HANS C. GUNDLACH

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Education

- Cambridge University, MASt Applied Mathematics, 2021-2022,
  Essay: "Computer Design of Quantum Experiments" (link)
- UC Berkeley, majors: Physics (3.9), Mathematics (3.8), Overall GPA: 3.8, 2017-2021,
  Graduated with General Distinction & Departmental Honors,
  Thesis: "QAOA Makes the Cut: Investigating Quantum Max-Cut Solutions"
- Exchange student for two semesters at EPFL, Lausanne, Switzerland 2018-2019
- Lakeside High School, Seattle, 2013-2017

Professional Experience

- **Researcher, MIT CSAIL**
  April 2024 - : Researching technical and economic questions in deep learning and quantum computing with Neil Thompson's FutureTech group. Projects include experimental AI scaling laws research (paper), economics of AI evaluations (NeurIPS 2025 Workshop), studying diminishing returns to training (ICML 2025 Workshop)(WIRED magazine), and analyzing the potential of quantum computers for deep learning (AAAI 2026 Workshop), chemistry (IEEE Quantum Proceedings 2025) , and other topics in AI (google scholar link).

- **AI Safety Research Fellow, Cavendish Labs, Vermont**
  Sept 2023 - Jan 2024: Developed REBUS multimodal model benchmark (paper) highlighted by co-founder of Anthropic (article). Developed a system (using dictionary learning) to understand transformer models. Researched properties of sparse auto-encoder interpretability methods including scaling laws of feature development (paper).

- **AI Safety Research Engineer Resident, REMIX Program, Redwood Research**
  Dec 2022-Feb 2023: Studied how AIs make strategic decisions in the game of Go (using PyTorch). Classified structures in the neural network Leela Zero responsible for the strategic move of "Atari" (Slide).

- **Quantum Computing and Machine Learning Researcher, UC Berkeley**
  Sept 2020-July 2021: Co-authored paper on machine learning for quantum protocol design accepted in MSML 2021 (paper link). Completed honors thesis investigating new (counterdiabatic) methods for Max-Cut. Helped implement and design reinforcement learning algorithms using Python and the ML platform TensorFlow to tackle problems in quantum control as part of Professor L. Lin's group at UC Berkeley.

- **Pasto, Colombia AI Bike&Traffic-Recognition Engineer/AI-Workshop Leader**
  June-Sept 2019: Worked as an engineer sponsored by Ingénieurs du Monde, to alleviate traffic and investigate safe bicycle lanes in Pasto, Colombia (a city of 390,000 people). Started and built a neural network traffic monitoring system using machine learning APIs for the specifications of the University of Nariño and the Transportation Bureau of Pasto. Led a workshop on deep learning at the University of Nariño.

- **Lakeside School Attendance System Entrepreneur and Developer**
  Jan - June 2017: Initiated, co-implemented, and negotiated the sale of an automatic Wifi attendance system after identifying problems with the previous slow manual sign-in system. I built the system and worked with the administration to design the UI to their specifications. Lakeside High School bought the system and it is currently in use keeping highly accurate attendance information on 600+ students.

Selected Publications

- **SAGE: Self-play Adversarial Games Enhance Large Language Model Reasoning Capabilities** Saraswathy Amjith, Michael X. Wang, Jayson Lynch, **Hans Gundlach**, Neil Thompson. 2026. *ICLR Self-Recursing Improvement Workshop*
- **On the Origin of Algorithmic Progress in AI. H. Gundlach**, A. Fogelson, J. Lynch, A. Trisovic, J. Rosenfeld, A. Sandhu and N. Thompson. 2025. [https://arxiv.org/pdf/2511.21622]
- **Quantum Deep Learning Still Needs a Quantum Leap. H. Gundlach**, H.Kukina, J. Lynch, and N. Thompson. *AAAI QCAI Workshop*, 2025. [https://arxiv.org/abs/2511.01253]
- **The Price of Progress: Algorithmic Efficiency and the Falling Cost of AI Inference. H. Gundlach**, J. Lynch, M. Mertens, and N. Thompson. *NeurIPS Workshop on Evaluating the Evolving LLM Lifecycle: Benchmarks, Emergent Abilities, and Scaling*, 2025. [https://arxiv.org/pdf/2511.23455v1]
- **Meek Models Shall Inherit the Earth. H. Gundlach**, J. Lynch, and N. Thompson. *ICML Technical AI Governance Workshop*, 2025. [https://arxiv.org/abs/2507.07931]
- **Quantum Advantage in Computational Chemistry? H. Gundlach**, K. Sharkey, J. Lynch, V. Hazoglou, K.-C. Hsu, C. Dukatz, E. Crane, K. Walczyk, M. Bodziak, J. Galatsanos-Dueck, and N. Thompson. *IEEE Quantum Conference Proceedings*, 2025. [https://www.computer.org/csdl/proceedings-article/qce/2025/573601c289/2c5N1BLj3eo]
- **Introducing the Quantum Economic Advantage Calculator.** F. Mejia, **H. Gundlach**, J. Lynch, C. Dukatz, A. Lucas, E. Crane, P. Shukla, and N. Thompson. *IEEE Quantum Conference Proceedings*, 2025. [https://www.computer.org/csdl/proceedings-article/qce/2025/573601b873/2c5MG4poOCQ]
- **REBUS: A Robust Evaluation Benchmark of Understanding Symbols.** A. Gritsevskiy, A. Panickassery, A. Kirtland, D. Kauffman, **H. Gundlach**, *et al. arXiv preprint*, 2024. [https://arxiv.org/abs/2401.05604]
- **Reading the Dictionary.** K. Ayonrinde*, A. Gritsevskiy*, **H. Gundlach***, and D. Kauffman. Research Report, 2024. [https://cavendishlabs.org/blog/dictionary-learning/]
- **Noise-Robust End-to-End Quantum Control Using Deep Autoregressive Policy Networks.** J. Yao, P. Kottering*, **H. Gundlach***, L. Lin, and M. Bukov. *Mathematical and Scientific Machine Learning*, 2022, pp. 1044–1081. [https://proceedings.mlr.press/v145/yao22a.html]
- **Computer Design of Quantum Experiments. H. C. Gundlach.** Master's Essay, University of Cambridge, 2022. [https://hansgundlach.github.io/EssayCam.pdf]

Achievements/Activities/Skills

- Art (link) selected for (2016) 20 under 20 exhibit at Bellevue Art Museum
- Started/Created Wikipedia articles on math and CS with over 80,000 views (link).
- Activities: Founder and President of MIT Blogging Club (Club Website) , Standup Comedy, Painting, Cello