ADITYA KHER

https://linkedin.com/in/aditya-kher
Santa Monica, CA

EDUCATION

Ph.D., Applied Physics California Institute of Technology, 2017
Dissertation: Superconducting Nonlinear Kinetic Inductance Devices
Advisor: Prof. Jonas Zmuidzinas

M.S., Applied Physics California Institute of Technology, 2013
B.S., Engineering Physics, magna cum laude University of California, San Diego, 2009

TECHNICAL SKILLS

Scientific Computing/ML: MATLAB, Python (NumPy, SciPy, Pandas, matplotlib, PyTorch, scikit-learn), COMSOL, Sonnet

Experimental Physics: Cryogenics, magnetic hygiene/shielding, microwave and DC measurement, Python instrument control

Software/Data Infrastructure: Git, SQL, Elasticsearch, Grafana

EXPERIENCE

HRL Laboratories — Malibu, CA
Scientist V, Quantum and Cryogenic Systems May 2023 – April 2026

- Performed COMSOL and Python finite-element simulations of the magnetic environment of semiconductor spin qubit devices, including magnetic shielding and microscopic effects from ferromagnetic componentry. Designed mitigation solutions according to requirements flowed down from device theory team. Achieved $\sim$1000$\times$ reduction in environmental magnetic field, validated by qubit measurements showing corresponding increase in fidelity.
- Experimentally validated performance of magnetic shields in a cryostat, measuring shielding performance at low temperatures.
- Built a modular, stochastic, time-domain reliability model in Python to simulate uptime across cryogenic qubit test systems, incorporating system cycling, component failure modes, and random disruptions. Informed system-level design decisions and operational planning.
- Developed real-time telemetry aggregation and visualization tools for monitoring test system uptime and spin-qubit measurement throughput, fusing data from Elasticsearch and SQL into dynamic Grafana dashboards. Contributed both as an individual developer and by directing a software engineering team.
- Defined system architectures and CONOPS for inventory, maintenance, and configuration management efforts for cryogenic hardware, as well as for automated, data-driven, ML-in-the-loop system reliability simulation.
- Co-developed a department-wide cryogenics seminar series, preparing and delivering a lecture on solid-state physics for junior engineers.
- Collaborated across device physics, electronics design, cryogenics, maintenance, software/data infrastructure, and test engineering teams to support system-level integration and development.

Northrop Grumman — Azusa, CA
Principal → Sr. Principal Systems Engineer, Infrared Satellite Systems Oct 2016 – Apr 2023

- Served as Principal Investigator for a space-based hyperspectral remote-sensing R&D program, leading proposal development, staffing, technical direction, and customer engagement, while collaborating across systems and software engineering teams. Directed development of lightweight spectral feature extraction algorithms according to real-time edge-compute performance requirements. Delivered an on-schedule demonstration on both GPU and low-SWAP hardware.
- Mathematically formulated and implemented a 6-DOF aerodynamic trajectory and infrared-signature model in MATLAB for a class of advanced missile threats, evolving into a real-time satellite-based warning algorithm rapidly transitioned to military operations and instrumental in renewal of a $200M+ US Space Force program.
- Performed comprehensive analyses of infrared satellite observations to extract key metrics for US Space Force operational missile warning system under high-reliability constraints.
- Developed real-time geospatial clustering algorithms using unsupervised learning methods for a novel infrared satellite-based wildfire-detection and monitoring system. Collaborated with a software engineering team to implement and operationalize, contributing to the rapid identification and suppression of four emerging fires.
- Delivered technical presentations at national and international conferences, enabling new collaborations and follow-on funding.
- Maintained a close collaborative relationship with government partners, enabling smooth algorithm deployment into operational systems.

California Institute of Technology — Pasadena, CA
Graduate Research Fellow, Astronomy and Cosmology Instrumentation Dec 2011 – Sep 2016

- Designed and tested multiple hardware implementations of a novel low-noise microwave nonlinear superconducting current-sensor technology with single-layer fabrication, scalable to arrays $\sim$100$\times$ larger than the state of the art.
- Built circuit-level and full-wave electromagnetic models for superconducting resonators, transmission lines, filters, and couplers in MATLAB and Sonnet to simulate transfer functions and S-parameters, aiding device design.
- Performed cryogenic microwave measurements, device calibration, and system-level integration of nonlinear superconducting resonator and transmission line devices. Utilized test equipment including vector network analyzers, spectrum analyzers, frequency synthesizers, IQ mixers, lock-in amplifiers, and DC sources, with devices installed in a dilution refrigerator.
- Achieved performance benchmarks enabling deployment in next-generation astronomy and cosmology instruments. Used resonators to read out transition-edge sensors from collaborating teams, successfully mapping the entire TES superconducting transition region.
- Demonstrated near-quantum-limited parametric amplification in nonlinear kinetic-inductance resonators, achieving $\sim$30 dB gain with sub-photon noise.
- Secured multi-year NASA fellowship funding through competitive annual proposals. Collaborated across institutions via seminars and international conferences.

California Institute of Technology — Pasadena, CA
Graduate Research Assistant, Nanoelectromechanical Systems Jul 2010 – Aug 2011

- Developed a novel RF Joule heating technique to extract substrate thermal conductivity, via formulation of an electrothermal partial differential equation model. Measured thermal conductivity of amorphous silicon using Joule heating from a thin-film metallized resistor.
- Designed nanoscale structures and devices with the aid of COMSOL analyses combining electrical, thermal, and mechanical phenomena.
- Trained on a wide variety of nanofabrication techniques, including several methods of thin-film deposition, chemical and plasma etching, and scanning electron microscopy.

University of California, San Diego — La Jolla, CA
Undergraduate Research Assistant, Ultrafast and Nanoscale Optics Nov 2007 – Jun 2009

- Fabricated "lab-on-a-chip" plasmonic biochemical sensors using nanofabrication techniques including holographic photolithography and sputtering.
- Characterized surface hydrophilicity of nanostructured gold films in a microfluidic and optical setup with an infrared laser and MATLAB data acquisition and analysis scripts.

Applied Materials — Santa Clara, CA
Intern, Product Safety and Environmental Engineering Jul 2006 – Sep 2006

- Developed a Microsoft Excel-based energy consumption calculator for Applied Materials semiconductor processing equipment, based on industry energy efficiency standards.
- Analyzed product safety reports in order to improve ergonomic issues.

INDEPENDENT PROJECTS

Earth Observation AI/ML Pipeline 2026

- Trained a ResNet-18 deep neural network land cover classifier on Sentinel-2 satellite imagery using an NVIDIA GPU, achieving 96% accuracy.
- Analyzed land cover classifier model interpretability using GradCAM; determined image sections resulting in classification.
- Developed Python scripts to retrieve Sentinel-2 scenes via Microsoft Planetary Computer STAC API and utilize NDVI analysis to characterize vegetation density and health.
- Built an agentic pipeline using the Anthropic Claude API providing a natural-language interface for satellite imagery retrieval and land cover analysis.

PUBLICATIONS

K. G. Davis, **A. Kher**, J. Biddlecomb, D. Baumgartner, M. Tsao, M. Saad, V. Agarwal, K. Tan, M. Trippe, J. Ulcickas. "HOP Queue: Hyperspectral Onboard Processing Queue Demonstration," *Proceedings of the Small Satellite Conference, Advanced Technologies I*, SSC22I-06 (2022).

A. Kher, P. K. Day, B. H. Eom, J. Zmuidzinas, H. G. Leduc. Kinetic Inductance Parametric Up-Converter. *Journal of Low Temperature Physics* 184, 480 (2016).

H. P. M. Chen, L. Pang, **A. Kher**, Y. Fainman. Three-dimensional composite metallodielectric nanostructure for enhanced surface plasmon resonance sensing. *Applied Physics Letters* 94, 073117 (2009).

H. P. M. Chen, L. Pang, **A. Kher**, Y. Fainman. "Reconfigurable large area metallic nanohole array and its application in bio-sensing," *LEOS 2008 – 21st Annual Meeting of the IEEE Lasers and Electro-Optics Society*, pp. 278-279 (2008).

PREPRINTS

Members of the HRL Quantum Team and Collaborators (incl. **A. Kher**). A digitally controlled silicon quantum processing unit. arXiv:2604.16216 [quant-ph] (2026). Under review at *Nature*.

ORAL PRESENTATIONS

Hyperspectral Onboard Processing Cubesat Demonstration. 36th Annual Small Satellite Conference, Logan, UT: August 8, 2022.

Target Trajectory and Signature Modeling Prediction and Comparisons to Measured OPIR Data. Classified conference: 2019.

Kinetic Inductance Parametric Up-Converter. 16^{th} International Conference on Low Temperature Detectors, Grenoble, France: July 21, 2015.

Kinetic Inductance Parametric Up-Converter. Applied Superconductivity Conference 2014, Charlotte, NC: August 12, 2014.

Superconducting Nonlinear Kinetic Inductance Devices. 11^{th} European Conference on Applied Superconductivity, Genova, Italy: September 17, 2013.

Superconducting Nonlinear Kinetic Inductance Devices. 15^{th} International Conference on Low Temperature Detectors, Pasadena, CA: June 24, 2013.

POSTER PRESENTATIONS

Real-Time OPIR Data Processing and Warning Region Prediction. Classified conference: 2019.

OPIR Data Processing and Warning Region Prediction. National Fire Control Symposium 2019, Lake Buena Vista, FL: February 5, 2019.

OPIR Data Processing and Warning Region Prediction. Classified conference: 2018.

Kinetic Inductance Parametric Up-Converter. American Physical Society March Meeting 2016, Baltimore, MD: March 16, 2016.

TEACHING ASSISTANTSHIPS

California Institute of Technology — Pasadena, CA

- **Physics** - Introductory Physics Laboratory (Fall 2011)
- **Physics** - Modern Physics Laboratory (Spring 2010)
- **Applied Physics** - Semiconductor Fabrication Laboratory (Fall 2010)
- **Applied Physics** - Thermodynamics and Statistical Mechanics (Fall 2009)

HONORS & AWARDS

1st-Place Poster, classified conference (2019)
Northrop Grumman Aerospace Systems President's Award (2019)
USDA Certificate of Appreciation (2019)
NASA Space Technology Research Fellowship (2012–2016)
Calit2 Summer Undergraduate Research Scholarship (2008)
IEEE-HKN induction (2007)

PROFESSIONAL DEVELOPMENT

DeepLearning.AI Machine Learning Specialization (2023)
Capture Manager Training (2023)
Earned Value Management Training (2022)
NASA Applied Remote Sensing Training (2022)
Dale Carnegie Course (2017)