Siddharth Maddali, Ph.D

Computational Scientist

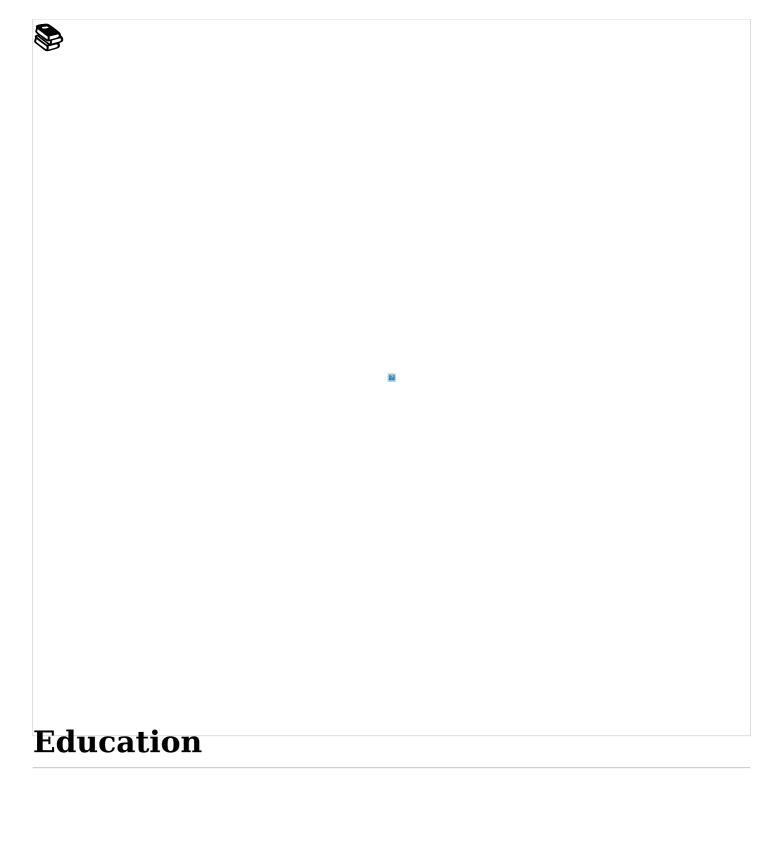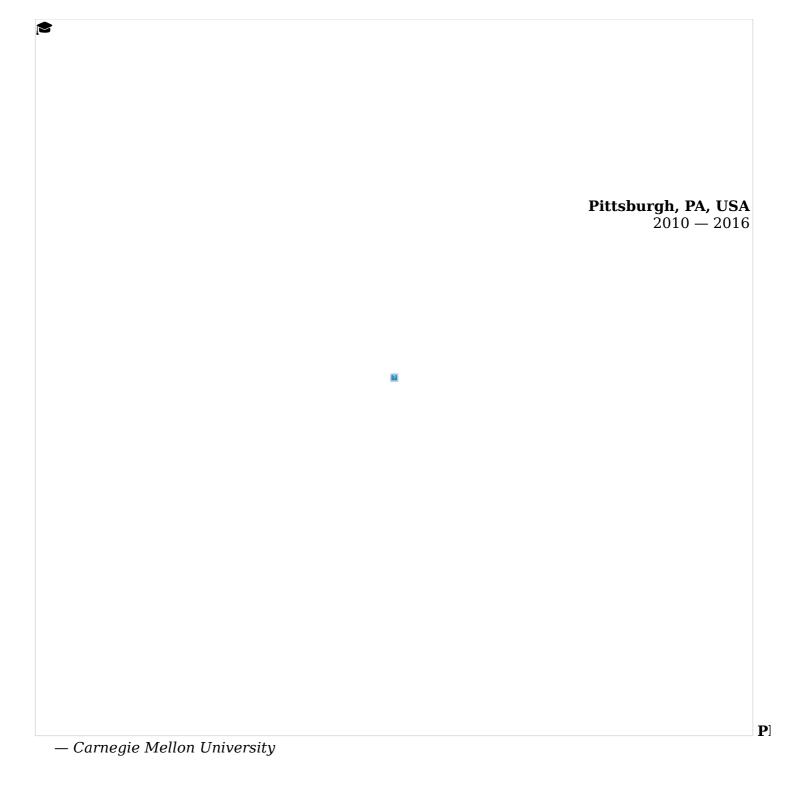## Summary

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
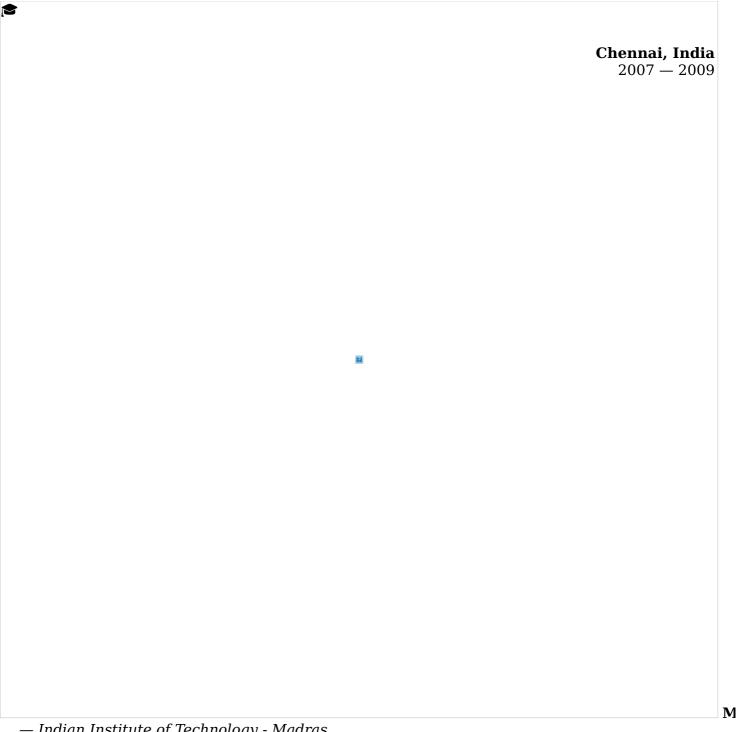**Sponsorship required**: No

Education

Pittsburgh, PA, USA
2010 — 2016

Ph

— *Carnegie Mellon University*

M

— *Carnegie Mellon University*

— *Indian Institute of Technology - Madras*

Bengaluru, India
2004 — 2007

B

— *Bangalore University*

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)   Milpitas, CA, USA
<u>**Research Scientist**</u>: Broadband Plasma (BBP) Division   Nov 2022 —present

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

Argonne National Laboratory   Chicago, IL, USA
<u>**Staff Scientist (≅ Assistant Professor)**</u>: Materials Science Division   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   Chicago, IL, USA
<u>Post-doctoral researcher</u>: Materials Science Division   Jan 2017 — Sep 2019

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

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

    — Developed guidelines for machine learning-driven materials discovery of novel, function-optimized steel alloys.
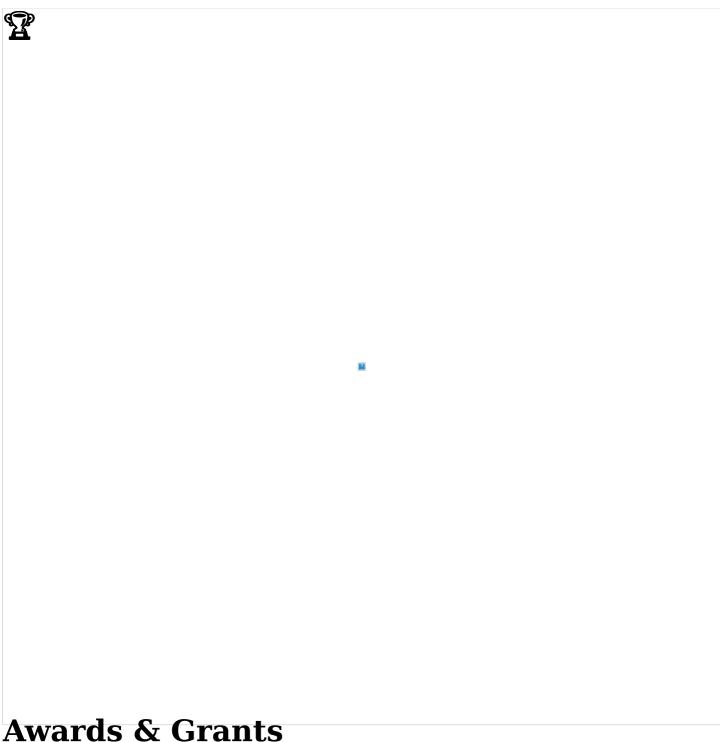
Carnegie Mellon University   Pittsburgh, PA, USA
<u>Graduate student</u>: Physics Department   Aug 2009 — Feb 2016

    — 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 $\simeq 4000$ (2007).
— Bangalore University overall undergraduate rank 5 (2007).

Hobbies & Activities

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

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