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Sustainable Economy Advisory Council Meeting: Quantum Overview

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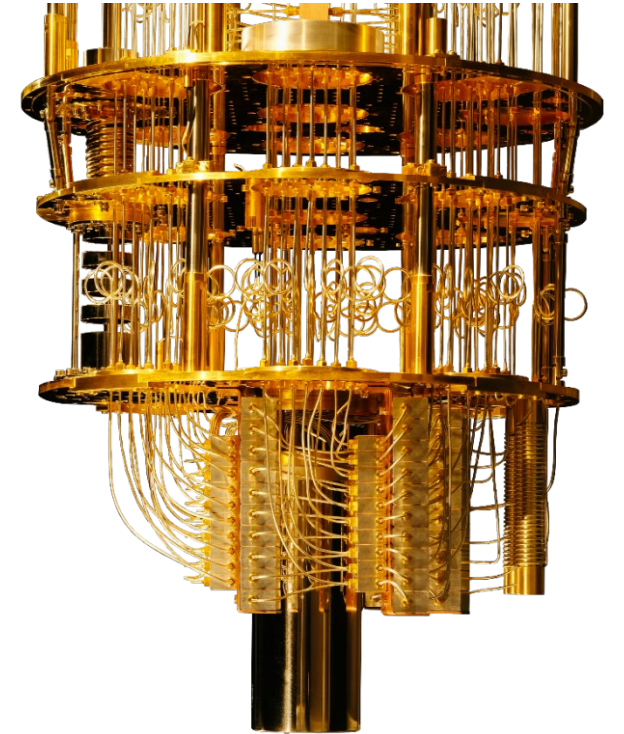
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QUANTUM 101

Quantum information science and technology (QIST) will allow us to solve new types of problems

- Quantum technologies operates under the rules of quantum physics
- Nascent technology with the potential to solve previously unsolvable problems
 - Break **unbreakable** cryptography
 - Enable **provably** secure communications
 - Dramatically improve **sensing** and **detection** capabilities
- Quantum computing has demonstrated the ability to do things that are **currently impossible** with classical computers
 - E.g., in September 2019, performed a calculation in 200 seconds that a classical computer would require 10,000 years to solve



“Many industries are currently working with quantum computing, including banking, capital markets, insurance, automotive, aerospace, and energy. In years to come, the breadth and depth of the industries leveraging quantum will continue to grow.” – Dr. Robert Sutor, Chief Quantum Exponent, IBM Research



QIST IS A NATIONAL STRATEGIC PRIORITY

Significant legislation has been enacted in the last 5 years to rapidly develop and support Quantum Information Science & Technologies (QIST)

- **National Quantum Initiative (NQI) - 2018:** This bill authorized \$1.15B in funding to support an all of government approach to advancing QIST to sustain national and economic security.
- **CHIPS and Science Act of 2022:** Authorizes additional funding for QIST infrastructure, R&D, and workforce development programs
- **The Dept. of Energy, National Science Foundation, and Dept. of Defense** all have significant QIST programs in their portfolios



The 13 major NQI research centers and their affiliates ([quantum.gov](https://www.quantum.gov))

Private investment in QIST has been significant over the past 5 years

- \$2.35B was raised for quantum technology startups in 2022 alone
- Even with a changing economic development outlook in 2023 we are still seeing very strong trends for the QIST industry

 Quantum computing	 Quantum communication	 Quantum sensing
<ul style="list-style-type: none"> • 261 start-ups • \$6.7 billion investment 	<ul style="list-style-type: none"> • 96 start-ups • \$1.2 billion investment 	<ul style="list-style-type: none"> • 48 start-ups • \$0.7 billion investment
Companies pursuing two or more quantum technologies simultaneously: 38		

*Information reported in McKinsey Digital titled "Steady progress in approaching the quantum advantage", April 2024.



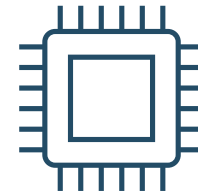
QIST WILL HAVE SIGNIFICANT IMPACT ACROSS MULTIPLE VERTICALS AND DOMAINS

Some of the biggest areas of opportunity include the following



Energy

Mineral & oil exploration, oil well optimization, energy distribution, battery & solar cell design



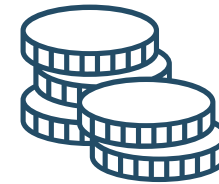
Information Technology

Cybersecurity, cryptography, machine learning, AI, search, software verification & validation



Chemistry & Pharma

Catalyst & enzyme design, drug discovery, bioinformatics, genomics, patent diagnosis, improved MRI



Finance

Portfolio optimization, asset pricing, risk analysis, trading strategies, fraud detection, market simulation



Defense

Inertial guidance, radar, imaging, cyber, autonomy, command & control



Other Industry

Materials, OLEDs, composites, logistics, scheduling, semiconductor device design, chip layout

While some QIST applications are still 10 years away, others are here now

NM IS POISED TO LAUNCH A NEW AND ROBUST QIS SECTOR

- We have the opportunity to leverage **NM's world leading quantum capabilities** to secure a position a for the region as the global epicenter for quantum
 - Sandia, UNM, LANL, and AFRL all have strong QIST programs
 - UNM, NMSU, NMT, and CNM are already training the next generation QIS workforce
 - We are primed to launch an industry cluster now
- Through strategic partnerships like **Quantum New Mexico (QNM)** and **Elevate Quantum (EQ)**, we can create a thriving QIS sector by accelerating QIS technology commercialization and driving new economic development activities



Tomorrow's Quantum Hotbeds? 7 U.S. Cities That Could Incubate The Next Great Quantum Technology Ecosystem

Quantum Computing Business, Research • Matt Swayne • March 4, 2024



[Albuquerque named as one of the 7 U.S. Cities that could be the next great quantum ecosystem](#)

The University of New Mexico launches The Quantum New Mexico Institute

Related News

UNM and Sandia National Laboratories seek to establish New Mexico as a national Quantum hub

By Marissa Lucero © January 22, 2024

[Annual Research Lecture](#)
Wednesday, March 27

[New Mexico Basic Needs](#)

Governor Polis and Governor Lujan Grisham Urge the Department of Commerce to Fund the Regional Quantum Partnership with Phase 2 Implementation Grant

FRIDAY, MARCH 1, 2024

ALBUQUERQUE, NM & DENVER, CO - Today, Governor Jared Polis of Colorado and Governor Michelle Lujan Grisham of New Mexico shared a [letter](#) encouraging the Department of Commerce to award a Phase 2 Implementation Grant to the Tech Hub of [Elevate Quantum](#) (EQ) in Quantum information science and technology (QIS). The letter highlighted the particular strengths of Colorado and New Mexico in the EQ consortium, which consists of more than 118 organizations in the Mountain West.

New Mexico Community College Receives Federal Funding to Launch Rare Quantum Learning Lab and Training Program



NEWS PROVIDED BY
Central New Mexico Community College (CNM) →
May 02, 2024, 15:45 ET

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