

# Sajid Ali

PhD Candidate  
Applied Physics  
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📁 [s-sajid-ali.github.io](https://github.com/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, parallel programming 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.

## 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 **Editor's pick**

- 2020 Benchmark informed software upgrades on Quest, Northwesterns HPC cluster **Sajid Ali**, Alper Kinaci, and Alexander John Mamach *In Practice and Experience in Advanced Research Computing (PEARC '20)*, Association for Computing Machinery (526529)
- 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, Northwesterns 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 (Proficient) C, Python, (Novice) C++, Bash, Matlab
- 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

## 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