

# Clifton L.R. Cunningham

## Curriculum Vitae

### Field of Research

Langlands Programme **Algebraic Geometry, Representation Theory & Number Theory**, *admissible and automorphic representations*, perverse sheaves, geometrization & categorification of the Langlands programme.

### Research Group

Voganish Project **Lead**, *The Voganish project seeks to geometrize and categorify parts of the local Langlands program building on ideas introduced by David Vogan.*, The project is collaborative and international.  
Website: <http://automorphic.ca>

### Academic appointments and visiting positions

- 2020.07 – **University of Calgary**, *Professor*, Department of Mathematics & Statistics.
- 2020.07 – 2025.06 **University of Calgary**, *Associate Dean*, Faculty of Graduate Studies.
- 2018.08 – 2020.07 **University of Calgary**, *Associate Head and Graduate Programme Director*, Department of Mathematics & Statistics.
- 2015.09 – 2018.04 **University of Toronto**, *Associate Professor (status appointment)*, Department of Mathematics.
- 2012.05 – 2012.08 **Centre National de la Recherche Scientifique (CNRS)**, *Poste Rouge*, Institut de Mathématiques de Jussieu, Université Pierre et Marie Curie (Paris 6).
- 2008.09 – 2015.12 **Pacific Institute for the Mathematical Sciences (PIMS)**, *Site Director*, University of Calgary.
- 2005.09 – 2005.12 **Institut des Hautes Études Scientifiques (IHES)**, *Visiteur*, Bures-sur-Yvette.
- 2005.08 – 2020.06 **University of Calgary**, *Associate Professor*, Department of Mathematics & Statistics.
- 2001.05 – 2001.06 **Centre National de la Recherche Scientifique (CNRS)**, *Chercheur Associé*, Institut de Mathématiques de Jussieu, Université Pierre et Marie Curie (Paris 6).
- 2000.08 – 2005.07 **University of Calgary**, *Assistant Professor*, Department of Mathematics & Statistics.
- 2000.01 – 2000.02 **Ecole Normale Supérieure, Paris (ENS)**, *Professeur Invité*, Département de Mathématiques.

- 1998.08 – 2000.07 **University of Massachusetts**, *Visiting Assistant Professor*, Department of Mathematics.
- 1997.09 – 1998.05 **University of Toronto**, *Research Fellow*, Department of Mathematics.
- 1994.09 – 1996.05 **Trinity College**, *Don of Mathematics*, University of Toronto.

## Education

- 1997 **Ph.D.**, *University of Toronto*, Supervisor: James Arthur, PhD thesis: The Characters of Depth-zero Supercuspidal Representations of  $\mathrm{Sp}(4)$ .  
<http://hdl.handle.net/1807/10636>
- 1992 **M.Sc.**, *University of Toronto*, Supervisor: V. Kumar Murty, MSc project: edited *Introduction to Abelian Varieties*, Kumar Murty, CRM Monograph Series, **3** 1993.  
 ISBN: 0-8218-6995-7

## Publications

- 2021 **Arthur packets for  $p$ -adic groups by way of microlocal vanishing cycles of perverse sheaves, with examples**, *Clifton Cunningham, Andrew Fiori, Ahmed Moussaoui, James Mracek, Bin Xu*, *Memoirs of the American Mathematical Society*, (2021, in press).  
<https://arxiv.org/abs/arXiv:1705.01885>
- (preprint) **Arthur packets for  $G_2$  and perverse sheaves on cubics**, *Clifton Cunningham, Andrew Fiori & Qing Zhang*.  
<https://arxiv.org/abs/2005.02438>
- (in revision) **Commutative character sheaves and geometric types for supercuspidal representations**, *Clifton Cunningham & David Roe*, *Annales Henri Lebesgue*.  
<https://arxiv.org/abs/1605.08820>
- (in revision) **Lifts of Hilbert modular forms and application to a Conjecture of Gross**, *Clifton Cunningham & Lassina Dembélé*, *Mathematical Research Letters*.  
<https://arxiv.org/abs/1705.03054>
- (in preparation) **Arthur packets for unipotent representations of  $p$ -adic  $G_2$** , *Clifton Cunningham, Andrew Fiori & Qing Zhang*.
- 2018 **From the function-sheaf dictionary to quasicharacters of  $p$ -adic tori**, *Clifton Cunningham & David Roe*, *Journal of the Institute of Mathematics of Jussieu*, **17** (2018) no. 1, pp. 1–37.  
<http://dx.doi.org/10.1017/S1474748015000286>
- 2015 **A note on  $L$ -packets and abelian varieties over local fields**, *Jeffrey D. Achter & Clifton Cunningham*, *Pacific Journal of Mathematics*, **273** (2015) no. 2, pp. 395–412.  
<http://dx.doi.org/10.2140/pjm.2015.273.395>
- 2013 **Geometrization of continuous characters of  $\mathbb{Z}_p^\times$** , *Clifton Cunningham & Masoud Kamgarpour*, *Pacific Journal of Mathematics*, **261** (2013) no.1, pp. 95–99.  
<http://dx.doi.org/10.2140/pjm.2013.261.95>

- 2012 **Geometrization of Smooth Characters**, *Pramod Achar, Clifton Cunningham, Masoud Kamgarpour, David Roe & Hadi Salmasian*, Joint final report: Mathematisches Forschungsinstitut Oberwolfach (MFO), 2011.07 . Research in Pairs and Banff International Research Station (BIRS) 2012.05 Focused Research Group, Oberwolfach, Germany and Banff, Alberta.  
<http://www.birs.ca/workshops/2012/12frg163/report12frg163.pdf>
- 2011 **L-packets**, *Clifton Cunningham, Colette Mœglin & Vinayak Vatsal*, Final report on Banff International Research Station (BIRS) 5-day workshop, 2011.06, Banff, Alberta.  
<http://www.birs.ca/workshops/2011/11w5100/report11w5100.pdf>
- 2011 **On the computability of some positive-depth characters near the identity**, *Raf Cluckers, Clifton Cunningham, Julia Gordon & Loren Spice*, *Representation Theory*, **15** (2011), pp. 531–567.  
<http://dx.doi.org/10.1090/ert/2011-15-15/S1088-4165-2011-00403-9>
- 2010 **Toward a Mackey formula for compact restriction of character sheaves**, *Pramod Achar & Clifton Cunningham*, *Contemporary Mathematics*, **543** (2010), pp. 1–18.  
<http://dx.doi.org/10.1090/conm/543>
- 2009 **Ottawa Lectures on Admissible Representations of Reductive  $p$ -adic Groups**, *Clifton Cunningham & Monica Nevins, editors*, *Fields Institute Monograph Series*, **26** (2009).  
 ISBN: 978-0-8218-4493-9
- 2009 **Computation of genus 2 Hilbert-Siegel modular forms over  $\mathbb{Q}(\sqrt{5})$  via the Jacquet-Langlands Correspondence**, *Clifton Cunningham & Lassina Dembélé*, *Experimental Mathematics*, **18** no.3 (2009), pp. 337–345.  
<http://projecteuclid.org/euclid.em/1259158470>
- 2009 **Motivic proof of a character formula for  $SL(2)$** , *Clifton Cunningham & Julia Gordon*, *Experimental Mathematics*, **18** no.1 (2009), pp. 11–44.  
<http://projecteuclid.org/euclid.em/1243430527>
- 2008 **Report from the Ambassador to Cida-2**, *Clifton Cunningham*, *College Mathematics Journal*, **39** no. 5 (2008), pp. 337–345.  
<http://www.jstor.org/stable/27646679>
- 2004 **Good Orbital Integrals**, *Clifton Cunningham & Thomas Hales*, *Representation Theory*, **8** (2004), pp. 414–457.  
<http://dx.doi.org/ert/2004-008-16/S1088-4165-04-00220-1>
- 2002 **Isogeny classes of Hilbert-Blumenthal abelian varieties over finite fields**, *Jeffrey D. Achter & Clifton L.R. Cunningham*, *The Journal of Number Theory*, **92** no. 2 (2002), pp. 272–303.  
<http://dx.doi.org/10.1006/jnth.2001.2716>
- 2000 **Characters of depth-zero, supercuspidal representations of the rank-2 symplectic group**, *Clifton Cunningham*, *The Canadian Journal of Mathematics*, **52** no. 2 (2000), pp. 306–331.  
<http://dx.doi.org/10.4153/CJM-2000-014-3>
- 1997 **The characters of depth-zero supercuspidal representations of  $Sp(4)$** , *Clifton Cunningham*, Ph.D. thesis, University of Toronto.  
<http://hdl.handle.net/1807/10636>

---

## Invited presentations

- 2020.09 **Fields Institute, Toronto**, *Number Theory Seminar*, Arthur packets of unipotent representations the  $p$ -adic exceptional group  $G_2$ .  
<http://www.fields.utoronto.ca/talks/Arthur-packets-unipotent-representations-p-adic-exceptional-group-G2>. A recording of the talk is posted here.
- 2020.04 **Massachusetts Institute of Technology, Boston**, *Lie Theory Seminar*, Arthur packets for  $G(2)$  and perverse sheaves on cubics.  
<https://mathseminars.org/seminar/MITLie>. A recording of the talk is posted here.
- 2020.02 **University of Alberta, Edmonton**, *Geometry, Algebra and Physics Seminar*, The Kashiwara-Saito singularity in the local Langlands correspondence.  
<https://www.ualberta.ca/science/events/math/5obp6fofqaqr94kejjj51lcj9f>
- 2019.11 **University of Toronto**, *Number/Representation Theory Seminar*, The geometry of Arthur packets for  $p$ -adic groups.  
Abstract
- 2019.11 **University of British Columbia, Vancouver**, *Lie Theory Seminar*, The geometry of Arthur packets for  $p$ -adic groups.  
Abstract:
- 2019.03 **University of Alberta, Edmonton**, *Number Theory/Representation Theory Seminar*, The geometry of local Arthur packets.  
Abstract
- 2018.12 **MATRIX Mathematical Institute, Australia**, *Geometric and Categorical Representation Theory*, The geometry of local Arthur packets, Creswick.  
<https://www.matrix-inst.org.au/events/geometric-and-categorical-representation-theory/>
- 2017.05 **Mathematisches Forschungsinstitut Oberwolfach (MFO), Germany**, *Harmonic Analysis and the Trace Formula*, Arthur packets and Adams-Barbash-Vogan packets for  $p$ -adic groups, joint presentation with Bin Xu.  
<https://www.mfo.de/occasion/1721/>
- 2016.06 **Canadian Mathematical Society**, *Representation Theory Session*, Lifts of Hilbert modular forms and applications to a conjecture of Gross, Edmonton.  
Joint work with Lassina Dembele
- 2016.06 **Canadian Mathematical Society**, *Computational Number Theory Session*, Lifts of Hilbert modular forms and applications to a conjecture of Gross, Edmonton.  
Joint work with Lassina Dembele
- 2015.10 **Institute for Computational and Experimental Research in Mathematics (ICERM), Providence RI**, *Testing automorphicity of lifts of Hilbert modular forms*, Explicit Methods for Modularity of K3 Surfaces and Other Higher Weight Motives, Brown University, Providence, Rhode Island.
- 2015.07 **Banff International Research Station (BIRS)**, *Lifting Hilbert modular forms to spin modular forms*, Alberta Number Theory Days VII, Banff, Alberta.
- 2015.05 **Pacific Institute for the Mathematical Sciences (PIMS)**, *Automorphic Abelian Varieties*, Collaborative Research Group on Explicit Methods for Abelian Varieties.

- 2014.06 **Banff International Research Station (BIRS)**, *Progress toward the geometrization of admissible distributions on  $p$ -adic groups*, Workshop on the The Future of Trace Formulas, Banff, Alberta.
- 2014.05 **University of Saskatchewan, Saskatoon**, *Lost in Translation: The function-sheaf dictionary for smooth commutative group schemes over finite fields*, Colloquium, Department of Mathematics and Statistics.
- 2013.12 **Canadian Mathematical Society**, *A function–sheaf dictionary for algebraic tori over local fields*, Ottawa.
- 2013.06 **Second Congress of the Pacific Rim International Mathematics Association (PRIMA), Shanghai**, *Geometric reciprocity for algebraic tori over non-Archimedean local fields*, Session on Representation Theory and Categorification.
- 2013.05 **Banff International Research Station (BIRS)**, *L-packets attached to abelian surfaces*, Alberta Number Theory Days V, Banff, Alberta.
- 2013.05 **American Institute of Mathematics**, *Abelian varieties and L-packets*, Workshop on Algorithms for lattices and algebraic automorphic forms.
- 2012.12 **Canadian Mathematical Society**, *A geometric and categorical description of complete Langlands parameters for quasi-split  $p$ -adic groups*, Montreal.
- 2012.06 **École Normale Supérieure de Lyon**, *Caractères et faisceaux caractères: le cas des tores  $p$ -adiques non-ramifiés*.
- 2011.06 **Canadian Mathematical Society**, *Geometrization of two stably-conjugate, self-dual distributions on  $p$ -adic  $sl(2)$* , Session on Lie Theory, Edmonton.
- 2010.12 **Canadian Mathematical Society**, *Geometrization of characters of the multiplicative group of  $p$ -adic numbers*, Session on  $p$ -adic groups, Automorphic forms and Geometry, University of British Columbia, Vancouver.
- 2010.03 **Banff International Research Station (BIRS)**, *Some remarkable L-packets*, Alberta Number Theory Days IV, Banff, Alberta.
- 2010.02 **Amherst College**, *Why might a number theorist care for character sheaves?*, Five College Number Theory Seminar.
- 2010.01 **American Mathematical Society National Meeting**, *Toward a Mackey formula for compact restriction of character sheaves*, Session on Harmonic analysis and representation theory of reductive  $p$ -adic groups, San Francisco.
- 2009.12 **Canadian Mathematical Society**, *Compact Restriction of Perverse Sheaves*, Session on Lie Groups and Automorphic Forms, University of Windsor.
- 2009.08 **Second Canadian Mathematical Society/Sociedad Matemática Mexicana Congress**, *Character sheaves over local fields: the example  $SL(2)$* , Session on Algebra, University of British Columbia, Vancouver.
- 2009.05 **Fields Institute Workshop on Geometry Related to the Langlands Programme**, *Mini-course on Character Sheaves*, University of Ottawa.
- 2009.02 **Colorado State University**, *Isogeny classes over finite fields and adelic orbital integrals*, Algebra Seminar.
- 2008.11 **PIMS/Shell Canada Lunchbox Lecture Series**, *The Elementary Particles of Arithmetic*, Public lecture, Calgary.

- 2008.06 **Deuxième Congrès Canada-France**, *Character sheaves of algebraic groups defined over local fields*, Session on Automorphic Forms, Université du Québec à Montréal.
- 2007.10 **American Mathematical Society**, *Motivic parametrization of restricted orbital integrals*, Session on Automorphic forms: representation theory of  $p$ -adic and adelic groups, DePaul University.
- 2007.03 **Quebec-Vermont Number Theory Seminar**, *Remarkable properties of some perverse sheaves on  $p$ -adic  $GL(2)$* , McGill University.
- 2006.07 **Banff International Research Station (BIRS)**, *Some examples of automorphic representations*, Pacific Institute for Mathematical Sciences/Universidad Nacional Autónoma de México Algebra Summer School, Banff, Alberta.
- 2005.06 **Canadian Mathematical Society**, *Depth-zero Character Sheaves*, University of Waterloo.
- 2004.09 **University of Alberta**, *Tate's thesis - an introduction to automorphic representations*, Algebra Seminar.
- 2004.08 **Alberta Topology Seminar**, *A gentle introduction to rigid analytic spaces*, Kananaskis.
- 2004.05 **Fields Institute**, *Some remarks on Geometry, Orbital Integrals and Characters*, Workshop on Representations of Reductive Algebraic Groups, University of Ottawa.
- 2004.04 **Harvard University**, *Some remarks on Geometry, Orbital Integrals and Characters*, Number Theory Seminar.
- 2004.04 **Colloquium**, *Localisation and completion in number theory: the field of  $p$ -adic numbers*, University of Lethbridge, Department of Mathematics & Computer Science.
- 2003.03 **University of Notre Dame**, *Geometric aspects of representations of  $p$ -adic groups*, Representation Theory Seminar, Sam Evans, org.
- 2002.11 **Colloquium**, *Orbital Integrals in Number Theory*, University of Alberta, Department of Mathematics & Statistics.
- 2002.03 **University of Pittsburgh**, *Pittsburgh  $p$ -adic fest hosted by Thomas Hales*.
- 2001.12 **Colloquium**, *Geometry and representations of  $p$ -adic groups*, University of Ottawa, Department of Mathematics & Statistics.
- 2001.08 **NATO Advanced Research Workshop on Topological Quantum Field Theory**, *Representations of affine groups in the cohomology of rigid analytic spaces*, University of Calgary.
- 2001.06 **Université de Paris VII, Jussieu (Chevaleret)**, *Sheaves on adic groups for  $p$ -adic representation theory*, journées de solstice d'été, Anne-Marie Aubert, org.
- 2000.05 **University of Toronto**, *Character sheaves on rigid analytic spaces for  $p$ -adic group representation theory, preliminary report*, Lie Algebras and Number Theory Seminar.
- 2000.03 **University of Massachusetts**, *Isogeny classes of Hilbert-Blumenthal abelian varieties over finite fields*, Five College Number Theory Seminar, University of Massachusetts.

- 2000.02 **Yale University**, *An elliptic character expansion for supercuspidal representations*, Lie Groups Seminar.
- 2000.01 **École Normale Supérieure Paris**, *An elliptic character expansion for supercuspidal representations*, Groupe de travail: séminaire sur types.
- 1998.06 **Centre International de Rencontres Mathématiques**, *Characters of depth-zero, supercuspidal representations*, Analyse harmonique sur le groupe  $p$ -adique  $\mathrm{Sp}(4)$ , Luminy.
- 1999.11 **University of Toronto**, *An elliptic character expansion for supercuspidal representations*, Lie Algebras and Number Theory Seminar.
- 1999.02 **Amherst College**, *Counting curves with Kottwitz*, Five College Number Theory Seminar, University of Massachusetts.
- 1998.02 **University of Michigan**, *The Fourier transform and stability*, Lie Theory Seminar.
- 1997.06 **University of Chicago**, *Characters of some depth-zero representations*, Representation Theory Seminar, Paul Sally, org.

## Major grants

### National Sciences and Engineering Research Council (NSERC)

- 2020 – 2025 **Discovery Grant**, *Categorical consequences of the microlocal perspective on Arthur packets for  $p$ -adic groups*, Principal Investigator.
- 2015 – 2020 **Discovery Grant**, *Geometrization of Admissible Distributions and the Local Langlands Conjecture*, Principal Investigator.
- 2014 – 2019 **Collaborative and Thematic Resources Support in Mathematics and Statistics (CTRMS)**, *Grant to the Pacific Institute for the Mathematical Sciences*, co-Principal Investigator.
- 2010 – 2015 **Discovery Grant**, *Endoscopic Transfer of Character Sheaves*, Principal Investigator.
- 2005 – 2010 **Discovery Grant**, *Character Sheaves for  $p$ -adic Groups*, Principal Investigator.
- 2000 – 2005 **Discovery Grant**, *Geometric Techniques for  $p$ -adic group representation theory*, Principal Investigator.

### Pacific Institute for Mathematical Sciences (PIMS)

- 2015 – 2017 **Collaborative Research Group**, *Explicit Methods for Abelian Varieties*, member.
- 2010 – 2013 **Collaborative Research Group**,  *$L$ -functions and Number Theory*, co-Principal Investigator.
- 2005 – 2007 **Collaborative Research Group**, *Algebraic Geometry, Galois Cohomology and Representation Theory*, member.

### Alberta Ministry of Advanced Education and Technology

- 2014 – 2017 **Grant to the Pacific Institute for the Mathematical Sciences**, *co-Principal Investigator*.
- 2010 – 2013 **Grant to the Pacific Institute for the Mathematical Sciences**, *co-Principal Investigator*.

---

## Postdoctoral supervision

- 2018.09 – (current) **Qing Zhang**, *Cubic unipotent representations and their Arthur packets for  $G(2)$* , Pacific Institute for Mathematical Sciences Postdoctoral Fellow at the University of Calgary.
- 2016.08 – 2017.02 **Geo Kam-Fai Tam**, *Types for coronal representation*, Postdoctoral Fellow at the University of Calgary.  
Current position: Visiting Assistant Professor, Radboud University, Netherlands
- 2015.09 – 2017.08 **Bin Xu**, *A geometric approach to Arthur packets*, Pacific Institute for Mathematical Sciences Postdoctoral Fellow at the University of Calgary.  
Current position: Assistant Professor, Yau Mathematical Science Center, Tsinghua University, Beijing
- 2015.09 – 2017.08 **Ahmed Moussaoui**, *Induction of parameter sheaves*, Pacific Institute for Mathematical Sciences Postdoctoral Fellow at the University of Calgary.  
Current position: Maître de Conference, Université de Poitiers
- 2015.09 – 2017.08 **Andrew Fiori**, *The algebraic geometry of Morse fibres*, Pacific Institute for Mathematical Sciences Postdoctoral Fellow at the University of Calgary.  
Current position: Assistant Professor, University of Lethbridge
- 2011.09 – 2014.08 **David Roe**, *The function-sheaf dictionary for smooth commutative group schemes over finite fields and the geometrization of quasicharacters of  $p$ -adic tori*, Pacific Institute for Mathematical Sciences Postdoctoral Fellow at the University of Calgary.  
Current position: Research Scientist, Massachusetts Institute of Technology (MIT), Boston
- 2010.09 – 2011.07 **Masoud Kamgarpour**, *Geometrization of continuous characters of  $\mathbb{Z}_p^*$* , University of Calgary.  
Current position: Lecturer in mathematics at the University of Queensland in Brisbane, Australia
- 2005.08 – 2007.08 **Lassina Dembélé**, *Hilbert-Siegel Modular Forms and automorphic representations*, Pacific Institute for Mathematical Sciences Postdoctoral Fellow at the University of Calgary.

---

## Students

### Doctoral

- 2016 – (current) **Geoff Voys**, *University of Calgary*, A site on formal schemes corresponding to the étale site on the Greenberg transform.  
Expected completion: 2020
- 2013.09 – 2017.10 **James Mracek**, *University of Toronto*, Applications of algebraic microlocal analysis in symplectic geometry and representation theory (co-supervised with Lisa Jeffrey), Using D-modules, calculated micropackets for admissible representations of  $SL(n)$ ,  $PGL(n)$ ,  $Sp(2n)$  and  $SO(2n+1)$  with regular infinitesimal characters.  
Current position: Amazon, San Francisco
- 2015.09 – 2018.08 **Majid Shahabi**, *University of Calgary*, Smooth Integral Models for Certain Congruence Subgroups of Odd Spin Groups.  
Current position: Sessional lecturer, University of Lethbridge



- 2014.05 – 2015.04 **Jason Nicholson**, *Motivic parameterization of conjugacy classes of regular semisimple equivalued elements in  $p$ -adic  $G_2$* , (2005.05 – 2010.05, then withdrew from the program for medical reasons, resumed thesis 2014.09 – 2015.04).
- 2007-09 – 2012.08 **Aaron Christie**, *Galois Actions on  $\ell$ -adic Local Systems and Their Nearby Cycles: A Geometrization of Fourier Eigendistributions on the  $p$ -adic Lie Algebra  $sl(2)$* .  
Current position: Cryptanalyst, Canadian Security Establishment, Tutte Institute, Ottawa  
[Masters](#)
- 2019.09 – (current) **James Steele**, Koszul duality of a category of perverse sheaves.  
Expected completion: 2020.07
- 2019.09 – (current) **André de Waal**, Koszul duality of a category of graded Hecke modules.  
Expected completion: 2020.07
- 2013.09 – 2015.08 **Adam Gerlings**, *Constructions of Galois Categories*, Co-supervised with Kristine Bauer.  
Current: PhD candidate at Ontario Institute for Studies in Education (OISE)
- 2012.09 – 2014.08 **Marie-Andrée Langlois**, *An Elliptic Curve Over  $\mathbb{Q}$  has an Isogenous Quadratic Twist if and Only if it has Complex Multiplication*.
- 2011.09 – 2013.02 **Tristan Jugdev**, *A Modern Introduction to Algebraic Goodwillie Calculus*, co-supervised with Kristine Bauer.  
Current position: Software Developer at Arterys, Calgary
- 2010.09 – 2012.08 **Milad Sabeti**, *Edwards form for elliptic curves*, co-supervised with Mark Bauer.
- 2006.09 – 2008.08 **Ryan Stratford**, *Examples of  $\ell$ -adic Tate modules and Galois representations*.
- 2004.09 – 2006.08 **Aaron Christie**, *The Adic Drinfeld Space for  $GL(2)$* .
- 2003.09 – 2005.09 **Tracy Walker**, *Points on Affinoid Adic Spaces*.
- 2001.09 – 2003.12 **Brendan Oseen**, *Isomorphism and Isogeny of Elliptic Curves, with Examples*, co-supervised with R. Scheidler.
- [Undergraduate Summer Research Students](#)
- 2019.05 – 2019.08 **Nicole Kitt**, *Characteristic cycles of the Kashiwara-Saito singularity*.  
Current position: MSc student in Mathematics at the University of Waterloo
- 2018.05 – 2018.07 **Nicole Kitt**, *Orbit duality in quiver representation varieties*.
- 2018.05 – 2018.07 **Reginald Lybbert**, *Computation of characteristic cycles of perverse sheaves on Vogan varieties*.  
Current position: MSc student at McGill University
- 2017.05 – 2017.08 **Reginald Lybbert**, *Perverse sheaves on Vogan varieties*.
- 2013.05 – 2013.08 **Samuel Reid**, *Weak Neron Models for nilpotent orbit varieties*.  
Current position: CEO Geometric Energy
- 2011.05 – 2011.08 **Tristan Jugdev**, *Elementary Examples in Motivic Cohomology*.
- 2010.05 – 2010.08 **Tristan Jugdev**, *Galois Cohomology with a view to Global Class Field Theory*.
- 2010.05 – 2010.08 **Adrian Keet**, *The Hecke algebras of Quantum Information and adelic Hilbert spaces*.  
Current position: Software Engineer at Nvidia Corporation, California
- 2006.05 – 2006.08 **Colin Grabowski**, *Local Class Field Theory*.

- 2006.05 – 2006.08 **Tom Kuwahara**, *Deligne-Lusztig varieties*.
- 2003.05 – 2003.08 **Paul Dickinson**, *Quantum Fourier Transform and  $p$ -adic analysis*.
- 2003.05 – 2003.08 **Patrick Walls**, *Models for Modular Curves*.  
Current position: Instructor, University of British Columbia
- 2002.05 – 2002.08 **Vladimir Papish**, *Iwahori-Hecke Algebras*.

---

## Other contributions to HQP

### Ph.D. External Examiner

- 2020 **Bich-Ngoc Cao (Athena) Nguyen**, *Department of Mathematics, University of British Columbia*, Supervisor: Julia Gordon, Thesis: Equivariant extensions of distributions on GLN.
- 2009 **Iyad Abu Ajamieh**, *Department of Physics and Astronomy, University of Calgary*, Thesis: Optical Properties of Driven Dense Atomic Gases.
- 2008 **Mark Adcock**, *Department of Mathematics, University of Calgary*, Supervisor: Gilad Gour, Topic: Continuous Variable Quantum Algorithms.  
Oral candidacy exam passed 22 October 2008

### Ph.D. Supervisory Committee Member

- 2013 **Colin Weir**, *Department of Mathematics, University of Calgary*, Supervisor: Renate Scheidler, Thesis: Efficient algorithms for constructing and tabulating quartic function fields with any given ramification divisors.
- 2012 **Brett Giles**, *Department of Computer Science, University of Calgary*, Supervisor: Robin Cockett, Thesis: Categorical Semantics of Quantum Computing.
- 2012 **Syd Lavassani**, *Department of Mathematics, University of Calgary*, Supervisor: Mark Bauer, Thesis: Constructibility and Existence of Covers for Varieties with prescribed Automorphisms and Ramification Suitable for Cryptographic Purposes.
- 2012 **Sarah Chisholm**, *Department of Mathematics, University of Calgary*, Supervisor: Mark Bauer, Topic: Algebraic Number Theory.
- 2011 **Matthew Musson**, *Department of Mathematics, University of Calgary*, Thesis: On Curves in the Weil Restriction of Elliptic Curves.
- 2010 **Shawn McCann**, *Department of Mathematics, University of Calgary*, Supervisor: Berndt Brenken, Topic: Operator Algebras.
- 2009 **Pieter Rozenhart**, *Department of Mathematics, University of Calgary*, Thesis: Fast Tabulation of Cubic Function Fields.
- 2007 **Jonathan Eugene Webster**, *Department of Mathematics, University of Calgary*, Thesis: Cubic Function Fields in Characteristic Three.

### M.Sc. Supervisory Committee member

- 2020 **Kuntal Sengupta**, *Department of Mathematics, University of Calgary*, Supervisor: Gilad Gour, Thesis: Dynamic Bell Nonlocality.
- 2018 **Rachel Hardeman**, *Department of Mathematics, University of Calgary*, Supervisor: Kristine Bauer, Thesis: Lifting Properties in Graph Homotopy Theory.

- 2015 **German Luna**, *Department of Mathematics, University of Calgary*, Supervisor: Kristine Bauer, Thesis: The relation between one-dimensional persistence and multi-dimensional persistence.  
Current position: Data scientist, Lockheed Martin, Calgary
- Amy Cheung**, *Department of Mathematics, University of Calgary*, Supervisor: Mark Bauer.
- 2010 **Yuval Sanders**, *Department of Mathematics, University of Calgary*, Supervisor: Gilad Gour, Thesis: Resource Theories in Quantum Information.
- [M.Sc. External Examiner](#)
- 2010 **Saleh Rahimi Keshari**, *Department of Physics and Astronomy, University of Calgary*, Supervisor: Barry Sanders, Thesis: Quantum process tomography with coherent states.
- 2009 **Nitin Jain**, *Department of Physics and Astronomy, University of Calgary*, Supervisor: Alex Lvovsky, Thesis: Quantum optical state engineering at few-photon level.
- 2009 **Hanieh Mehrabani-Yeganeh**, *Department of Geoscience, University of Calgary*, Thesis: A review of Refraction Statics Correction methods with comparison and study of Generalized Linear Inversion and Tomography processing for reflection seismic data with examples from British Columbia.
- 2006 **Shantha Rose Ramachandran**, *Department of Computer Science, University of Calgary*, Thesis: Numerical Results on Class Groups of Imaginary Quadratic Fields.
- 2005 **Kristopher H. Luttmmer**, *Department of Computer Science, University of Calgary*, Thesis: The Complexity of Separability Testing.
- 2003 **Shahab Shahabi**, *Department of Mathematics, University of Lethbridge*, Supervisor: Amir Akbary, Thesis: On the vanishing of certain L-functions.
- 2003 **Jonathan Neil de Beaudrap**, *Department of Computer Science, University of Calgary*, Topic: Applying Quantum Information.

---

## Outreach

- 2018.09 **Mathematics and Language**, Seven Languages, University of Calgary Alumni Event.  
<https://www.ucalgary.ca/alumniweekend/headliners>
- 2017.03 **Pi Day, Beakerhead**, *Crave Cupcakes*.  
<http://beakerhead.org>
- 2013.09 **Science Busker, Beakerhead**, *Spin*, designed and demonstrated a Beakerhead 4-6 Event exhibit showing  $\pi_1(SO(3)) = \mathbb{Z}/2\mathbb{Z}$  on Stephen Avenue, downtown Calgary.  
<http://beakerhead.org>
- 2008.09 – 2009.06 **University School Math Club**, Calgary.
- 2008.03 **Society of Calgary Undergraduate Mathematics Students (SCUM)**, *Spin*, University of Calgary.
- 2008.02 **Garbanzo the Mathemagician**, *presentation to Grade 2 students at University Elementary School*, Calgary.

- 2007.07 **Canadian Mathematical Society Math Camp**, *Report from the Ambassador to Cida-2*, University of Calgary.
- 2007.05 **Garbanzo the Mathemagician**, *presentation to Grade 1 students at Edelweiss Elementary School*, Calgary.
- 2007.03 **Society of Calgary Undergraduate Mathematics Students (SCUM)**,  $-1 = 1 + 2 + 4 + 8 + 16 + \dots$ , Calgary.
- 2003.04 **Chaos in Arcadia: Mathematics in Tom Stoppard's plays**, *presentation for students of English Literature*, University of Calgary.
- 2002.07 **Calculus for number theory: An introduction to  $p$ -adic numbers**, *plenary talk at the Canadian Undergraduate Mathematics Conference*, University of Calgary.
- 2001.11 **How to survive calculus**, *Residence Prof Night*, University of Calgary.
- 1996.04 **Greetings from Planet Aiag**, *Presentation to secondary school students*, University of Toronto Day.
- 1995.03 **The Double Pendulum: An introduction to Chaos**, *Don's Night*, Trinity College (University of Toronto).
- 1994.03 **An Evening with Foucault's Pendulum**, *Don's Night*, Trinity College (University of Toronto).

---

## Service

### Conferences and workshops organized

- 2019.07 **Banff International Research Station (BIRS)**, *Focused Research Group*, The Voganish Project.  
<http://www.birs.ca/events/2019/focussed-research-groups/19frg277>
- 2019.08 **Banff International Research Station (BIRS)**, *Focused Research Group*, Microlocal Geometry of Langlands Parameter Spaces for  $p$ -adic Groups.  
<http://www.birs.ca/events/2018/focussed-research-groups/18frg237>
- 2016.05 **Canadian Number Theory Association (CNTA)**, *Scientific Committee*, University of Calgary.
- 2015.12 **Canadian Mathematical Society**, *Session on Representation Theory*, joint with David Roe, Montreal.
- 2014.10 **Pacific Institute for the Mathematical Sciences**, *Masterclass on Shimura Varieties*, lectures by Patrick Walls, University of Calgary.
- 2014.04 **Banff International Research Station (BIRS)**, *Alberta Number Theory Days VI*, with Habiba Khadiri and Soroosh Yazdani.  
<https://www.birs.ca/events/2014/2-day-workshops/14w2192>
- 2013.05 **Second Congress of the Pacific Rim International Mathematics Association (PRIMA)**, *Session on Number Theory and Representation Theory*, joint with V. Vatsal (UBC) and A. Ichino (RIMS, Kyoto), Shanghai.  
<http://www.primath.org/congress/2013>

- 2013.05 **Banff International Research Institute (BIRS)**, *Focused Research Group on Geometrization of smooth characters*, joint with Pramod N. Achar (Louisiana State University), Masoud Kamgarpour (Queensland) and Hadi Salmasian (Universit d'Ottawa).  
<https://www.birs.ca/events/2012/focussed-research-groups/12frg163>
- 2011.06 **Banff International Research Institute (BIRS)**, *Workshop on L-packets*, joint with V. Vatsal (UBC) and C. Moeglin (Jussieu).  
<https://www.birs.ca/events/2011/5-day-workshops/11w5100>
- 2011.06 **Canadian Mathematical Society**, *Session on L-functions and Number Theory*, joint with Matthew Greenberg, University of Alberta, Edmonton.
- 2010.12 **Canadian Mathematical Society**, *Session on p-adic groups, automorphic forms and geometry*, joint with Julia Gordon (UBC), University of British Columbia, Vancouver.
- 2009.12 – 2013.04 **West End Number Theory Seminar**, *web-based seminar held simultaneously at the University of Alberta, the University of British Columbia, the University of Calgary and the University of Lethbridge*.
- 2009.04 **Fields Institute**, *Workshop on geometry related to the Langlands Programme*, joint with Monica Nevins (UOttawa), University of Ottawa.  
<http://www.fields.utoronto.ca/programs/scientific/08-09/Langlands/>
- 2008.10 **American Mathematical Society**, *Session on L-functions, Automorphic Forms and Representations*, joint with Julia Gordon (UBC), University of British Columbia, Vancouver.
- 2007.01 **Fields Institute**, *Workshop on Representations of Reductive Algebraic Groups*, joint with Monica Nevins (UOttawa), University of Ottawa.  
<http://www.fields.utoronto.ca/programs/scientific/06-07/reductive/>
- 2006.09 – 2009.04 **Automorphic Forms Seminar**, *web-based seminar held simultaneously at the University of Alberta, the University of British Columbia, the University of Calgary and the University of Lethbridge*.  
<http://www.netera.ca/seminars/math/>
- 2006.06 **Canadian Mathematical Society**, *Session on L-functions, Automorphic Forms and Representations*, joint with Amir Akbary (ULethbridge).
- 2002.02 **Pacific Institute for Mathematical Sciences (PIMS)**, *Workshop on Representations of Reductive p-adic Groups*, joint with Fiona Murnaghan (UToronto), Banff, Alberta.  
<http://www.pims.math.ca/science/2002/rrpg/>

### Leadership

- 2018.09 – 2020.07 **Graduate Program Director and Associate Head (Graduate)**, Department of Mathematics and Statistics, University of Calgary.
- 2016.01 – (current) **PIMS Steering Committee**, *member*, University of Calgary.
- 2011.09 – 2015.07 **General Faculties Council**, *member*, University of Calgary.
- 2008.09 – 2015.12 **Pacific Institute for the Mathematical Sciences (PIMS)**, *Site Director*, University of Calgary.
- 2007.07 – 2011.06 **Canadian Mathematical Society**, *Regional Director*.

### Refereeing

- 2015.10 **Simons Symposium Proceedings**, *Springer Verlag*.
- 2015.04 **International Journal of Number Theory**.
- 2014.05 **Electronic Research Announcements in Mathematical Sciences**, *American Institute of Mathematical Sciences*.
- 2013.05 **Canadian Journal of Mathematics**.
- 2012.04 **Canadian Mathematical Bulletin**.
- 2010.04 **Fields Institute Publications**.
- 2007.04 **Cambridge University Press**.
- 2006.04 **Canadian Journal of Mathematics**.
- 2004.04 **Documenta Mathematica**.

### Granting agencies

- 2017, 2009, 2007, 2005 **NSERC Discovery Grant**, *Reviewer*.

---

### References

Available upon request.