Arun Suresh

PhD student - University of Missouri

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Education

2021 – Now **University of Missouri (MU)**, Columbia, MO, United States
PhD in Mathematics
Advisor: Dr. Dan Edidin, *GPA:* 4.0.

2020 – 2021 **Georgia State University (GSU)**, Atlanta, GA, United States
M.S. in Mathematics
Advisor: Dr. Florian Enescu, *GPA:* 4.04.

2016 – 2019 **Georgia State University (GSU)**, Atlanta, GA, United States
B.S. in Mathematics
Advisor: Dr. Florian Enescu, *GPA:* 4.18.

Research Interests

My current research utilizes results from algebraic geometry and representation theory to say meaningful things about recovering signals from "phase-less" measurements. Such problems are typically categorized as phase-retrieval problems. My engagement in phase retrieval has thus far been with situations emerging from areas such as X-ray Crystallography, Multi-Reference Alignment (MRA), and Cryo-Electron Microscopy (cryo-EM).

Research Experience

Summer 2023 **MU department of mathematics**, *Graduate research assistant*.
Project: The generic crystallographic phase retrieval problem. Mentor: Dr. Dan Edidin

Summer 2020 **GSU department of mathematics and statistics**, *Graduate research assistant*.
Project: Parameter estimation models and neural ODEs. Mentor: Dr. Yaroslav Molkov

2019 **GSU department of mathematics and statistics**, *University assistant*.
Project: Presentation ideal of the Backelin semigroup ring. Mentor: Dr. Florian Enescu

Skills

Programming: Python, Julia, Macaulay2, R, C++ (beginner), Haskell (beginner).
Languages: English, Tamil, LaTeX.

Certificates

Spring 2023 Google Data Analytics certificate, *Google (via Coursera) online*.

Fall 2023 Advanced Learning Algorithms, *Deeplearning.ai, Stanford online*.

Publications

Submitted Tamir Bendory, Nadav Dym, Dan Edidin, **Arun Suresh**. 2023. Phase retrieval with semi-algebraic and ReLU neural network priors. *SIAM journal on mathematics of data science*

Submitted Dan Edidin, **Arun Suresh**. 2023. The generic crystallographic phase retrieval problem. *Journal of Applied and Computational Harmonic Analysis.*

CiA 2021 Florian Enescu, **Arun Suresh**. 2021. The generators relations and type of the Backelin semigroup. *Communications in Algebra*

Talks and Presentations

Research talks

Summer 2023 **Codes and Expansion (CodEx)**, *Online*.
Title: The generic crystallographic phase retrieval problem

Spring 2023 **Commutative Algebra Regional Expository Seminar (CARES)**, *Online*.
Title: Betti numbers of the Backelin semigroup

Spring 2023 **Pre-print seminar**, *MU department of mathematics*.
Title: Exploring the Backelin semigroup

Spring 2020 **MathNexus - student body at ISI**, *Online*.
Title: The generators, relations and type of the Backelin semigroup

Fall 2019 **Georgia Undergraduate Research Conference**, *University of North Georgia*.
Title: The minimal generating set for the presentation ideal of the Backelin semigroup ring.

Spring 2018 **GSU algebra seminar**, *Georgia State University*.
Title: On the number of generators for the presentation ideal of a semigroup ring.

Co-curricular and outreach talks

Summer 2023 **GSU-MathPath workshop for undergraduates**, *Online*.
A workshop on the peer-review process

Fall 2022 **Graduate student seminar**, *MU department of mathematics*.
Title: All the money in the world cannot buy me 151 chicken McNuggets*

Fall 2022 **Pre-print seminar**, *MU department of mathematics*.
Title: Every algebraic set in $n-$space is the intersection of $n-$hypersurfaces

Spring 2022 **GSU Mathematics and Statistics Undergradaute research conference**, *Online*.
Title: The art of reasoning: why it is meaningful to pursue a graduate degree in mathematics

Spring 2020 **Mathematical music composition workshop**, *Perimeter college*.
Title: La-Pendu: An exploration of neo-Riemannian transformations and Euclidean rhythms.
Original music composition: La-Pendu

Spring 2019 **Mathematical music composition workshop**, *Georgia State University*.
Title:Neo-Riemannian transformations and Sierpenski-like walks across the Tonnetz.
Original music composition: Spring

Posters

Fall 2023 **Western Algebraic Geometry Symposium**, *Washington University*.
Title: Second moment of dihedral actions, incidence varieties and ensuring signal recovery

Summer 2020 **eCARs conference**, *Online*.
Betti-sequence for the Backelin semigroup

Spring 2019 **Georgia State Undergraduate Research Conference**, *Georgia State University*.
Title: Numerical semigroup rings and the Frobenius coin exchange problem

Fall 2018 **Georgia Undergraduate Research Conference**, *University of North Georgia*.
Title: On the existence of arbitrarily large number of generators for the presentation ideal of semigroup rings

Fall 2018 **Undergraduate Math Symposium**, *University of Illinois, Chicago*.
Title: On the minimal number of relations among the generators of the Backelin semigroup

Projects

Fall 2020 **Dr. Xiaojing Ye's Numerical analysis research group**, *Georgia State University*.
Title: Compressed Sensing using (Accelerated) Proximal Gradient Descent and wavelet transforms for non-sparse signals

Spring 2020 **Numeripy**, *Online*.
Python package containing numerical ODE solvers and iterative matrix methods

Fall 2018 **Physics4500 - Computational fluid dynamics**, *Georgia State University*.
Title: Collapse Of Spherical Magnetic Molecular Cloud Core With ENZO AMR MHD Code.
Used GSU's supercomputer "Harlow" for computation

Teaching

2021 - Now **University of Missouri**, *Graduate Teaching Assistant*.

Teaching:
Fall 2023: Math 1500H, Calculus and analytic geometry 1 - Honors (Recitations)
Fall 2023: Math 1500, Calculus and analytic geometry 1 (Recitations)
Spring 2023: Math 1400, Calculus for social and life sciences
Fall 2022: Math 1300, Finite mathematics
Fall 2021 - Summer 2022: Math 1100, College algebra

Grading:
Fall 2021 - Spring 2023: Math 3000, Introduction to advanced mathematics.

2020-2021 **Georgia State University**, *Graduate teaching assistant*.
Teaching:
Fall 2020 - Spring 2021: Math 1111, College algebra

2017-2020 **Mathematics Assistance complex (MAC) at GSU**, *Graduate lab assistant*.
Positions:
Spring 2020: Graduate Lab Assistant
2018-2019: University Assistant
2017: Undergradaute student assistant

Classes tutored:
All undergraduate math courses offered, barring those that required a statistics or bio-informatics concentration.

Summer 2017 **IIT-Buds Private Ltd.**, *RMO coach*.
Prepared students towards regional mathematics olympiad.

Extra Curricular

2023 - Now **Directed Readings Program (DRP) at MU**, *Founder, mentor*.
2022 - Now **American mathematical society - MU graduate student chapter**, *President*.
2022 - 2023 **(Student led) MU algebraic geometry reading group**, *Coordinator, presenter*.
2022 - Now **MU mathematics graduate student seminar**, *Co-coordinator*.
2018 - 2021 **GSU Continuum group (Putnam team)**, *Founder, member*.
2018 - 2021 **Mathematics and Statistics club at GSU**, *President*.
Summer 2016 **Org. for the promotion of science (Chennai, TN, India)**, *Speaker, member*.

Awards and achievements

Spring 2023 **Huckaba Scholarship in algebra**, *University of Missouri*.
This award entailed a $1,200 scholarship prize

Spring 2023 **Excellence in graduate teaching**, *University of Missouri*.
This award entailed a $300 scholarship.

Fall 2021 **Excellence in qualifying exams - Algebra, Analysis**, *University of Missouri*.
This award entailed a $600 scholarship prize

Spring 2021 **V.V.Lavroff award for exceptional graduate achievements**, *GSU*.
This award entailed a $600 scholarship prize.

Spring 2019 **V.V.Lavroff award for exceptional undergraduate achievements**, *GSU*.
This award entailed a $300 scholarship prize.

Fall 2017 **Kirkland Sattlemeyer Scholarship**, *Georgia State Honors College*.
Waived $2000 off the yearly tuition fees for my Junior and Senior years.

Fall 2016 **Campus Atlanta Scholarship**, *Georgia State University*.
Waived the out of state portion of my yearly tuition (∼$18000) during my undergraduate enrollment.

References available upon request.