

Siddharth Maddali, Ph.D

Computational Scientist



NOTE: Icons are clickable links.

Summary

Computational scientist with 7+ years' professional research experience in X-ray and optical microscopy, optics, imaging algorithms, signal processing, high-performance computing, scientific software development and materials physics. 1+ years in the semiconductor industry. Previous stints at top US national laboratories. Professional with a Ph.D in physics and strong fundamentals in mathematics and computation. Passionate about computational, experimental and AI innovation in any field, particularly the physical sciences.

Citizenship: India

Sponsorship required: No

Education

Ph.D, Applied physics — Carnegie Mellon University	Pittsburgh, PA, USA 2010 — 2016
MS, Physics — Carnegie Mellon University	Pittsburgh, PA, USA 2009 — 2010
M.Sc, Physics — Indian Institute of Technology - Madras	Chennai, India 2007 — 2009
B.Sc, Physics, mathematics, electronics — Bangalore University	Bengaluru, India 2004 — 2007

Skills

Proficiency	Physics	Computation	Programming
👉 Research	Fourier/physical/wave optics, microscopy, X-ray diffraction, condensed matter/materials physics	Linear algebra, imaging, reconstruction, signal processing, inverse problems, simulations	Python (numpy, scipy, pandas, matplotlib, scikit-learn), MATLAB, Linux, Bash, $LATEX$
👉 Expert	Computational electromagnetics, quantum & statistical physics, mechanics	Statistics, probability, FDTD, visualization, high-dimensional geometry, complex analysis	HPC/parallel computing (mpich, GPU development (PyTorch, Tensorflow))
📄 Functional	Semiconductors, Experimental design	Differential equations, machine learning, deep learning	C/C++
📄 Miscellaneous	Quantum information	Bayesian inference, uncertainty quantification, quantum computing	HTML, Javascript, CSS, Qiskit, cuQuantum

Experience

KLA Corp. (KLA-Tencor)
Research Scientist: Broadband Plasma (BBP) Division

Milpitas, CA, USA
Nov 2022 — present

Accomplishments:

— Developed methods for sensitivity enhancement in semiconductor wafer inspection with broadband optical illumination.

Accomplishments:

- Led the computational development and **first experimental demonstration** of multi-reflection Bragg coherent diffraction imaging (MR-BCDI).
- Pioneered design of futuristic experiments at Department of Energy facilities with physics-based signal processing techniques.
- Spearheaded the multi-scale X-ray diffraction imaging approach to characterizing materials in difficult-to-access environments (APS, ESRF).
- Commandeered research grants (ANL LDRD) for early-stage exploratory X-ray microscopy and experimental automation at synchrotron facilities.
- Proposed and executed successful synchrotron experiments (US, France).
- Published in high-impact journals, mentored postdocs and students, organized/chaired international workshops.

Argonne National Laboratory**Post-doctoral researcher:** Materials Science Division

Chicago, IL, USA

Jan 2017 — Sep 2019

Accomplishments: **First demonstration** of multi-scale, high-energy coherent diffraction imaging (HEDM) of 3D material microstructure.

National Energy Technology Laboratory**Post-doctoral researcher:** ORISE Fellow

Pittsburgh, PA, USA

May 2016 — Nov 2016

- Developed guidelines for machine learning-driven materials discovery of novel, function-optimized steel alloys.

Carnegie Mellon University**Graduate student:** Physics Department

Pittsburgh, PA, USA

Aug 2009 — Feb 2016

- Dissertation on mining meso-scale materials physics from high-energy synchrotron data.
- Created `HierarchicalSmooth`: mesh smoothing for physical interface networks.
- Taught mechanics & electromagnetism to undergraduate science majors.

Awards & Grants

- ANL LDRD: *Coherence-enhanced dark-field X-ray microscopy* (Role: PI; \$930,000).
- ANL LDRD: *Detecting critical micro-structural processes with AI* (Role: PI; \$100,000).
- Oak Ridge Institute for Science and Education (ORISE) post-doctoral fellowship (2016).
- Indian Institute of Technology Madras Merit Scholarship (2007 — 2009).
- IIT Joint Admission to M.Sc (IIT-JAM): All-India rank 5 out of \approx 4000 (2007).
- Bangalore University overall undergraduate rank 5 (2007).

Hobbies & Activities

Swimming, hiking, biking, table tennis (ping-pong), squash.