Sajid Ali

PhD Candidate
Applied Physics
Northwestern University

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Overview

Objective — To continually enhance my expertise in computational science so as to accelerate development of reusable scientific software and maintain software infrastructure for high performance computing.

Summary — Extensive experience in computational physics across various domains including modeling, simulations, inverse problems. Skilled in scientific software engineering and management of software stacks on clusters.

Education

2016–Present — **Northwestern University**, *Evanston, IL*,
Ph.D., Applied Physics,
Computational x-ray optics, Technique development for X-ray Microscopy.

2011–2016 — **IIT Madras**, *Chennai, India*,
Masters of Tech. in Microelectronics and VLSI Design Electrical Engg.,
Master's Thesis : Impurity induced magnetism in Graphene.

2011–2016 — **IIT Madras**, *Chennai, India*,
Bachelors of Technology, Electrical Engg.,
Minor: Physics.

Professional Experience

Summer 2020 — **WJ Cody Associate**,
Mathematics and Computer Science Division, Argonne National Laboratory, PI: Dr Wendy Di.
- Improving the performance and scalability of a tomography reconstruction code written in C++/PETSc.

Research Experience

2018–Present — **X-Ray Wave Propagation**,
X-Ray Microscopy Group, Northwestern University, PI: Prof Chris Jacobsen.
- Developed parallelized computer codes for large scale wave propagation.
- Implemented finite difference based wave propagation in PETSc.

2016–2019 — **Zone Plate Testing**,
X-Ray Microscopy Group, Northwestern University, PI: Prof Chris Jacobsen.
- Tested high aspect ratio zone plates for efficiency and tilt tolerance at APS and NSLS.
- Developed code to simluate the effect of tilt misalignment.

2015–2016 — **Magnetism in Graphene**,
Computaional Condensed Matter Group, IIT Madras, PI: Prof Ranjit Nanda.
- Investigated the magnetic properties of ntercalated bilayer graphene using DFT.
- Performed stability analysis for those which exhibited a non-trivial magnetic moment.

Summer 2015 **A preliminary DFT Study on the stability of cathode materials**,
Center for Automotive Energy Materials, ARCI IITM Research Park, PI: Dr Sahana MB.
- Studied the relative stability of three structural phases of a novel cathode material for Li-ion batteries.
- Created complex heterostructures and studied their electronic structure using DFT.

Teaching Experience

2018 **Dept. of Physics & Astron., Northwestern University**, *Evanston, IL*, Teaching Assistant.
- Undergraduate Lab methods course for calculus based EM
- Led laboratory sections to demonstrate and facilitate experiments.
- Held discussion hours to facilitate learning by one-on-one discussion of homework problems.

2015 **Dept. of Electrical Engg., IIT Madras**, *Chennai, India*, Teaching Assistant.
- Introduction to the basics of scientific computing using C and Python.
- Facilitated lab sessions, held office hours and graded assignments.

Publications

2020 Comparison of distributed memory algorithms for X-ray wave propagation in inhomogeneous media **Sajid Ali**, Ming Du, Mark F. Adams, Barry Smith, and Chris Jacobsen *Optics Express Vol. 28, Issue 20, pp. 29590-29618*

2020 Benchmark informed software upgrades on Quest, Northwestern's HPC cluster **Sajid Ali**, Alper Kinaci, and Alexander John Mamach *In Practice and Experience in Advanced Research Computing (PEARC '20), Association for Computing Machinery (526–529)*

2020 Tunable hard x-ray nanofocusing with Fresnel zone plates fabricated using deep etching Kenan Li, **Sajid Ali**, Michael Wojcik, Vincent De Andrade, Xiaojing Huang, Hanfei Yan, Yong S. Chu, Evgeny Nazaretski, Ajith Pattammattel, and Chris Jacobsen *Optica Vol. 7, Issue 5, pp. 410-416*

2020 Effect of tilt on circular zone plate performance **Sajid Ali** and Chris Jacobsen *Journal of the Optical Society of America A Vol. 37, Issue 3, pp. 374-383*

2018 Zone Plate Performance as a Function of Tilt Analyzed via Multislice Simulations **Sajid Ali**, Kenan Li, Michael Wojcik and Chris Jacobsen *Vol 24, Suppl. S2 (Proc. of the 14th Intl. Conf. on X-ray Microsc. 2018) pp. 298-299*

2016 Magnetism in intercalated graphene **Sajid Ali**, BRK Nanda *AIP Conference Proceedings 1731, 130040*

Conference & Workshops

2020 **PEARC20**, *Virtual*,
Poster: Benchmark informed software upgrades on Quest, Northwestern's HPC cluster.

2019 **PEARC19**, *Chicago, USA*,
Award : Most Outstanding Student Modeling Challenge Presentation.

2019 **PETSc User Meeting**, *Atlanta, USA*,
Talk: X-Ray Wave Propagation in PETSc,
Panel: Simulation Beyond PDEs (Can PETSc do more?).

2018 **X-Ray Microscopy**, *Saskatoon, Canada*,
Poster: Zone Plate Performance as a Function of Tilt Analyzed via Multislice Simulations.

2016 **DAE Solid State Physics Symposium**, *New Delhi, India*,
Poster: Magnetism in Intercalated Graphene.

2014 **Strongly correlated systems: From models to materials**, *Bengaluru, India*,
Workshop on therorical and computational tools to study strongly correlated electron systems.

Outreach, Volunteer and Leadership Experience

2020	Member, Student Program Committee, PEARC20
2019–Present	XSEDE Student Champion at NU
2019–Present	Literature Review volunteer at NumFOCUS DISC
2018–Present	Contributor to open source software
2018	Taught a class on Emergence for Splash at NU
2013	Graphic Designer for Saarang, IIT Madras
2013	Coordinator for Shaastra Symposium, IIT Madras
2012–2013	Coordinator for Colloquium, IIT Madras

Computer Skills

Programming	C/C++, Python, Matlab, Bash
Software	PETSc, Scientific Python, QuantumEspresso
Perf. Eng.	Intel VTune, Intel APS, Caliper
Sys. Admin.	Spack, Environment Modules, yum/dnf, apt
Soft. Eng.	Git , GitLab CI, Travis CI, Codecov, GNU Debugger
Platforms	Linux (CentOS/RHEL, Ubuntu), Windows