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Quantum Policy, Topological Qubits, and the Maryland Research Center with Charles Tahan



Charles Tahan helped write the National Quantum Initiative — the policy framework that triggered a global wave of quantum investment — and now he's at Microsoft building the hardware that policy was designed to accelerate. This episode explores what it looks like when the architect of U.S. quantum strategy turns his attention to one of the most scientifically contested bets in the field: topological qubits. Recorded the day after Microsoft opened a new quantum research center in Maryland and handed DARPA on-site access to its Majorana 2 system, this is a rare conversation about quantum computing timelines, workforce development, and the honest distance between where the field is and where it needs to go.



THE NEW QUANTUM ERA - INNOVATION IN QUANTUM COMPUTING, SCIENCE A...

Quantum Policy, Topological Qubits, and the Maryland

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Charles Tahan has one of the most unique career arcs in quantum: PhD in silicon quantum computing, postdoc across three continents, fifteen years at the Lab for Physical Sciences running quantum programs and doing original research, then the first Director of the National Quantum Coordination Office at the White House OSTP, and now a Partner at Microsoft Quantum. He is one of the very few people who has both written U.S. quantum policy and is now executing on it from inside a major hardware program. That dual vantage point — policymaker turned builder — gives him a kind of credibility that is rare in a field full of either pure researchers or pure advocates.

The timing of this conversation matters too. Microsoft just opened a 15,000-square-foot quantum research center at the University of Maryland's Discovery District, and DARPA has been given on-site access to the Majorana 2 system as part of its Quantum Benchmarking Initiative — the first opportunity for a technically capable independent party to evaluate Microsoft's topological qubit claims. Tahan is candid about the difficulty of what Microsoft is attempting, honest about the timelines, and enthusiastic about the parts of this problem that most people in his position would prefer to keep vague.

Listeners who follow quantum hardware development, national science policy, or the workforce and ecosystem questions around quantum will find this episode unusually grounded.

WHAT WE GET INTO

- **How Tahan ended up in government in the first place** — starting as a DARPA technical consultant in 2007, helping write the milestones for the first quantum computing programs, and eventually becoming the first Director of the National Quantum Coordination Office

Microsoft's pursuit of Majorana physics

- **The DARPA Quantum Benchmarking Initiative as an independent audit** — why having DARPA's technical team on-site to evaluate Majorana 2 is meaningful, and how Tahan thinks about external validation as a feature rather than a threat
- **Why Tahan now believes the next five years may equal the last thirty** — his specific reasoning about how AI-accelerated science, the scale of capital flowing into computing infrastructure, and demonstrated quantum error correction have changed his sense of what's possible
- **The "simplest quantum computer" argument** — what Tahan was actually proposing in his 2024 arXiv preprint (written as a retrospective from 2040, presented at APS in a Doc Brown costume), and how the idea of using quantum computers to generate training data for classical models fits into a near-term business model
- **What a quantum hardware makerspace actually is** — the specific vision for the Maryland center's hands-on space, including dilution refrigerators, hardware from AMD, IQM, Quantum Motion, Fermilab's QICK tools, and a model Tahan hopes can be replicated and scaled
- **Why the workforce gap is a hardware problem, not just a software one** — and how Tahan's own path (his father was an HVAC technician at the Smithsonian who got him a high school internship in astrophysics) shapes his conviction that hands-on experience is how scientists and engineers are actually made
- **Microsoft as a platform company** — why Tahan frames Microsoft's quantum strategy as wanting the best computers for customers, full stop, which means partnering with and supporting other modalities, not just betting everything on topological qubits

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RESOURCES & LINKS

government roles, and move to Microsoft Quantum

- UMD Physics — "Charles Tahan Brings His Research Expertise to Thriving UMD Quantum Enterprise" — UMD's announcement of Tahan's visiting research professor and special advisor roles

PAPERS & ARTICLES

- arXiv:2412.18726 — "Opinion: The Simplest Quantum Computer," Charles Tahan (Dec. 2024) — The speculative preprint written as a retrospective from 2040 that Tahan discusses in the episode; argues for a minimalist path to useful quantum computing and for using quantum computers to train classical models
- Microsoft Quantum Blog — "Microsoft's Quantum Research Center Opens in Maryland" (Sept. 22, 2026) — Written by Tahan; the primary source on the new center, DARPA access to Majorana 2, and the workforce development mission
- Microsoft on the Issues — "Supporting American Leadership in Quantum Technology" (May 7, 2025) — Tahan's written testimony to the House Committee on Science, Space, and Technology; covers NQIA reauthorization and AI-quantum convergence
- An in-depth look at Tahan's perspective in his Nature paper Quantum meets capitalism: how to pair long-term bets on technology with commercial speed
- IAS Science, Technology & Social Values Lab — "Dr. Charles Tahan" (Jan. 7, 2026) — Summary of Tahan's December 2025 IAS lecture "Quantum Information Technology and Society from 2000 to 2040," including his "not imminent, but inevitable" framing
- Science News — "Microsoft's Quantum Chip Got an Upgrade. Critics Are Still Skeptical" (June 2, 2026) — Covers expert skepticism around the Majorana 2 chip and the X vs. Z measurement debate; useful context for understanding what DARPA's independent evaluation is actually testing
- Post Quantum — "Microsoft Majorana 2: 20-Second Qubits, Same Questions" (June 3, 2026) — Critical analysis of the Majorana 2 chip, including the scientific controversy around missing X-parity measurements

independently evaluating Microsoft's Majorana 2 system; program overview and stage structure

- DARPA — "DARPA Selects Two Discrete Utility-Scale Quantum Computing Approaches for Evaluation" (Feb. 6, 2025) — Confirms Microsoft and PsiQuantum as the two US2QC Stage C finalists
- The Quantum Insider — "Fermilab and Microsoft Partner on Quantum Hardware Tools" (Sept. 23, 2026) — Background on the Fermilab collaboration and QICK integration into the Maryland center's education mission

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KEY QUOTES & INSIGHTS

"THE NEXT FIVE YEARS WILL BE EQUAL TO THE NEXT THIRTY." TAHAN'S ASSESSMENT OF HOW AI-ACCELERATED SCIENCE, DEMONSTRATED QUANTUM ERROR CORRECTION, AND THE SCALE OF CAPITAL FLOWING INTO COMPUTING INFRASTRUCTURE HAVE CHANGED HIS SENSE OF WHAT'S ACHIEVABLE — FROM SOMEONE WHO SPENT TWENTY YEARS TELLING AUDIENCES THAT BUILDING A QUANTUM COMPUTER IS HARDER THAN THEY THINK.

"IT'S A POSITION OF MORAL AUTHORITY, NOT A POSITION OF ABSOLUTE AUTHORITY." ON WHAT IT ACTUALLY MEANS TO COORDINATE U.S. QUANTUM POLICY FROM THE WHITE HOUSE — BRINGING TOGETHER AGENCIES WITH THEIR OWN MISSIONS AND BUDGETS, AND GETTING THEM TO AGREE ON A SHARED DIRECTION WITHOUT THE POWER TO COMPEL ANYONE.

INSIGHT: THE NQI'S BIGGEST IMPACT MAY HAVE BEEN GLOBAL, NOT DOMESTIC. TAHAN ARGUES THAT THE NATIONAL QUANTUM INITIATIVE'S

MARYLAND CENTER — DELIBERATELY BUILDING SPACE FOR PARTNER COMPANIES, DARPA EVALUATORS, AND A HARDWARE MAKERSPACE ALONGSIDE MICROSOFT'S OWN RESEARCH, BECAUSE THE GOAL IS THE BEST QUANTUM COMPUTERS FOR CUSTOMERS, NOT PROPRIETARY LOCK-IN.

INSIGHT: HARDWARE EXPERIENCE IS HOW SCIENTISTS AND ENGINEERS ARE ACTUALLY MADE. TAHAN TRACES HIS OWN PATH TO SCIENCE THROUGH HIS FATHER'S HVAC WORK AT THE SMITHSONIAN AND A HIGH SCHOOL INTERNSHIP IN ASTROPHYSICS — AND ARGUES THAT THE QUANTUM FIELD HAS INVESTED HEAVILY IN SOFTWARE TOOLS FOR EDUCATION WHILE NEGLECTING THE HANDS-ON HARDWARE EXPERIENCES THAT ACTUALLY FORM THE NEXT GENERATION OF BUILDERS.

RELATED EPISODES

- **Ep. 74 — Majorana Qubits with Chetan Nayak** — Chetan Nayak is Microsoft's Technical Fellow leading the topological qubit program; this episode provides deep technical context for the Majorana physics that Tahan discusses
- **Ep. 13 — The Mysterious Majorana with Leo Kouwenhoven** — An earlier conversation on the physics and history of Majorana fermions and their potential role in quantum computing
- **Ep. 86 — Quantum Advantage Achieved with Dominik Hangleiter** — Directly relevant to Tahan's discussion of honest benchmarking and what it actually means to claim quantum advantage; Hangleiter works on quantum benchmarking theory
- **Ep. 35 — Quantum Benchmarking with Jens Eisert** — Foundational context for understanding QCVV and independent verification — the discipline Tahan helped pioneer and that DARPA is now applying to Microsoft's own hardware

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If this conversation made you think differently about quantum timelines, workforce development, or what it takes to move from policy to hardware, the best next step is to subscribe so you don't miss what's coming.

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