

Mathematics Department, University of Georgia, Athens, GA 30602
 brian@math.uga.edu

(706) 542-2547

Education

1978 B.Sc. Honours, Mathematics Queen's University at Kingston (Canada)
1982 Ph.D. Mathematics Yale University

Academic and Professional Positions

1982–1985 Instructor University of Utah
1985–1987 Lecturer University of California, Berkeley
1987–1990 Assistant Professor University of Georgia
1990–1999 Associate Professor University of Georgia
1999– Professor University of Georgia

Specialization

Representation Theory, Cohomology and Geometry of Algebraic Groups, Lie Algebras, Superalgebras, Quantum Groups, Finite Groups of Lie Type

Publications

1. Pieri formula for $SO(2n+1)/U(n)$ and $Sp(n)/U(n)$, (with H. Hiller), Adv. in Math. **62** (1986), 49–67.
2. Homomorphisms between generalized Verma modules, Trans. Amer. Math. Soc. **288** (1985), 791–799.
3. A comparison theory for the structure of induced representations, (with D. Collingwood), J. Alg. **94** (1985), 511–545.
4. A comparison theory for the structure of induced representations II, (with D. Collingwood), Math. Zeit. **190** (1985), 1–11.
5. A multiplicity one theorem for holomorphically induced representations, (with D. Collingwood), Math. Zeit. **192** (1986), 265–282.
6. Intertwining operators between holomorphically induced modules, (with D. Collingwood), Pacific J. Math. **124** (1986), 73–84.
7. Determination of the intertwining operators for holomorphically induced representations of $SU(p, q)$, (with T. Enright), Math. Annalen **275** (1986), 401–404.
8. Determination of the intertwining operators for holomorphically induced representations of Hermitian symmetric pairs, (with T. Enright and B. Shelton), Pacific J. Math. **131** (1988), 39–50.
9. Kazhdan-Lusztig polynomials for Hermitian symmetric spaces, Trans. Amer. Math. Soc. **309** (1988), 279–294.
10. Multiplicity free categories of highest weight representations I, (with D. Collingwood), Commun. in Alg. **18** (1990), 947–1032.
11. Multiplicity free categories of highest weight representations II, (with D. Collingwood), Commun. in Alg. **18** (1990), 1033–1070.
12. A counterexample to the Gabber-Joseph conjecture, Contemp. Math. **139** (1992), 1–3.

13. Enright-Shelton theory and Vogan's problem for generalized principal series, (with D. Collingwood), *Memoirs Amer. Math. Soc.* **486**, 107 pp., 1993.
14. Characteristic cycles associated to Schubert varieties in classical Hermitian symmetric spaces, (with J. Fu), *Canadian J. Math.* **49** (1997), 417–467.
15. Geometry of the Jantzen region in Lusztig's Conjecture, *Mathematics of Computation* **70** (2001), no. 235, 1265–1280.
16. The maximum length in the restricted region, preprint, 1998.
17. A lookup conjecture for rational smoothness (with W. Graham), *Amer. J. Math.* **125** (2003), 317–356.
18. Varieties of nilpotent elements for simple Lie algebras I: Good primes (with UGA VIGRE Algebra Group), *J. Alg.* **280** (2004), 719–737.
19. Relative category \mathcal{O} , blocks, and representation type, *Resenhas Inst. Mat. Estat. Univ. Sao Paulo* **6** (2004), 121–128.
20. Representation type of the blocks of category \mathcal{O}_S (with D. Nakano), *Adv. in Math.* **196** (2005), 193–256.
21. Varieties of nilpotent elements for simple Lie algebras II: Bad primes (with UGA VIGRE Algebra Group), *J. Alg.* **292** (2005), 65–99.
22. Support varieties for Weyl modules over bad primes (with UGA VIGRE Algebra Group), *J. Alg.* **312** (2007), 602–633.
23. Category \mathcal{O} for the Virasoro algebra: Cohomology and Koszulity (with D. Nakano and E. Wiesner), *Pacific J. Math.* **234** (2008), 1–22.
24. Kostant modules in blocks of category \mathcal{O}_S (with M. Hunziker), *Commun. in Alg.* **37** (2009), 323–356.
25. Cohomology and support varieties for Lie superalgebras II (with J. Kujawa and D. Nakano), *Proc. London Math. Soc.* **98** (2009), 19–44.
26. On Kostant's Theorem for Lie algebra cohomology (with UGA VIGRE Algebra Group), *Contemp. Math.* **478** (2009), 39–60.
27. Ext^1 -quivers for the Witt algebra $W(1,1)$ (with D. Nakano and E. Wiesner), *J. Alg.* **322** (2009), 1548–1564.
28. An analog of Kostant's theorem for the cohomology of quantum groups (with UGA VIGRE Algebra Group), *Proc. Amer. Math. Soc.* **138** (2010), 85–99.
29. Cohomology and support varieties for Lie superalgebras (with J. Kujawa and D. Nakano), *Trans. Amer. Math. Soc.* **362** (2010), 6551–6590.
30. Complexity and module varieties for classical Lie superalgebras (with J. Kujawa and D. Nakano), *Int. Math. Res. Notices* **2011** (2011), 696–724, doi:10.1093/imrn/rnq090.
31. First cohomology for finite groups of Lie type: Simple modules with small dominant weights (with the UGA VIGRE Algebra Group), *Trans. Amer. Math. Soc.* **365** (2013), 1025–1050, doi:10.1090/S0002-9947-2012-05664-9.
32. Complexity for modules over the classical Lie superalgebra $\mathfrak{gl}(m|n)$ (with J. Kujawa and D. Nakano), *Compositio Math.* **148** (2012), 1561–1592, doi:10.1112/S0010437X12000231.
33. Second cohomology for finite groups of Lie type (with the UGA VIGRE Algebra Group), *J. Alg.* **360** (2012), 21–52, doi:10.1016/j.jalgebra.2012.02.028.
34. Bounding the dimensions of rational cohomology groups (with C. Bendel, C. Drupieski, D. Nakano, B. Parshall, C. Pillen, and C. Wright), in *Developments and Retrospectives in Lie*

- Theory: Algebraic Methods, *Developments in Mathematics* **38** (2014), 51–69.
35. Extensions for generalized current algebras (with C. Drupieski, T. Macedo, and D. Nakano), preprint, Nov 2015, arXiv:1511.00024.
 36. Tensor triangular geometry for classical Lie superalgebras (with J. Kujawa and D. Nakano), *Adv. in Math.* **314** (2017), 228–277, doi:10.1016/j.aim.2017.04.022.
 37. Tensor triangular geometry for quantum groups (with J. Kujawa and D. Nakano), 40 pp., submitted, June 2017, arXiv:1702.01289.
 38. Complexity and support varieties for type P Lie superalgebras (with J. Kujawa), to appear, *Mathematical Research Letters*, arXiv:2001.11310.
 39. *Homologica*, a companion mobile app for the paper “Complexity and support varieties for type P Lie superalgebras,” published on the Apple App Store.

Presentations

- | | |
|-----------------|--|
| Apr 1982 | Homomorphisms between generalized Verma modules, Conference on Representations of Real Reductive Groups, Park City, UT |
| Nov 1984 | Structure of induced representations, Special session on Representations of Semisimple Lie Groups, AMS Meeting, San Diego, CA |
| Oct 1985 | Highest weight representations of semisimple Lie algebras, Seminar, University of Massachusetts, Amherst, MA |
| Oct 1986 | Kazhdan-Lusztig polynomials for Hermitian symmetric spaces, Special session on Representations of Reductive Groups, AMS Meeting, Logan, UT |
| Aug 1987 | Highest weight representations for Hermitian symmetric pairs, Conference on Enveloping Algebras, Differential Operators, and Representation Theory, Oberwolfach, Germany |
| Aug 1988 | Multiplicity free categories of perverse sheaves, Conference on Intersection Homology, University of Georgia, Athens, GA |
| Jan 1989 | Verma modules, differential operators, and geometry, Colloquium, University of Washington, Seattle, WA |
| May 1989 | Multiplicity free categories of highest weight representations, Special session on Kazhdan-Lusztig Theory, AMS Meeting, Chicago, IL |
| Mar 1990 | Harmonic analysis and representation theory, Colloquium, University of Ottawa, Ottawa, Canada |
| Nov 1990 | Vogan’s problem #3 and Enright-Shelton theory, Special session on Representation Theory of Lie Groups, AMS Meeting, Denton, TX |
| Jun 1993 | Intersection homology and Kazhdan-Lusztig Theory, Queen’s University, Kingston, Canada (6 talks over 3 days) |
| Jun 1994 | Characteristic cycles associated to Schubert varieties in classical Hermitian symmetric spaces, Canadian Math. Soc. Annual Seminar, Banff, Canada |
| Oct 1994 | Characteristic cycles associated to Schubert varieties, special session on Geometry and Representations of Lie Groups, AMS Meeting, Stillwater, OK |
| Mar 1998 | Lusztig’s conjecture and geometry of the Jantzen region, special session on Combinatorics and Enumerative Geometry, AMS Meeting, Louisville, KY |
| May 2004 | Representation type of the blocks of category \mathcal{O}_S , Lie and Jordan Algebras, their Representations and Applications, II, Guarujá, Brazil. |

- Jul 2004** Varieties of nilpotent elements for simple Lie algebras: Restricted nullcones and support varieties, Representations of Algebraic Groups, Quantum Groups, and Lie Algebras, Snowbird, UT.
- Apr 2005** Nilpotent matrices in Lie algebras, Colloquium, University of South Alabama, Mobile, AL.
- Apr 2005** Support varieties for Lie algebras, Algebra Seminar, University of South Alabama, Mobile, AL.
- Apr 2006** Kostant modules, AMS Meeting, San Francisco, CA.
- Jan 2007** Cohomology for Lie superalgebras, AMS Annual Meeting, New Orleans, LA.
- Jun 2007** Lie algebra cohomology, American Institute of Mathematics Workshop, Palo Alto, CA.
- Aug 2007** On Kostant's Theorem for Lie algebra cohomology, Lie and Jordan Algebras, their Representations and Applications, III, Maresias, Brazil.
- Nov 2007** Cohomology and support varieties for Lie superalgebras II, AMS Meeting, Murfreesboro, TN.
- Oct 2008** Cohomology of quantum groups: An analog of Kostant's theorem, AMS Meeting, Kalamazoo, MI.
- Nov 2008** From nilpotent matrices to support varieties for Lie algebras, Algebra Seminar, Emory University, Atlanta, GA.
- Jul 2009** Complexity and module varieties for classical Lie superalgebras, Algebras, Representations and Applications, IV, Manaus, Brazil.
- Mar 2010** Lie Superalgebras and Varieties, Algebra Seminar, University of Georgia, Athens, GA.
- Mar 2010** Lie Superalgebras and Varieties, Colloquium, University of Virginia, Charlottesville, VA.
- Mar 2010** First Cohomology for Finite Groups of Lie Type, Algebra Seminar, University of Virginia, Charlottesville, VA.
- Oct 2010** First Cohomology for Finite Groups of Lie Type: Simple Modules with Small Dominant Weights, AMS Meeting, Syracuse, NY.
- Sep 2011** Complexity for $\mathfrak{gl}(m|n)$ (two talks), Algebra Seminar, University of Georgia, Athens, GA.
- Mar 2012** Complexity for modules over the classical Lie superalgebra $\mathfrak{gl}(m|n)$, AMS Meeting, Tampa, FL.
- Oct 2012** Thick subcategories for classical Lie superalgebras, AMS Meeting, New Orleans, LA.
- Feb 2014** Tensor triangulated geometry, Algebra Seminar, University of Georgia, Athens, GA.
- Mar 2014** Bounding the dimensions of rational cohomology groups, AMS Meeting, Knoxville, TN.
- Mar 2016** Extensions for generalized current algebras, AMS Meeting, Athens, GA.
- Jun 2016** Being part of the broader mathematical community, Professional development workshop, University of Georgia, Athens, GA.
- Mar 2017** Tensor triangular geometry for quantum groups, AMS Meeting, Charleston, SC.
- Apr 2017** Tensor triangular geometry for quantum groups, Algebra Seminar, University of Georgia, Athens, GA.
- Jul 2018** What to expect from the Joint Mathematics Meetings, Professional development

- workshop, University of Georgia, Athens, GA.
- Jun 2019** Perspectives on support varieties and tensor triangular geometry, Invited hour address, Conference in honor of Gregg Zuckerman's 70th birthday, Ruhr University, Bochum, Germany.
- Apr 2021** Complexity and support varieties for type P Lie superalgebras, Algebra Seminar, University of Georgia, Athens, GA.

Conferences Co-organized

- Jan 2005** Special session on Representations of Lie Algebras, AMS Annual Meeting, Atlanta, GA.
- Mar 2007** Special session on Geometric and Combinatorial Methods in Representation Theory, AMS Meeting, Davidson, NC.
- May 2010** Lie and Representation Theory (2-week VIGRE Summer School Program), Athens, GA.
- May 2010** Homological Methods in Representation Theory (Southeast Lie Theory II), Athens, GA.
- Oct 2013** AMS Southeastern Sectional Meeting, Louisville, KY.
- Mar 2014** AMS Southeastern Sectional Meeting, Knoxville, TN.
- Nov 2014** AMS Southeastern Sectional Meeting, Greensboro, NC.
- Mar 2015** AMS Southeastern Sectional Meeting, Huntsville, AL.
- Oct 2015** AMS Southeastern Sectional Meeting, Memphis, TN.
- Mar 2016** AMS Southeastern Sectional Meeting, Athens, GA.
- Nov 2016** AMS Southeastern Sectional Meeting, Raleigh, NC.
- Jan 2017** AMS-MAA Joint Mathematics Meetings, Atlanta, GA. I was the AMS Associate Secretary in charge of the AMS scientific program.
- Mar 2017** AMS Southeastern Sectional Meeting, Charleston, SC.
- Jul 2017** Mathematical Congress of the Americas, Montreal, Canada.
- Sep 2017** AMS Southeastern Sectional Meeting, Orlando, FL.
- Sep 2017** Special session on Categorical Methods in Representation Theory, AMS Southeastern Sectional Meeting, Orlando, FL.
- Mar 2018** AMS Southeastern Sectional Meeting, Nashville, TN.
- Jun 2018** Geometric, Combinatorial and Categorical Methods in Lie Theory (6-day NSF-RTG Summer School Program), Athens, GA.
- Nov 2018** AMS Southeastern Sectional Meeting, Fayetteville, AR.
- Mar 2019** AMS Southeastern Sectional Meeting, Auburn, AL.
- Mar 2019** Special session on Recent Advances in Lie and Related Algebras and their Representations, AMS Joint Central-Western Sectional Meeting, Honolulu, HI.
- Jun 2019** Joint AMS-Vietnamese Mathematical Society Meeting, Quy Nhon, Vietnam.
- Nov 2019** AMS Southeastern Sectional Meeting, Gainesville, FL.
- Mar 2020** AMS Southeastern Sectional Meeting, Charlottesville, VA (postponed to 2022 due to COVID-19).
- Oct 2020** AMS Southeastern Sectional Meeting, virtual due to COVID-19 pandemic (formerly in Chattanooga, TN).

- Jan 2021** AMS–MAA Joint Mathematics Meetings, virtual due to COVID-19 pandemic (formerly in Washington, DC). I was the AMS Associate Secretary responsible for overseeing the entire AMS scientific program.
- Mar 2021** AMS Southeastern Sectional Meeting, virtual (formerly in Atlanta, GA).
- Nov 2021** AMS Southeastern Sectional Meeting, virtual (formerly in Mobile, AL).
- Mar 2022** AMS Southeastern Sectional Meeting, Charlottesville, VA (cancelled due to COVID-19 Omicron variant).
- Jul 2022** Joint AMS–Société Mathématique de France–European Mathematical Society Meeting, Grenoble, France.
- Oct 2022** AMS Southeastern Sectional Meeting, Chattanooga, TN.
- Mar 2023** AMS Southeastern Sectional Meeting, Atlanta, GA.
- Oct 2023** AMS Southeastern Sectional Meeting, Mobile, AL.
- Mar 2024** AMS Southeastern Sectional Meeting, Tallahassee, FL.
- Jul 2024** Joint AMS–Unione Matematica Italiana Meeting, Palermo, Italy.

Other Conferences Attended

- Jun 2005** Algebraic and Finite Reductive Groups, Lausanne, Switzerland.
- May 2006** Geometry and Representation Theory (Lusztig’s 60th birthday), Cambridge, MA.
- Oct 2009** Combinatorial Lie Theory and Applications (Southeast Lie Theory I), Raleigh, NC (Scientific Committee).
- Oct 2009** Representation Theory and Mathematical Physics (Zuckerman’s 60th birthday), New Haven, CT.
- Jan 2010** Joint Mathematics Meetings, San Francisco, CA.
- Jan 2011** Joint Mathematics Meetings, New Orleans, LA.
- Jun 2011** Finite and Algebraic Groups (Southeast Lie Theory III), Charlottesville, VA.
- Jan 2012** Joint Mathematics Meetings, Boston, MA.
- Jun 2012** Cohomology bounds and growth rates, American Institute of Mathematics workshop, Palo Alto, CA (invited).
- Jan 2013** Joint Mathematics Meetings, San Diego, CA.
- Jan 2014** Joint Mathematics Meetings, Baltimore, MD.
- Jan 2015** Joint Mathematics Meetings, San Antonio, TX.
- Jan 2016** Joint Mathematics Meetings, Seattle, WA.
- May 2016** Algebraic Groups, Quantum Groups and Geometry (Southeast Lie Theory IX), Charlottesville, VA.
- Jan 2017** Joint Mathematics Meetings, Atlanta, GA.
- Jan 2018** Joint Mathematics Meetings, San Diego, CA.
- Jun 2018** Southeast Lie Theory Workshop X, Athens, GA.
- Jan 2019** Joint Mathematics Meetings, Baltimore, MD.
- Jun 2019** Joint AMS–Vietnamese Mathematical Society Meeting, Quy Nhon, Vietnam.
- Jan 2020** Joint Mathematics Meetings, Denver, CO.

Special Honors Received For Academic Achievement

- 2009–2012** McCay Award (for distinguished research, teaching and service), Department of Mathematics, University of Georgia

Professional Service

- 2009–2011** Scientific Committee, Southeastern Lie Theory Network
- 2013–** AMS Associate Secretary for the Southeastern Section
- 2013–** AMS Secretariat
- 2013–** AMS Abstracts Editorial Committee
- 2013–** AMS Council (ex officio)
- 2014–2018** Mathematical Council of the Americas (AMS representative)
- 2015–2017** Chair, Mathematical Congress of the Americas 2017 Special Sessions Subcommittee
- 2015–2017** Mathematical Congress of the Americas 2017 Organizing Committee
- 2016–2017** AMS Program Committee for National Meetings
- 2017–2019** AMS-Vietnamese Mathematical Society Joint Meeting Program Committee (co-chair)
- 2019–2020** AMS Joint Meetings Planning Committee Codes Subcommittee (to design a new system of codes to supplement Math Subject Classification Numbers for classification of “MAA-type” abstracts and session proposals once MAA withdraws from being a co-organizer of the JMM in 2022, and AMS becomes solely responsible for handling these abstracts and sessions)
- 2020–2021** AMS Program Committee for National Meetings
- 2020–2021** AMS Committee for Special Sessions and Contributed Paper Sessions (for JMM2022)

University Committees

Served on College of Arts & Science Faculty Senate, two Senate subcommittees, College Promotion and Tenure Committee, College Computer Committee, and Faculty Research Grant Awards Committee.

Departmental Administration

- 2007–2013** Graduate Coordinator
- 2009–** MSRI Sponsor Institution Representative

Dissertations Directed

- 2005–2008** Kenyon J. Platt, University of Georgia, graduated May 2008.
Thesis: Classifying the Representation Type of Infinitesimal Blocks of Category \mathcal{O}_S .
Obtained 2-year Visiting Assistant Professorship at Brigham Young University, Utah.
Now has faculty positions at Utah Valley University and Brigham Young University.

Masters Theses Directed

- 2020** Matthew Hamil (co-advisor with Arik Wilbert), University of Georgia, graduated August 2020. Thesis: On parabolic Kazhdan–Lusztig polynomials.
Admitted to the Mathematics PhD program at UGA, Fall 2020.

Advisory Committees and Mentoring

Served on advisory committees of over 65 Doctoral and Masters students in Mathematics and Mathematics Education since 1989. Teaching mentor for three graduate students, three postdocs, and one assistant professor. Research mentor for two postdocs and one assistant professor. C-sponsor and co-research mentor for visiting scholar Tiago Macedo.

Courses Taught

At University of Georgia, I have taught: trigonometry, calculus (all levels), differential equations, introductory linear algebra, applied linear algebra, sequences and series, introduction to higher mathematics, abstract algebra, advanced linear algebra, advanced calculus, point set topology, combinatorics, graph theory, foundations of geometry, foundations for graduate mathematics, graduate algebra, commutative algebra, homological algebra, Lie algebras, Lie groups, and various graduate topics courses.

Prepared: July 2022