David Nicholaeff

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About

> *Ἀδικεῖ πολλάκις ὁ μὴ ποιῶν τι, οὐ μόνον ὁ ποιῶν τι.*
>
> *He often acts unjustly who does not do a certain thing; not only he who does a certain thing.*
>
> — Marcus Aurelius, Meditations 9.5

If the ultimate hubris is to strive to change the world, then it is the ultimate nobility to make a difference for good in the world. This underscores my passions and endeavours, in seeking justice, finding truth, and ultimately understanding purpose. My technical passions and abilities therefore leverage the elegance of mathematics to build computational models to simulate complex physical systems, so that I may solve problems that remain out of reach.

Experience

DaletN

2018–Present

Founder & CEO — *Albuquerque, New Mexico, U.S.A.*

Consulting

- Acting as a Fractional CTO for clients
- Building customer solutions leveraging cloud deployments and agentic AI

Student Journey Platform

- Creating better paths for prospective students on their education journeys by matching them with schools driven by data and intelligence

Education Sanctum

- Dreaming of an education renaissance with quantum theory, computational philosophy, and artificial intelligence as a new education technology pedagogy

New Mexico Consortium

2023–Present

Quantum Computing Lead — *Los Alamos, New Mexico, U.S.A.*

Quantum Cloud Access Project

- Acting as the quantum computing lead on a subcontract for Los Alamos National Laboratory
- Managing quantum cloud access for researchers across New Mexico
- Democratizing user workflows through education and community outreach
- Researching new protocols for scalable quantum advantage via quantum Darwinism and quantum contextuality

GitOps Development

- Hosting on-prem GitLab

SavantX

2022–2023

Mathematician — *Santa Fe, New Mexico, U.S.A.*

High Risk Quantum Computing Research

- Researched models, derived theory, and conducted experiments to emulate quantum circuits on D-Wave quantum annealers via the Feyman-Kitaev equivalence between adiabatic quantum computing and the quantum circuit model

MRI Technologies

2020–2022

Senior DevOps Engineer — *Houston, Texas, U.S.A.*

NASA Mission Telemetry Data Services

- Prototyped a provable zero trust architecture and Kubeflow AI platform to share telemetry data from mission control with external partners
- Helped win the Mission Enabling Services Contract (MESC, C22-012)

New Mexico Consortium

2018–2020

Research Scientist — *Los Alamos, New Mexico, U.S.A.*

U.S. DOE Exascale Computing Project

- Managed the ECP DevSecOps research team across all national laboratories
- Developed a zero trust infrastructure to enable secure continuous integration in a multi-cloud environment

Descartes Labs, Inc.

2016–2018

Computer Scientist / Data Scientist — *Santa Fe, New Mexico, U.S.A.*

Geospatial satellite data refinery

- Enriched petabytes of hyperspectral data: visible (RGB), near infrared (NIR), shortwave infrared (SWIR), and synthetic aperture radar (SAR)

Asynchronous, event-driven scalable distributed compute

- Constructed a task manager using Google Cloud Platform's Pub/Sub: pipelines on 64k+ cores across managed instance groups

Los Alamos National Laboratory

2011–2016

Computational Physicist — *Los Alamos, New Mexico, U.S.A.*

D-Wave quantum annealer exploration

- Explored the D-Wave quantum annealer by bridging discrete and continuous optimization: sphere packing with local topological constraints and unequal volumes using a quadratic non-convex optimization specification

Multiphysics Eulerian code modernization

- Developed higher order function mappings over physics kernels in order to replace core mesh iteration patterns in multiphysics Eulerian codes

Accelerated asynchronous message passing interface (MPI) facility

- Unified cell-based adaptive mesh refinement (AMR) and N-body particle models and simulations using projective geometry and hashing: prototyped an accelerated asynchronous MPI facility

Radiation-Hydrodynamics codes at exascale

- Researched, designed, and implemented hash-based algorithms to discretize continuous spaces into computational meshes across scalable heterogeneous architectures with primary application in radiation/hydrodynamics codes for exascale machines

Shallow water equations model simulation using cell-based AMR on GPUs

Lambda Labs 2014

Early Engineer (Employee #3)

- Developed a face recognition API, an Elm-compiled web frontend UI, and implemented machine learning algorithms including deep learning convolutional neural networks.

Education

University of Oxford, U.K. 2014

MSc. in Mathematics and the Foundations of Computer Science

Dissertation: ***On the topology of measurement contexts for asymmetric multipartite spin systems***

- Computed degrees of non-locality of entangled qubits using algebraic topology

Adviser: Samson Abramsky

University of California, Los Angeles, U.S.A. 2012

BSc. in Physics & Mathematics

Departmental Honors; Dean's List

Publications

- **Compressed Sensing for Efficient Fidelity Estimation of GHZ States**
  Farrokh Labib, David Nicholaeff, Vincent Russo, & William J. Zeng (2026).
  arXiv preprint arXiv:2604.27824.
  https://doi.org/10.48550/arXiv.2604.27824

- **Observation of quantum Darwinism and the origin of classicality with trapped ions (Quantinuum)**
  David Nicholaeff & Akram Touil (2026).
  Manuscript in preparation.
- **Identifying quantum coherence in quantum annealers**
  Connor Aronoff, Travis Howard, David Nicholaeff, Alejandro Lopez-Bezanilla, & Wade DeGottardi (2026).
  arXiv preprint arXiv:2602.21355.
  https://doi.org/10.48550/arXiv.2602.21355
- **Q2B24 Silicon Valley | David Nicholaeff, Systems Research Scientist, New Mexico Consortium**
  QC Ware (2025, February 4).
  YouTube.
  https://www.youtube.com/watch?v=pLSCHSTQFCc
- **Commit San Francisco 2020: Federation and Zero Trust CI in GitLab**
  GitLab (2020, January 15).
  YouTube.
  https://www.youtube.com/watch?v=5mOnp26Ingo
- **Satellite imagery analysis for automated global food security forecasting**
  Daniela I. Moody, Steven P. Brumby, David Nicholaeff, Rick Chartrand, Mark Mathis, Justin Poehnelt, Samuel W. Skillman, & Michael S. Warren (2018).
  SPIE Defense + Commercial Sensing 2018 (Proc. SPIE 10644).
  https://doi.org/10.1117/12.2315960
- **Predicting Performance of Smoothed Particle Hydrodynamics Codes at Large Scales**
  Guillaume Julien Chapuis, David Nicholaeff, & Stephan Eidenbenz (2016).
  WSC '16: Simulating Complex Service Systems.
  https://doi.org/10.1109/WSC.2016.7822229
- **Modernizing a Legacy Physics Code**
  Charles Roger Ferenbaugh & et al. (2016).
  Supercomputing '16.
- **Fast Mesh Operations using Hierarchical and Templated Spatial Hashing: Remaps and Neighbor Finding**
  David Nicholaeff & Robert W. Robey (2016).
  Internal Joint LANL-LLNL Conference.
- **Hashing in the Discrete Exterior Calculus**
  David Nicholaeff (2015).
  New Trends in Compatible Discretizations CEA-EDF-INRIA School.
- **Algorithms for Optimizing the Eulerian Applications Code Base for Future Computational Architectures**
  Robert W. Robey, David Nicholaeff, Rachel N. Robey, Patrick S. McCormick, Marion K. Davis, Adam McLaughlin, David R. Montoya, & Scott D. Pakin (2013).
  LA-UR Report LA-UR 13-20169.
- **Hash-Based Algorithms for Discretized Data**
  Rachel N. Robey, David Nicholaeff, & Robert W. Robey (2013).
  SIAM Journal on Scientific Computing, 35(4), C346–C368.
  https://doi.org/10.1137/120873686
- **Paradigmatic shifts for exascale supercomputing**

Neal E. Davis, Robert W. Robey, Charles R. Ferenbaugh, David Nicholaeff, & Dennis P. Trujillo (2012). *The Journal of Supercomputing*, 62(2), 1023–1044.
https://doi.org/10.1007/s11227-012-0789-3