

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, Fourier/wave optics, imaging algorithms, signal processing, high-performance computing, scientific software development and condensed matter 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 computation, mathematics. Passionate about computational and experimental innovation in any field, particularly the physical sciences.

Citizenship: India

Sponsorship required: No

Education



Pittsburgh, PA, USA
2010 — 2016







Chennai, India
2007 — 2009



— *Indian Institute of Technology - Madras*

M



Bengaluru, India
2004 — 2007



— *Bangalore University*

B





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, <i>L^AT_EX</i>
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.

Argonne National Laboratory

Staff Scientist (\cong Assistant Professor): Materials Science Division

Chicago, IL, USA

Oct 2019 — Oct 2022

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 ≈ 4000 (2007).
- Bangalore University overall undergraduate rank 5 (2007).



Hobbies & Activities

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