Initialize early projects that can leverage existing activities within DoD (e.g. the Microelectronics Commons and the DoD Manufacturing Institutes)</li> <li>- Initiate projects identified as supporting improved manufacturability or performance of the quantum sensors funded through this Program Element.</li> <li>- Establish information mechanism to more easily integrate quantum specific components through Process Design Kit (PDK) and/or Assembly Design Kits (ADK). This PDK and/or ADK will combine multiple information libraries from multiple fabrication sources (e.g. national laboratories, manufacturing institutes, and private fabrication facilities).</li> <li>- Establish National Laboratory testbed to identify the hardest integration problems associated with quantum technology and develop technology solutions for those problems.</li> </ul> <p><b>FY 2023 to FY 2024 Increase/Decrease Statement:</b> PE 0603330D8Z increase of \$30.000 million will enable low-volume manufacturing of critical components for quantum technology. It will leverage existing resources and institutions in government and the private sector.</p>		-	-	30.000
<b>Accomplishments/Planned Programs Subtotals</b>		-	-	75.000
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b>				
N/A				