

SEAN HOWELL

Researcher // Engineer // Technical Leader

sean.g.howell@gmail.com // +1 310.496.9920 // [Github](#) // [Google Scholar](#) // Los Angeles / San Francisco Bay Area

Researcher and engineer focused on AI-driven scientific discovery: building agents, models, and infrastructure that allow machines to participate meaningfully in physics and mathematics research and control complex systems. Recent work includes neural decoders and RL for fault-tolerant quantum computing, VLA models for autonomous experimental science and quantum control, autonomous agent systems for physics research, formalization and verification, scalable systems software and compute co-design for fault-tolerant quantum computers, and compiler toolchains grounded in ZX-Calculus. 15 years in AI/ML, with R&D leadership across three quantum computing organizations from formation through production.

RESEARCH & ENGINEERING EXPERIENCE

Principal Engineer, AI for Quantum & Director, Quantum OS

2024 – Present

PsiQuantum // Palo Alto, CA

- Founded and leading AI for Quantum R&D. Architecture, training, and real-time inference for ML based QEC decoders, RL for adaptivity in fault-tolerant quantum computing, scientific agents for physics research, and multi-agent systems for calibration, control, and operation of quantum systems.
- Building agentic discovery infrastructure for scientific AI: harnesses, trajectory capture, structured evaluation of AI-generated scientific artifacts. Autonomous AI driven QEC research.
- Designing ZX-calculus-native compiler and simulation stack for fault-tolerant quantum computing.
- Directed Quantum OS: designed scalable control plane, fabrics, OS software for utility-scale photonic QC. Grew engineering org by 15+ ICs YoY. Co-designed embedded, inference, and data-center compute.

Independent Research & Development

2025 – Present

AI for Science & Systems // Los Angeles, CA

- Developing architectures for AI-assisted scientific reasoning, including evaluation, harnesses, provenance systems, and long-horizon agent frameworks for physics and mathematics, with a focus on quantum computing.
- Conducting research at the intersection of reasoning models and formal methods, targeting formalization of results and exploration of open problems in quantum information science and fault-tolerant quantum computing.
- Designing structured representations of reasoning (typed graphs over claims, evidence, derivations, simulations, and proofs) to support verifiable multi-agent collaboration.
- Investigating learning and inference strategies for long-horizon reasoning tasks, including decomposition, tool use, and iterative refinement in scientific domains.
- Exploring safety and alignment properties of agentic scientific systems, including formalization of correctness, robustness, and liveness guarantees.

Software Engineering Manager

2022 – 2024

AWS Center for Quantum Computing // Pasadena, CA

- Led engineering and research in quantum compilers, quantum control software & hardware, quantum error correction frameworks, and a distributed runtime for quantum information processing systems.
- Built and mentored a team of scientists and engineers (0–30 years experience) developing scalable, fault-tolerant quantum computing systems.

Head of US Division

2019 – 2022

Q-CTRL // Los Angeles, CA

- Led US R&D, software engineering, and product. Grew team 0 to 20 engineers, drove 10x YoY revenue growth, achieved 9000x algorithm performance improvement.
- First demonstration of reinforcement learning for gateset design and calibration on a superconducting quantum processor. Pioneering work in AI for NISQ hardware.

PRIOR POSITIONS

Quantitative Research Engineer , BlackRock <i>Quantitative research and ML for systematic trading strategies.</i>	2018 – 2019
AI Software Engineer , Cogitai <i>Continual learning research and reinforcement learning for robotics.</i>	2017
Senior Scientist , Areté Associates <i>Deep learning for computer vision and chemical detection in hyperspectral data.</i>	2016 – 2017
Computer Scientist , Novetta <i>Deep learning for web-scale multimedia classification and indexing.</i>	2015 – 2016
Research Engineer , NASA Goddard Space Flight Center <i>ML for multimodal geoscience and remote sensing.</i>	2013 – 2015
Software Engineer , Oceaneering Advanced Technologies <i>Deep learning and computer vision for autonomous underwater robotics systems.</i>	2012 – 2013
Research Assistant , University of Maryland <i>Scientific ML for cosmology and gravitational wave astrophysics.</i>	2009 – 2011

TECHNICAL EXPERTISE

AI / ML: Reinforcement Learning, Transformers, Diffusion Models, GNNs, LLMs, VLAs, Continual Learning, Autonomous Agents, Multi-Agent Systems, AI for Science, Scientific Harness Engineering, Scientific Agents, Formalization, MLOps, Robotics

Quantum: QEC, FTQC, Fault Tolerance, Quantum Compilers, Quantum Control, Photonic, Superconducting, & Atomic Systems, ZX-Calculus

Systems: Training/Inference Compute Co-design, OS & Runtime Design, Cyber-Physical Systems, Scientific Computing/HPC, Distributed Systems, FPGA/ASIC/PIC Integration

Stack: Python, Rust, C/C++, TypeScript, CUDA, Triton, PyTorch, JAX, LLVM/MLIR, ROCm, Tokio, ratatui, Astro, Axum, Svelte, Lean

Leadership: Engineering & Research Management (20+ reports), Product Development, Technical Strategy, Org Building, Research-to-Production

SELECTED PUBLICATIONS

H. Levine, A. Haim, et al. Demonstrating a long-coherence dual-rail erasure qubit using tunable transmons. *Physical Review X*, 2024.

Y. Baum, M. Amico, S. Howell, et al. Experimental Deep Reinforcement Learning for Error-Robust Gaset Design on a Superconducting Quantum Computer. *PRX Quantum*, 2021.

Y. Baum, S. Howell, et al. Reinforcement Learning for Error Robust Control on Cloud Based Superconducting Hardware. *Bulletin of the American Physical Society*, 2021.

EDUCATION

B.S. Physics & Mathematics, University of Maryland, College Park