Curriculum Vitae
David Helm

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Education/Employment:

Aug. 2016 – Reader, Imperial College
Oct. 2013 – July 2016 Senior Lecturer, Imperial College
June – July 2013 Visitor, Université Pierre et Marie Curie (Paris 6)
2007 – 2013 Assistant Professor, University of Texas
2003 – 2007 Benjamin Pierce Assistant Professor, Harvard University
2003 Ph.D. University of California, Berkeley, Mathematics (advisor: Ken Ribet)
1999 A.B. Harvard University, Cambridge, MA, Mathematics. (Magna cum laude, with highest honors in field.)

Scientific/Academic Honors and Grants:

2015 – 2018 EPSRC Standard Grant EP/M029719/1 (£315,611)
2012 – 2015 National Science Foundation Grant DMS-1161582 ($135,999, 6/01/2012 – 5/31/2015)
2003 – 2005 National Science Foundation Postdoctoral Research Fellowship
1999 – 2002 National Science Foundation Graduate Research Fellowship
2001 Charles B. Morrey, Jr. Award (Berkeley Math Department)

Research Interests:

Number theory, particularly the geometry of Shimura varieties, the representation theory of p-adic algebraic groups and their application to the Langlands correspondence.

Publications and Preprints:

1. (with Gilbert Moss) *Converse theorems and the local Langlands correspondence in families*, to appear in Invent. Math.
2. (with Liang Xiao and Yichao Tian) *Tate cycles on some unitary Shimura varieties mod p* Algebra and Number Theory **11** (2017), no. 10, 2213–2288.
3. *Whittaker models and the integral Bernstein center for* $\boldsymbol{GL}_n$, arxiv:1210.1789, Duke Math. Journal. **165** (2016), no. 9, 1597–1628.
4. *The Bernstein center of the category of smooth* $W(k)[GL_n(F)]$*-modules*, Forum of Mathematics, Sigma **4** (2016), e11.
5. (with Gilbert Moss) *Gamma factors in deformation rings*, arXiv:1510.08743, 11 pages, submitted.
6. *Curtis homomorphisms and the integral Bernstein center for* $\boldsymbol{GL}_n$, arxiv:1605.00487, submitted.
7. (with Patrick Allen, Frank Calegari, Ana Caraiani, Toby Gee, Bao Le Hung, James Newton, Peter Scholze, Richard Taylor, and Jack Thorne) *Potential automorphy over CM fields*, in preparation.
8. (with Jean-Francois Dat, Robert Kurinczuk, and Gilbert Moss) *Moduli of Langlands parameters*, in preparation.

9. (with David Nadler and David Ben-Zvi) *The Deligne-Langlands conjecture in families and the coherent Springer sheaf*, in preparation.
10. (with Matthew Emerton) *The local Langlands correspondence for $\boldsymbol{GL}_n$ in families*, Ann. Sci. École Norm. Sup. **47** (2014), no. 4, 655–722.
11. *On the modified mod p local Langlands correspondence for $\boldsymbol{GL}_2(\mathbb{Q}_\ell)$*, Math. Res. Lett. **20** (2013), no. 3, 489–500.
12. (with José Felipe Voloch) *Finite descent obstruction on curves and modularity*, Bull. London Math. Soc. 2011.
13. *On l-adic families of cuspidal representations of $\boldsymbol{GL}_2(\mathbb{Q}_p)$*, Math. Res. Lett. **17** (2010), no. 5, 805–822.
14. (with Eric Katz) *Monodromy filtrations and the topology of tropical varieties*, Canad. J. Math. **64** (2012), 845–868.
15. *Towards a geometric Jacquet-Langlands correspondence for unitary Shimura varieties*, Duke Math. J. **155** (2010), no. 3, 483–518.
16. *Mazur's principle for U(2,1) Shimura varieties*, preprint, available at arxiv:math/0606731
17. *A geometric Jacquet-Langlands correspondence for U(2) Shimura varieties*, Israel J. Math. **187** (2012), 37–80.
18. *On maps between modular Jacobians and Jacobians of Shimura curves*, Israel J. Math **160** (2007), 61–117.
19. (with Brian Osserman) *Flatness of the linked Grassmannian*, Proc. Amer. Math. Soc **136** (2008), no. 10, 3383–3390. arxiv:math.AG/0605373
20. (with Ezra Miller) *Algorithms for graded injective resolutions and local cohomology over semigroup rings*, Journal of Symbolic Computation **39**, 373–395. arXiv:math.AC/0309256
21. (with Ezra Miller) *Bass numbers of semigroup-graded local cohomology*, Pacific Journal of Mathematics **209**, no. 1, 41–66. arXiv:math.AG/0010003

Recent Talks:

2018 Jul. Workshop on Galois Representations, Heidelberg: Moduli of Langlands parameters.
May London-Paris number theory seminar: Towards a local Langlands correspondence in families for split groups in depth zero.
Apr. Workshop on new developments in automorphic forms, IMUS, Seville: Towards a local Langlands correspondence in families for split groups in depth zero.
2016 Mar. Algebraisation and geometrisation in the Langlands programme, Bristol: The integral Bernstein center for $\mathbf{GL}_n$ and the local Langlands correspondence in families.
2016 Mar. Exeter number theory seminar: The integral Bernstein center for $\mathbf{GL}_n$ and the local Langlands correspondence in families.
2016 Jan. Workshop on categorification and p-adic groups, University of East Anglia: The integral Bernstein center for $\mathbf{GL}_n$ and the local Langlands correspondence in families.
2015 Jun. CIRM conference on Arithmetic Geometry, Representation Theory, and Applications: Whittaker models, converse theorems, and the local Langlands correspondence for $\mathbf{GL}_n$ in families.
Apr. UT number theory seminar: Maximal tori and the integral Bernstein center for $\mathbf{GL}_n$.
Feb. Workshop on Galois Representations, Heidelberg: Moduli of Weil group representations and the local Langlands correspondence in families.
2014 Dec. Imperial College number theory seminar: Maximal tori and the integral Bernstein center for $\mathbf{GL}_n$.

Jun. University of East Anglia: The integral Bernstein center for $\mathbf{GL}_n$.
Jan. Universitat Duisburg-Essen: A derived local Langlands correspondence for $\mathbf{GL}_n$.
2013 Nov. Imperial College number theory seminar: A derived local Langlands correspondence for $\mathbf{GL}_n$.
Oct. Cambridge number theory seminar: The integral Bernstein center for $\mathbf{GL}_n$.
Jul. Jussieu; Séminaire groups réductifs et formes automorphes: A derived local Langlands correspondence for $\mathbf{GL}_n$.
Jun. Jussieu; Séminaire groups réductifs et forms automorphes: The integral Bernstein center and the local Langlands correspondence for $\mathbf{GL}_n$ in families.
May. UCSD number theory seminar: A derived local Langlands correspondence for $\mathbf{GL}_n$.
May. UC Irvine number theory seminar: The integral Bernstein center and the local Langlands correspondence for $\mathbf{GL}_n$ in families.
Apr. National University of Singapore Institute for Mathematical Science: Conference on the modular representation theory of finite and p-adic groups: A derived local Langlands correspondence for $\mathbf{GL}_n$.
Apr. UT number theory seminar: A derived local Langlands correspondence for $\mathbf{GL}_n$.
2012 Dec. UIUC number theory seminar: The integral Bernstein center and the local Langlands correspondence for $\mathbf{GL}_n$ in families.
Oct. University of Chicago number theory seminar: The integral Bernstein center and the local Langlands correspondence for $\mathbf{GL}_n$ in families.
Jul. BIRS conference on Arithmetic and Geometry of Shimura Varieties: The local Langlands correspondence for $\mathbf{GL}_n$ in families.
Mar. MIT: Lie Groups seminar: The Bernstein center of the category of smooth $W(k)[\mathbf{GL}_n(F)]$-modules.
2011 Oct. UT: Local Langlands for families of Galois representations and the Bernstein center.
Apr. IAS: Galois representations and automorphic forms seminar: The Bernstein center of the category of smooth $W(k)[\mathbf{GL}_n(F)]$-modules.
Feb. UT: The Bernstein center of the category of smooth $W(k)[\mathbf{GL}_n(F)]$-modules.
2010 Feb. UT: Panel Discussion: Being an effective postdoc (with Mirela Ciperiani and Kristin Lauter).
2009 Dec. Harvard: On l-adic families of admissible representations of $\mathbf{GL}_n(\mathbb{Q}_p)$.
Oct. UT: On families of admissible representations of $\mathbf{GL}_n(\mathbb{Q}_p)$.
Feb. Caltech (Southern California number theory day): On l-adic families of admissible representations of $\mathbf{GL}_2(\mathbb{Q}_p)$.

Professional Activities:

- Journals Refereed:

  Journal of the American Mathematical Society
  Duke Mathematical Journal
  Bulletin of the London Mathematical Society
  Mathematische Annalen
  Journal of Number Theory
  Finite Fields and their Applications
  Mathematical Research Letters
  International Mathematics Research Notices
  Mathematics of Computation
  NSA Grant Applications

- Departmental service: Imperial College London:
  LSGNT lead selector for number theory (2017–2018)
  LSGNT admissions committee (Spring 2016)
  Year Tutor (Spring 2016–present)
  Pure Maths Exam Section Editor, 2015–2016
  Organizer, London Number Theory Seminar, Autumn 2015
  Interviewer, LSGNT applicants Spring 2015
- Departmental committees served, University of Texas at Austin:
  Administrative Subcommittee of the Graduate Studies Committee (ASGSC) (2012-2013)
  Administrative Subcommittee of the Graduate Studies Committee (ASGSC) (2011-2012)
  Algebra Prelim Committee (2012-2013, University of Texas at Austin)
  Algebra Prelim Committee (2011-2012, University of Texas at Austin)
  Graduate Admissions (algebra and number theory applicants, 2009-10)
  Algebra, Number Theory and Combinatorics Seminar, 2009-10 (with Mirela Ciperiani)
  Algebra Prelim Committee (2009-10, University of Texas at Austin)
  Algebra Prelim Committee (2008-9, University of Texas at Austin)

Postdoctoral Supervision

- Dr. Robert Kurinczuk (Oct. 2016 –)
- Dr. Jean-Stefan Koskivirta (Oct. 2016 - Oct. 2018)
- Dr. Daniel Skodlerack (Nov. 2015 - Nov. 2016)

Current and Former Students

- Mr. Johannes Girsch (LSGNT, begun Summer 2018)
- Dr. Gilbert Moss (Ph. D. UT Austin, Spring 2015)
- Dr. Mohammad Haque (Ph. D. UT Austin, Summer 2013)
- Dr. David Paige (Ph. D. UT Austin, Summer 2012)
- Dr. Brian Katz (Ph. D. UT Austin, Fall 2011)

Teaching Experience:

2018 Autumn Algebra III (M3/4/5P8), Imperial College London
2018 Autumn Modular Forms (M4/5P58), Imperial College London
2018 Summer Representation theory of $\mathbf{GL}_2$ (TCC course), Imperial College London
2016 Autumn Elementary Number Theory (M3/4/5P14), Imperial College London
2016 Autumn Modular Forms (M4/5P58), Imperial College London
2015 Autumn Elementary Number Theory (M3/4/5P14), Imperial College London
2015 Autumn Modular Forms (M4/5P58), Imperial College London
2014 Autumn Modular Forms (M4/5P58), Imperial College London
2013 Spring Advanced Calculus for Applications II (undergraduate vector calculus) University of Texas
2012 Fall Algebra (graduate) University of Texas
2012 Spring Advanced Calculus for Applications II (undergraduate vector calculus) University of Texas
2011 Fall Algebra (graduate) University of Texas
2011 Spring Modular forms and the Langlands Program (topics course) University of Texas

2010	Fall	Advanced Calculus for Applications II (Honors) (undergraduate vector calculus)
2010	Spring	Matrices and Matrix Computations (undergraduate linear algebra), University of Texas
2009	Fall	Theory of Schemes (topics course) University of Texas
2009	Spring	Algebra (graduate) University of Texas
2008	Fall	Calculus II (undergraduate) University of Texas
2008	Spring	Advanced Calculus for Applications II (undergraduate vector calculus) University of Texas
2007	Fall	Number Theory (undergraduate) University of Texas
2007	Spring	Algebraic Geometry (graduate, first semester); Linear Algebra (undergraduate) Harvard University
2006	Fall	Algebraic Geometry (graduate, first semester) Harvard University
2005	Spring	Algebraic Geometry (undergraduate) Harvard University
2004	Spring	Algebraic Geometry (graduate, second semester) Harvard University
2003	Fall	Algebraic Geometry (graduate, first semester) Harvard University
2003	Spring	Course Assistant, Algebraic Geometry (graduate, second semester) UC Berkeley
2002	Fall	Graduate Student Instructor, Math 1A (calculus) UC Berkeley

Miscellaneous Teaching Activities

2017-2018	M4R project for Christopher Haines - Class field theory and higher reciprocity
2016-2017	M4R project for Erik Scheriani- Primes of the form $x^2 + ny^2$
2015-2016	M4R project for Yong-Li Loh- Hilbert's tenth problem
Summer 2015	Supervised UROP for Alexander Horawa - Artin L-functions and class field theory
Spring 2015	Informal reading course - Dalton Fung - Class field theory and complex multiplication
2014–2015	M4R project for Mathew Bell - Class field theory and higher reciprocity
2011 Fall	Etale Cohomology seminar (twice weekly seminar co-organized with Hendrik Orem)
2010 Spring	Informal Seminar on Scheme Theory (reading course with twice-weekly student lectures; roughly 8 participants)
2009 Fall	Number Theory Journal seminar (weekly seminar co-organized with Kim Hopkins)
2008 Fall	Algebraic Geometry and Representation theory seminar (weekly seminar co-organized with Carl Mautner)
2007 Fall	Etale Cohomology seminar (twice weekly seminar co-organized with Carl Mautner)

References:

Kenneth A. Ribet (Advisor)
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