Siddharth Maddali, Ph.D

Computational Scientist

NOTE: Icons are clickable links.

Summary

Computational scientist with a demonstrated record of research and development. **7+ years' professional 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 strong fundamentals in computation, mathematics and a Doctor of Philosophy (Ph.D.) in physics. Passionate about computational and experimental 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, diffraction, scattering, condensed matter physics	Linear algebra, imaging, reconstruction, signal processing, inverse problems, simulations	Python (numpy, scipy, pandas, scikit-learn) MATLAB, Linux, LaTeX
Expert	Quantum & statistical physics, mechanics, electromagnetism, acoustics	Statistics, probability, visualization, high-dimensional geometry, complex analysis	HPC/parallel computing (mpich), GPU development (PyTorch, Tensorflow)
Functional	Semiconductors, Instrumentation/experimental design	Differential equations, machine learning, deep learning	C/C++
Miscellaneous	Dynamical systems, quantum information	Bayesian inference, uncertainty quantification, quantum computing	HTML, Javascript, CSS, Qiskit, cuQuantum

Experience

KLA Corp. (KLA-Tencor) — Milpitas, CA, USA
Research Scientist: Broadband Plasma (BBP) Division — Nov 2022 — Feb 2024

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

Argonne National Laboratory — Chicago, IL, USA
Staff Scientist (≅ Assistant Professor): Materials Science Division — Oct 2019 — Oct 2022

Accomplishments:

— Led the computational development and **first ever experimental demonstration** of imaging nano-scale tensor fields in in real-world, defected materials (MR-BCDI).

— Pioneered futuristic high-resolution imaging 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 high-risk, high-reward research grants (ANL LDRD) for early-stage exploratory X-ray microscopy and experimental automation at synchrotron facilities.

— Misc: Led successful proposals for experiments in national scientific user facilities (US, France), published in high-impact journals, mentored postdocs and students, organized/chaired international workshops.

Argonne National Laboratory Chicago, IL, USA
Post-doctoral researcher: Materials Science Division Jan 2017 — Sep 2019

Accomplishments:

— First demonstrated the feasibility of multi-scale imaging of 3D bulk material structure and defects in topologically and crystallographically complex materials using high-energy coherent X-ray illumination.

National Energy Technology Laboratory Pittsburgh, PA, USA
Post-doctoral researcher: ORISE Fellow May 2016 — Nov 2016

— Developed guidelines for machine learning-driven nl ldrdmaterials discovery of novel, function-optimized steel alloys with tailored properties to improve performance of power plant components.

Carnegie Mellon University Pittsburgh, PA, USA
Graduate student: Physics Department Aug 2009 — Feb 2016

— Dissertation on mining meso-scale materials physics from high-energy synchrotron data.

— Teaching mechanics & electromagnetism to undergraduate science majors.

🏆 Awards & Grants

— ANL LDRD: *Coherence-enhanced dark-field X-ray microscopy* (Principal Investigator; $930,000).

— ANL LDRD: *Detecting critical micro-structural processes with AI* (Principal Investigator, $100,000).

— Oak Ridge Institute for Science and Education (ORISE) post-doctoral fellowship (2016).

— Indian Institute of Technology Madras Merit Scholarship (2007 — 2009).

— Joint Admission to M.Sc at the Indian Institutes of Technology (IIT-JAM): **All-India rank 5** in a pool of $\simeq$ 4000 (2007).

— Bangalore University overall undergraduate rank 5 (2007).

Hobbies & Activities

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