

# Sajid Ali

*PhD Candidate  
Applied Physics  
Northwestern University*

2145 Sheridan Rd, F222

Evanston, IL 60208

📞 224-703-9695

✉ [sajidsyed2021@u.northwestern.edu](mailto:sajidsyed2021@u.northwestern.edu)

🌐 [s-sajid-ali](#)

## 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 and 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 simulate the effect of tilt misalignment.
- 2015–2016 **Magnetism in Graphene,**  
*Computational Condensed Matter Group, IIT Madras, PI: Prof Ranjit Nanda.*
  - Investigated the magnetic properties of intercalated 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 theoretical and computational tools to study strongly correlated electron systems.

## Professional Activities

Organizing	Member, Student Program Committee, PEARC20
Volunteering	Student Volunteer, PEARC19, Literature Review volunteer at NumFOCUS DISC
Membership	US-Research Software Engineering Association

## Parallel & Scientific Computing Skills

Languages	C/C++, Python, Matlab, Bash
Parallel Prog.	PETSc, MPI
Platforms	ALCF-Theta, ANL-LCRC
Workflows	Balsam, Maestrowf
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

## Outreach, Volunteer and Leadership Experience

2019–Present	XSEDE Student Champion at NU
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