Ashwin Iyengar

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Employment

2024-2025 **American Mathematical Society Congressional Fellow** *U.S. Senate Committee on Health, Education, Labor and Pensions*

2022-present **Volunteer Laboratory Scientist** *Open Insulin Foundation*

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

Education

2017-2021 **Ph.D 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

- **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*
  Submitted. arXiv
- **Zariski density of crystalline points** *with Gebhard Böckle and Vytautas Paškūnas*
  Published in PNAS, 2023. arXiv, journal
- **On local Galois deformation rings** *with Gebhard Böckle and Vytautas Paškūnas*
  Published in Forum of Mathematics, Pi, 2023. arXiv, journal
- **Deformation theory of the trivial mod p Galois representation for GL_n**
  Published in IMRN, 2020. arXiv, journal
- **Graphical display of search trees for transparent robot programming** *with Joaquin Pockels and David Touretzky*
  Published in Proceedings of the 25th International Florida Artificial Intelligence Research Society Conference (FLAIRS-25), Marco Island, FL. 2012. link

Expository writing

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.

Selected Invited Research Talks

Feb 2023 **Number Theory and Representation Theory Seminar**, University of Maryland, College Park

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

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
Mar 2023 **Number Theory Seminar**, Ohio State University
Feb 2023 **Number Theory Seminar**, Stanford University
Jan 2023 **AMS Special Session on Rethinking Number Theory**, Joint Math Meetings 2023, Boston
Nov 2022 **Philadelphia Area Number Theory Seminar**, Temple University
Aug 2022 **Department Colloquium**, University of Hawaii at Manoa
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
Jul 2019 **Conference on p-adic modular forms and Galois representations**, University of Sheffield

Scholarships and Awards

2024-2025 **AMS Congressional Fellowship** *American Mathematical Society*
1 year funding from the American Mathematical Society to conduct policy research in the U.S. Senate.
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 (LSGNT) Studentship**
2016-2017 **PGSM International Scholarship** *Fondation Sciences Mathématiques de Paris*
Aug 2012 **AAAI Most Innovative Video Award** *Association for the Advancement of Artificial Intellingence Yearly Conference 2012, San Francisco*

Video

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

Professional Service

Advising

2022-2024 **Chen-wei (Milton) Lin**, Serving as a second advisor, primary advisor: 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 Ph.D thesis defense committee at Johns Hopkins.

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

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

Refereeing

- Advances in Mathematics
- IMRN

Outreach

Oct 2023 **JHU Undergraduate Colloquium**, Expository talk on Fermat's Last Theorem.

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.

Videos

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

Teaching Experience

Spring 2024 **Graduate topics course in Number Theory** *Johns Hopkins University*

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

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

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

2017–2020 **Outreach Instructor** *London Maths Outreach*, Co-founded/taught for the program.

Spring 2020 **Graduate teaching assistant** *King's College London*, Taught weekly tutorials to 3 groups for "Representation Theory of Finite Groups", taught by Dmitri Panov

Fall 2018 **Graduate teaching assistant** *King's College London*, Taught weekly tutorials to 3 groups for "Elementary Number Theory", taught by James Newton

Dec 2017 **High School Outreach** *Allderdice High School/UCL*, Gave expository talks to high school students on the p-adic numbers

Summer 2015 **Counselor** *PROMYS Program*, 6 weeks, Mentored high school students learning undergraduate level algebraic number theory. Participated in the counselor seminar.

Conferences/Workshops Attended

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*, Boston, MA

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 Talks

Sep 2023 *The unbounded denominators conjecture*, JHU number theory learning group
Mar 2023 *The derived geometric Satake equivalence*, JHU number theory learning group
May 2022 *Introduction to Galois deformations*, Automorphic project learning seminar
Oct 2021 *Derived moduli stacks of Galois representations*, FRG learning seminar
Oct 2021 *$\mathbb{A}^1$-homotopy theory*, JHU category theory learning group
Sep 2021 *Derived structures in the Langlands program*, JHU number theory learning group
Mar 2021 *The fundamental line*, London number theory study group
Feb 2021 *Local aspects of Tate's thesis*, London number theory study group
Jan 2021 *Pseudorepresentations*, London junior number theory seminar
Nov 2020 *Coleman Theory and Higher Coleman Theory*, London number theory study group
Sep 2020 *Banach-Colmez spaces*, London number theory study group
Sep 2020 *Introduction to Homotopy Theory and Simplicial Sets*, LSGNT students' reading group
Jun 2020 *Deformation Theory for Supersingular Representations*, LSGNT students' reading group
Jun 2020 *Paškūnas's deformation theory*, LSGNT students' reading group
May 2020 *Irreducible smooth admissible mod p representations of $\mathrm{GL}_n(F)$*, LSGNT students' reading group
Apr 2020 *Arithmetic Level-Raising in the even case*, London number theory study group
Mar 2020 *Geometric Equivalence of Tori and Characters*, LSGNT students' reading group
Feb 2020 *Deformation theory of representations*, City University reading group
Feb 2020 *Deligne-Lusztig Varieties*, LSGNT students' reading group
Dec 2020 *Stark's Conjecture for Imaginary Quadratic Fields*, London number theory study group
Nov 2019 *An Introduction to Galois Deformation Problems*, Columbia Derived Deformation Theory Seminar
Nov 2019 *The Crystalline Realization of Venkatesh's Conjecture*, Columbia Student Working Group
Sep 2019 *The Eichler-Shimura Isomorphism*, Columbia Student Working Group
May 2019 *G-bundles on the Fargues-Fontaine curve*, London number theory study group
Mar 2019 *The derived deformation ring and patching*, London number theory study group
Dec 2018 *Introduction to stacks*, LSGNT students' reading group
Nov 2018 *Excursion operators and the spectral action*, London number theory study group
Nov 2018 *Irreducible components of local deformation spaces*, Young Researchers in Algebraic Number Theory
Oct 2018 *Mordell-Weil for abelian varieties*, LSGNT students' reading group
Oct 2018 *Integral models of Shimura varieties of Hodge type*, London number theory study group
May 2018 *The décalage functor*, London number theory study group
May 2018 *Deligne's principles A and B*, UCL Period Conjecture study group
Mar 2018 *Grothendieck's monodromy theorem*, LSGNT students' reading group

Feb 2018 *Basic Arakelov intersection theory*, London junior number theory seminar
Feb 2018 *Deligne's 1-motives*, London number theory study group
Nov 2017 *Deformation theory of Galois representations*, LSGNT students' reading group
Jun 2017 *Heights on toric varieties via polytopes*, Institut Fourier Toric Varieties Working Group
Feb 2016 *Emmy Noether and inverse Galois theory*, Math Mondays - UC Berkeley
Jul 2015 *Nets, ultrafilters, and Tychonov's theorem*, PROMYS Seminars
Jul 2015 *Covering spaces*, PROMYS Seminars
Jul 2015 *Point set topology*, PROMYS Seminars

Programming Languages

HTML, CSS, LESS, SQL, JavaScript, Sage, Python, Objective-C, Swift, Lisp, C, C++

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)