Ashwin Iyengar

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ashwiniyengar.github.io

Academic Positions

2024-2025 **AMS Congressional Fellow** *Sen. Bernie Sanders, U.S. Senate HELP Committee*

2021-2024 **J. J. Sylvester Assistant Professor** *Johns Hopkins University*
Faculty mentor: Professor David Savitt

Education

2017-2021 **PhD in Mathematics** *London School of Geometry and Number Theory (King's College London)*
Supervised by James Newton and Toby Gee

2016-2017 **Master of Pure Mathematics** *Université Paris 13, Mention Très Bien*

Fall 2015 **Budapest Semesters in Mathematics** *Budapest, Hungary*

2012-2016 **B.A. Mathematics** *University of California, Berkeley*, Berkeley, CA, *High Honors*

Publications and Preprints

- **Math for a Better Future**
  Reflections on the AMS Congressional Fellowship. To appear in AMS Monthly Notices.
- **Geometric Casselman–Shalika in mixed characteristic** *with Milton Lin and Konrad Zou*
  Submitted. arXiv
- **Mod ℓ gamma factors and a converse theorem for finite general linear groups** *with Jacksyn Bakeberg, Mathilde Gerbelli–Gauthier, Heidi Goodson, Gilbert Moss and Robin Zhang*
  To appear in Documenta Mathematica. arXiv
- **Zariski density of crystalline points** *with Gebhard Böckle and Vytautas Paškūnas*
  PNAS, 2023. arXiv, journal
- **On local Galois deformation rings** *with Gebhard Böckle and Vytautas Paškūnas*
  Forum of Mathematics, Pi, 2023. arXiv, journal
- **Deformation theory of the trivial mod p Galois representation for GL_n**
  IMRN, 2020. arXiv, journal
- **Graphical display of search trees for transparent robot programming** *with Joaquin Pockels and David Touretzky*
  Proceedings of the 25th International Florida Artificial Intelligence Research Society Conference (FLAIRS-25), Marco Island, FL. 2012. journal

Teaching Experience

Spring 2024 **Deformations of Galois Representations** *Johns Hopkins University*

Fall 2023 **Calculus II for Engineers** *Johns Hopkins University*

Spring 2023 **Introduction to Topology** *Johns Hopkins University*

Spring 2023 **Algebraic Number Theory II** *Johns Hopkins University*

Fall 2022 **Algebraic Number Theory I** *Johns Hopkins University*

Spring 2022 **Calculus I for Biologists** *Johns Hopkins University*

Spring 2022 **Algebraic Number Theory II** *Johns Hopkins University*

Fall 2021 **Algebraic Number Theory I** *Johns Hopkins University*

Spring 2020 **Introduction to Logic Gates** *London Maths Outreach*

Spring 2020 **Representation theory of Finite Groups** *King's College London*
Teaching Assistant

Fall 2018 **Elementary Number Theory** *King's College London*
Teaching Assistant

Summer 2015 **Counselor** *PROMYS Program, Boston University*
Summer high school program in number theory

Professional Service

PhD Student Advising

2025-present **Yashi Jain**, Co-advised with Prof. David Savitt

2022-2024 **Chen-wei (Milton) Lin**, Co-advised with Prof. David Gepner

Undergraduate Mentorship

2023-2024 **Liam Baca and Yash Lal**, Mentor for an independent study in algebraic number theory.

Fall 2022 **Akash Sureshkumar**, Mentor for an independent study on elliptic curves.

Thesis Defenses

Spring 2023 **Kalyani Kansal**, Served on PhD thesis defense committee at Johns Hopkins.

Spring 2023 **Luochen Zhao**, Served on PhD thesis defense committee at Johns Hopkins.

Spring 2022 **Zhongyipan Lin**, Served on PhD thesis defense committee at Johns Hopkins.

Refereeing

- Advances in Mathematics
- Algebra & Number Theory
- IMRN

Outreach

Oct 2025 **University of Maine Math Club**, How to prove Fermat's Last Theorem.

Oct 2023 **JHU Undergraduate Colloquium**, Elliptic Curves, Modular Forms, and Fermat's Last Theorem.

2022-present **Baltimore Underground Science Space**, Taught calculus and mathematical modeling to high-school students participating in the International Genetically Engineered Machine (iGEM) program.

Feb 2021 **London High School Outreach Talk**, Expository talk on the p-adic numbers to high school students in London (virtual).

May 2020 **Logic Gates Virtual Course**, Developed and taught a virtual 4 week course on logic gates to high school students as part of the London Maths Outreach program, which I co-founded.

Dec 2017 **Allderdice High School Outreach Talk**, Gave an expository talk on the p-adic numbers to students at my former high school.

Seminars Organized

2022-2023 **Johns Hopkins Number Theory Seminar**, with Rahul Dalal

2021-2022 **Johns Hopkins Number Theory Seminar**, with Aurélien Sagnier

Summer 2020 **Reading group on p-adic local Langlands for $\mathrm{GL}_2(\mathbb{Q}_p)$**, with Andrew Graham

Winter 2019 **Reading group on derived deformation theory of Galois representations and derived Hecke algebras**, with Carl Wang-Erickson, Pol van Hoften and Alice Pozzi

2018-2019 **London Junior Number Theory Seminar**, with Johannes Girsch

Scholarships and Awards

2024-2025 **AMS Congressional Fellowship** *American Mathematical Society*

May 2024 **Professor Joel Dean Award for Excellence in Teaching** *Johns Hopkins University*

May 2020 **Nominated for "Outstanding Teaching Assistant Award"** *King's College London*

2017-2021 **London School of Geometry and Number Theory Studentship**

2016-2017 **PGSM International Scholarship** *Fondation Sciences Mathématiques de Paris*

Aug 2012 **Most Innovative Video Award** *Association for the Advancement of Artificial Intelligence Yearly Conference 2012, San Francisco*

Research Talks

Invited Conference Talks

Oct 2025 **Maine-Québec Number Theory Conference**, University of Maine

Jan 2025 **AMS Special Session on Rethinking Number Theory**, Joint Math Meetings 2025, Seattle

Sep 2023 **AMS Special Session on Homological Aspects of p-adic Groups and Automorphic Representations**, University of Buffalo

Jun 2023 **Conference on Local Langlands and p-adic methods**, Hausdorff Institute, Bonn

Jan 2023 **AMS Special Session on Rethinking Number Theory**, Joint Math Meetings 2023, Boston

Jul 2019 **Conference on p-adic modular forms and Galois representations**, University of Sheffield

Nov 2018 **Young Researchers in Algebraic Number Theory**, University of Sheffield

Invited Seminar Talks

Mar 2024 **Algebra Seminar**, University of Arkansas

Feb 2024 **Number Theory and Representation Theory Seminar**, University of Maryland, College Park

Oct 2023 **Algebra, Combinatorics, and Geometry Seminar**, University of Pittsburgh

Mar 2023 **Number Theory Seminar**, Ohio State University

Feb 2023 **Number Theory Seminar**, Stanford University

Nov 2022 **Philadelphia Area Number Theory Seminar**, Temple University

May 2022 **Automorphic Project Research Seminar**, Virtual

Feb 2022 **Number Theory Seminar**, University of Chicago

Feb 2022 **Joint IAS/Princeton Number Theory Seminar**, Institute for Advanced Study

Sep 2021 **Number Theory Seminar**, Johns Hopkins University

May 2021 **Number Theory Seminar**, University of Warwick

May 2021 **Number Theory Seminar**, Purdue University

Jan 2021 **Number Theory Seminar**, UC San Diego

Dec 2020 **Number Theory Seminar**, University of Copenhagen

Nov 2020 **London-Paris Number Theory Seminar**, Virtual

Nov 2020 **POINT: New Developments in Number Theory**, Virtual

Oct 2020 **Number Theory Seminar**, Cambridge University

Jun 2020 **Séminaire de géométrie arithmétique et motivique**, Paris 13

Department Colloquia

Jan 2025 **University of Maine**

Mar 2024 **American University of Beirut**

Aug 2022 **University of Hawaii at Manoa**

Conferences/Workshops Attended

Oct 2025 *Maine-Québec Number Theory Conference*, University of Maine

Mar 2025 *Perfection in Algebra, Geometry and Topology*, Simons Foundation, New York

Jan 2025 *Joint Math Meetings*, Seattle, WA

Feb 2024 *Junior Number Theory Days*, Johns Hopkins University

Jan 2024 *Joint Math Meetings*, San Francisco, CA

Sep 2023 *AMS Fall Eastern Sectional Meeting*, University of Buffalo

Jun 2023 *Conference on Local Langlands and p-adic methods*, Hausdorff Institute, Bonn

Jan 2023 *Arithmetic Aspects of Deformation Theory*, Banff International Research Station

Jan 2023 *Joint Math Meetings*, Boston, MA

Dec 2022 *Junior Number Theory Days*, Johns Hopkins University

Dec 2021 *Junior Number Theory Days*, Johns Hopkins University

Jul 2021 *Rethinking Number Theory II*, Online

Apr 2021 *Towards a mod p Langlands correspondence*, Essen, Germany (online)

Apr 2021 *Derived Galois Deformation Rings and Cohomology of Arithmetic Groups*, Oberwolfach, Germany (online)
Nov 2020 *London-Paris Number Theory Seminar*, Online
Sep 2020 *Workshop on Serre weights conjectures and geometry of Shimura varieties*, Online
May 2020 *CARTOON Conference*, Online
Oct 2019 *Modularity and Moduli Spaces*, Oaxaca, Mexico
Sep 2019 *Hausdorff School on the Emerton-Gee stack and related topics*, Bonn, Germany
Jul 2019 *p-adic modular forms and Galois representations*, Sheffield, United Kingdom
Jun 2019 *Padova school on Serre conjectures and the p-adic Langlands program*, Padova, Italy
May 2019 *Workshop on the p-adic Langlands program and related topics*, London, England
Apr 2019 *MSRI Hot Topics: Recent progress in the Langlands program*, MSRI, Berkeley
Nov 2018 *Young Researchers in Algebraic Number Theory*, Sheffield, United Kingdom
Jul 2018 *Workshop on Galois Representations*, Heidelberg, Germany
Apr 2018 *MSRI Hot Topics: The Homological Conjectures*, MSRI, Berkeley, CA
Mar 2018 *Arizona Winter School 2018: 'Iwasawa Theory'*, University of Arizona, Tucson, AZ
Jun 2017 *Géométrie d'Arakelov et applications diophantiennes*, Institut Fourier, Grenoble
Aug 2011 *AAAI-11: Twenty-Fifth Conference on Artificial Intelligence*, San Francisco, CA

Expository writing

Spring 2024 *Deformations of Galois Representations*, Written for a course taught at JHU
Spring 2023 *Introduction to Topology*, Written for a course taught at JHU
2021 - 2023 *Class Field Theory*, Written for a course taught at JHU
2021 - 2023 *Algebraic Number Theory*, Written for a course taught at JHU
Spring 2019 *Transcription of the Padova summer school lectures*, Scribed for a summer school in Padova, Italy
Fall 2019 *Transcription of the Emerton–Gee stack lectures*, Wrote the original notes for an survey article on the Emerton–Gee stack

Spoken Languages

English (native), French (fluent)

References

- Prof. James Newton
  Oxford University
  newton@maths.ox.ac.uk
- Prof. David Savitt
  Johns Hopkins University
  savitt@jhu.edu
- Prof. Gebhard Böckle
  Heidelberg University
  gebhard.boeckle@iwr.uni-heidelberg.de
- Prof. Matthew Emerton
  University of Chicago
  emerton@math.uchicago.edu
- Prof. Emily Braley
  Johns Hopkins University
  ebraley1@jhu.edu
  (teaching)

Software, Data Science, and Policy Experience

American Mathematical Society Congressional Fellow *September 2024 - Present*
U.S. Senate HELP Committee (Working for Ranking Member Bernie Sanders)

- Conducted data analyses in R and Python to support Congressional oversight, through hearings and reports
- Engage with diverse healthcare stakeholders to understand domestic and global health challenges
- Support development of legislation addressing healthcare access and access to prescription drugs

Volunteer Scientist *May 2022 - present*
Open Insulin Foundation / Baltimore Underground Science Space

- Developed and optimized laboratory protocols for insulin production in a laboratory setting
- Programmed automated systems in Python and C++ to control a small-scale bioreactor
- Collaborated with interdisciplinary team including biologists and engineers
- Contributed to regulatory strategy development for getting open-source insulin to market

Data Scientist *May 2017 - September 2017*
Gresham Investment Management, LLC

- Built comprehensive data visualization platform from scratch using JavaScript, D3, and Python
- Developed and implemented statistical models for quantitative analysis of large financial datasets
- Created automated data processing pipelines for high-frequency data analysis
- Designed interactive dashboards for real-time monitoring and analysis

Co-founder and Backend Developer *2013 - 2016*
BerkeleyTime.com

- Co-founded and developed comprehensive course scheduling platform for UC Berkeley students
- Full-stack development including frontend user interface and backend database architecture
- Built scalable web application serving thousands of users with real-time course enrollment data
- Successfully sold platform to UC Berkeley for $70,000

Research Assistant *May 2013 - September 2013*
University of Pittsburgh, Department of Astronomy

- Developed data-mining algorithms in Python and R for automated analysis of large astronomical datasets
- Implemented statistical models to identify patterns in complex, multidimensional data
- Applied machine learning techniques to classify and characterize short-period binary star systems

Robotics Researcher *May 2011 - August 2012*
Carnegie Mellon University, School of Computer Science

- Wrote path-planning algorithms and built the graphics library for Tekkotsu robotics platform. C++, Java, and Python
- Created robotic demonstrations, such as programming a hexapod robot to play the piano.
- Won the “Most Innovative Video Award” at the AAAI Conference.

COMPUTER SCIENCE EXPERIENCE

Languages: PHP, SQL, C, C++, Python, R, Objective-C, Swift, Lisp, HTML, CSS, JavaScript, jQuery, Java, Perl, Processing, bash/zsh scripting
Operating Systems: Linux (Ubuntu, Red Hat), Unix, macOS, Windows
Coursework: Data Structures, Operating Systems, Computer Architecture, Complexity Theory