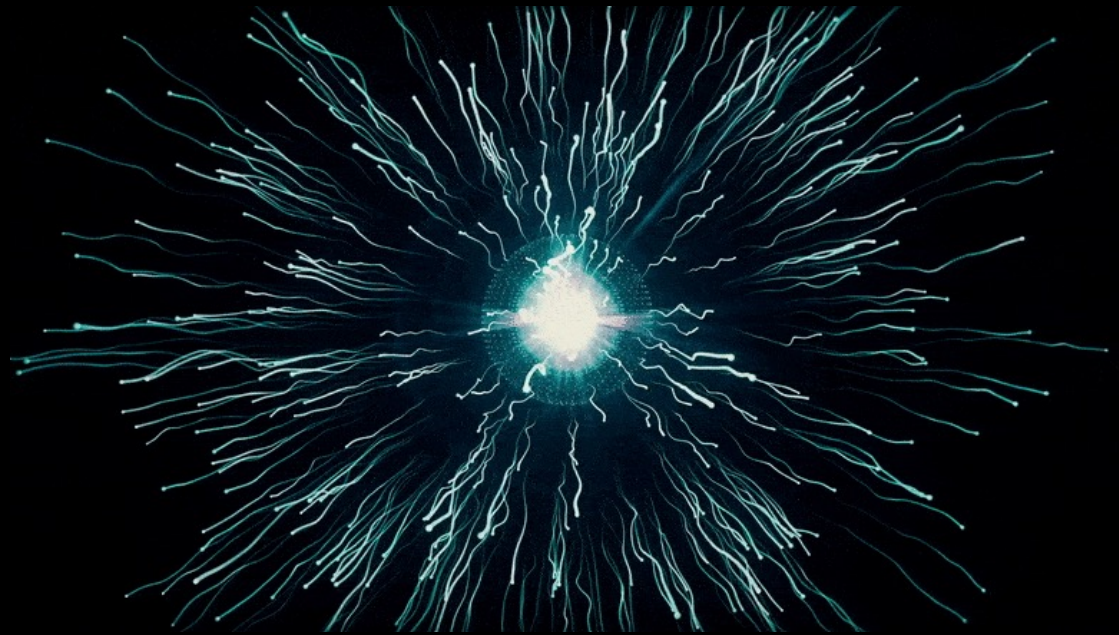
INTERSTELLAR FOUNDRY

Quantum Semiconductor CPU Development Initiative

Strategic Business & Action Plan



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Executive Summary

DEFENSE & INTELLIGENCE

Next generation quantum semiconductor CPU
engineered for mission critical-use

3 - 4 year plan

Hybrid structure fuses

- NV/SnV diamond qubit stability
- Integrated photonic entanglement networks
- Embedded logic control

Room-temperature
Resilient
Secure

Computing Platform

parallel exploratory R&D into antimatter-based qubit augmentation =
Ability to absorb breakthroughs in positronium & antihydrogen confinement in future hardware generations

Modular engineering strategy ⟶ Government-aligned capital sourcing ⟶ Top-tier academic collaborations

Designed for rugged conditions, optimizing SWaP (Size, Weight, & Power) constraints without sacrificing security or fidelity

Parth

Experience

aerospace research ⟶ quantum-adjacent R&D ⟶ systems engineering ⟶ AI/ML integration

Georgia Tech + MIT AeroAstro + Deloitte GPS + McKinsey

Secured access to advanced quantum testing & prototyping infrastructure—including NVIDIA AI Makerspace

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Introduction + Vision Statement

~~AUTONOMOUS~~ ADAPTIVE INTELLIGENCE

"Today, autonomy thrives; tomorrow, intelligence prevails."

Adaptive Intelligence Platform → **CRITICAL** to shift towards information-centric engagement with complex global security data

Mission → **Establish adaptable platform** serving as the computational core for:

- secure communications
- Intelligence Processing
- navigation in GPS-denied environments
- real-time field analytics

Laying the groundwork for sovereign computational infrastructure

capable of withstanding

technological & geopolitical challenges

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Market Overview

The quantum computing sector is undergoing rapid expansion.

2024 → **$1.8** billion

2032 → **$9.1** billion

= compound annual growth rate of 22-25%

↓

Defense & intelligence
is one of the highest-priority domains

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Defense Market Drivers

Defense-specific demand for computing is accelerating due to several converging **f a c t o r s:**

1

Secure Communications & QKD

Quantum Key Distribution (QKD) is expected to become a $3 billion market by 2030, with defense agencies prioritizing quantum-secure channels for command, control, & ISR operations.

2

GPS-Denied Navigation

Military reliance on satellite navigation remains a vulnerability; quantum-enhanced navigation offers a path to high-precision positioning in GPS-denied or jammed environments.

3

Real-Time ISR Analytics

AI/ML-driven field analytics supported by quantum acceleration can shorten the intelligence cycle from hours to seconds, enhancing operational agility.

4

Post-Quantum Cybersecurity Compliance

NIST & allied defense partners are mandating post-quantum cryptographic readiness within this decade, creating demand for hybrid quantum-classical secure processors.

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Market Potential

Defense-optimized Quantum CPU

=

500-700$ million

↓

By 2030

↓

Expansion into Civilian Applications:

- ✧ Financial modeling
- ✧ Climate simulation
- ✧ Healthcare analytics

>

5$ billion

↓

>10 years

⇒

need to initiate development in order to be positioned in one of the most lucrative & vital sectors within 4 years.

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Technical Architecture

A modular, enforceable intelligence stack.

Architectural Overview

1

NV^-/SnV^- diamond qubit technology

The quantum compute substrate, optimized for high-fidelity control & long coherence at ambient or mildly cryogenic conditions.

2

Advanced photonic interconnects

Scalable on-chip quantum optical routing enabling entanglement distribution, quantum key distribution (QKD), & multi-qubit gates.

3

ASIC-based runtime enforcement

Classical control plane ensuring deterministic gate execution, error correction, & cryptographic runtime governance.

4

Integration & Environmental Management Layer

Packaging, power delivery, thermal regulation, & ruggedization to meet MIL-STD-810G standards.

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Qubit Layer Design

Material

High-purity CVD diamond with isotopic purification (<0.01% ^{13}C) for coherence extension.

Center Types

✧ NV^-: Room-temperature compatible, mature optical/electronic control.

✧ SnV^-: Narrower optical linewidths & reduced phonon coupling, ideal for networked operations.

Control interface

✧ Microwave lines for spin rotations.

✧ Resonant optical excitation for initialization/readout.

Fidelity Targets

✧1-qubit: ≥ 99.95% by Year 3.

✧2-qubit: ≥ 99% by Year 4.

Security Hooks

Direct integration with ASIC logic to prevent unauthorized pulse sequences.

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Photonic Interconnect Layer

Material Platform

SiN waveguides with diamond photonic crystal cavities for qubit coupling.

Optical Loss Budget

< 1 dB per routed link.

Integrated Devices

✧ Resonators for spectral filtering & wavelength division multiplexing.

✧ Photonic crystal cavities for Purcell enhancement.

✧ On-chip nanowire single-photon detectors.

Protocols Supported

✧ On-chip Bell-state measurements.

✧ QKD key generation & distribution.

✧ Multi-qubit entanglement and swapping.

ASIC Runtime Enforcement Layer

Core Functions

✧ Deterministic gate scheduling & calibration.

✧ Error syndrome extraction & correction.

✧ Cryptographic enforcement of authorized instruction sets.

Performance Goals

✧ Control loop clock ≥ 1 GHz.

✧ Sub-nanosecond anomaly detection & rejection.

✧98% anomaly rejection rate by Year 4 under adversarial load.

Security Features

✧ OTP (One-Time Programmable) key storage.

✧ Secure boot with hardware root of trust.

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Integration & Environmental Management Layer

Packaging

✧ 3D stacked integration with thermal isolation between photonic/qubit modules.

✧ RF/optical feedthroughs with EMI shielding.

Thermal Management

✧ Heat spreaders, micro-fins, & high-κ materials.

✧ CFD-optimized airflow/cooling pathways.

Power Delivery

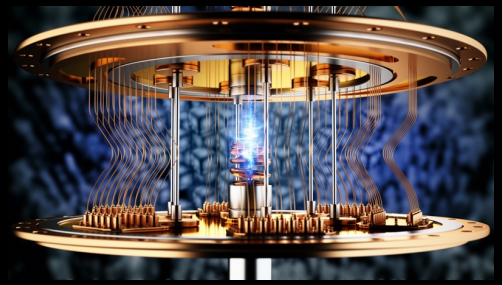
✧ Multi-rail PDN with low-noise regulators.

✧ DVFS (Dynamic Voltage & Frequency Scaling) for classical control logic.

Environmental Tolerance

✧ MIL-STD-810G compliance for vibration, shock, & temperature swings.

Modularity for Future Antimatter Qubit Augmentation



Optical Interface Compatibility

✧ Photonic routing layer supports coupling to positronium-based emitters without re-spinning the entire optical platform.

Control Interface Upgradeability

✧ ASIC microcode can be extended to drive different control pulse formats without altering enforcement security primitives.

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Developmental Roadmap

Year 1:
Foundation & Simulation

✧ Initiate **high-fidelity CAD modeling & simulation**

✧ Conduct **thermal & power envelope simulations**

✧ Establish **baseline qubit fabrication parameters**

✧ Complete **proof-of-concept ASIC layer** for logic enforcement.

✧ Deliverable: Simulated **end-to-end architecture demo** integrating ASIC logic with virtualized qubit nodes.

Year 2:
ASIC & Photonic prototyping

✧ Fabricate **ASIC runtime enforcement layer** with embedded cryptographic controls & error correction.

✧ Begin **experimental photonic waveguide & coupling device** fabrication for NV diamond qubits.

✧ Side R&D: Launch **antimatter qubit feasibility** program

✧ Deliverable: ASIC-photonics hybrid prototype demonstrating low-latency data transfer & initial qubit control.

Year 3:
Qubit Integration & Stability

✧ Integrate **NV & SnV diamond qubits** into photonic interconnects with active **decoherence suppression**.

✧ Implement **real-time error correction** using feedback loops.

✧ Expand **thermal regulation systems** to manage multi-qubit operation at low temperatures.

Antimatter track: Design **positronium storage & excitation control systems**.

✧ Deliverable: Fully functional **quantum-classical hybrid unit**

Year 4:
Field-Ready Quantum CPU

✧ Optimize **ruggedized packaging** for defense.

✧ Conduct **operational trials** in controlled defense simulations.

✧ Antimatter track: Conduct **lab-based hybrid tests** with antimatter qubit nodes interfacing with standard quantum architecture.

✧ Deliverable: **Deployment-ready quantum semiconductor CPU**.

Year 5:
Advanced Scaling & Antimatter Hybridization

✧ Scale **qubit count** & photonic interconnect complexity for higher throughput & redundancy.

✧ Begin **pre-integration testing** of antimatter qubit modules through particle accelerators.

✧ Expand **thermal/power management systems** to accommodate hybrid operation.

Year 6:
Antimatter-Augmented Deployment

✧ Fully integrate **antimatter qubit modules** into the primary architecture

✧ Conduct **multi-environment defense field tests**

✧ Complete **technology readiness level (TRL) 8–9 validation**

✧ Deliverable: **First antimatter-augmented quantum CPU**

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Strategic Partnerships & Talent Acquisition

Quantum CPU development will require an ecosystem of:

Research Partners

MIT

Engagement with the Research Laboratory of Electronics & the MIT.nano facility for diamond growth, quantum photonics, & ASIC co-design experiments.

Stanford

Partnership with the Quantum Fundamentals, Artificial Intelligence, & Software Engineering (QFASE) group for qubit control algorithms & quantum networking protocols.

Harvard

Collaboration with the Harvard Quantum Initiative for nitrogen-vacancy center defect engineering & materials science validation.

Caltech

Joint research with the Institute for Quantum Information & Matter, focusing on scalable photonic interfaces & hybrid quantum architectures that integrate NV-diamond superconducting systems.

Georgia Tech

Access to the NVIDIA AI Makerspace for accelerated simulation workloads, hardware-in-the-loop testing, & cross-disciplinary team integration.

Industry & Technology Partners

NVIDIA

Provision of GPU acceleration for large-scale quantum simulations & AI-driven optimization of qubit placement & photonic routing.

Element Six / De beers Group

Supplier of quantum-grade NV diamond substrates.

These partnerships accelerate technical execution & directly address operational, supply chain, & funding risks.

Cryomech & Bluefors

Providers of modular cryogenic systems optimized for portable quantum computing environments.

Keysight Technologies

RF & photonic test equipment for low-noise, high-precision measurement of qubit fidelity.

Capital Strategy & Fund Allocation

4 years → **$185 million** + **$65 million** → **Year 6**

Primary Development | Parallel antimatter Research

	1	2	3	4
Phase	**Concept & Foundation**	**Proof of Concept Development**	**System Integration & Optimization**	**Production Readiness & Deployment**
Series	Pre-seed	Seed	Series A	Series B
Month	1-12	13-24	25-36	37-48
Funding Range	$5-$8 million	$10-$15 million	$20-$25 million	$25-$35 million
Key Deliverables	Team assembly, CAD & simulation, procurement of NV/SnV diamond substrates, subsystem prototype initiation.	Supplier of quantum-grade NV diamond substrates.	Providers of modular cryogenic systems optimized for portable quantum computing environments.	RF & photonic test equipment for low-noise, high-precision measurement of qubit fidelity.

Fund Allocation & Framework

Category	**Engineering & Development**	**Facilities & Infrastructure**	**Talent Acquisition & Research Collaboration**	**Defense Field Trials & Deployment**	**Advanced R&D Antimatter**
% of Total Capital	40%	15%	20%	15%	10%
Dollar Allocation	74 million	28 million	37 million	28 million	18.5 (core period) + 46.5 (extended period)
Key Deliverables	CAD models, ASIC design, photonic integration, NV/SnV fabrication	NVIDIA-powered AI Makerspace utilization, cleanroom upgrades, cryogenic test benches	Recruitment of PhD-level researchers from MIT, Stanford, Harvard, Georgia Tech	ISR, QKD, GPS-denied navigation pilots with defense agencies	Positronium qubit modeling, containment testing, hybrid integration concepts

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Strategic Value Proposition

"Peace cannot be kept by force; it can only be achieved by understanding." — Einstein

✧ Interstellar Foundry's Quantum Processing Unit is the future of intelligence infrastructure.

✧ World-class partnerships ensure access to the best talent & facilities in the world.

✧ Operating secure, high-fidelity quantum processors in GPS-denied, communications-contested, or high-threat environments gives allied forces decisive advantage in ISR, secure communications, & real-time battlefield analytics.

✧ A parallel antimatter qubit R&D program positions the initiative to leapfrog conventional quantum modalities.

✧ Quantum computing for defense & intelligence is projected to **exceed** USD $10 billion in annual spending within the decade.

✧ Early investment will secure a leadership position in a market that is not only lucrative but existentially important for geopolitical stability.

✧ Interstellar Foundry will deliver a decisive leap in computational power, integrating diamond-based qubits with antimatter-enhanced architectures into a single, resilient system. This technology will give defense agencies a sustained edge, ensuring mission-critical superiority & forge quantum solutions to protect & advance tomorrow's world.

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