

## Emily Cliff

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Sydney Mathematical Research Institute  
The Quadrangle, University of Sydney  
Camperdown NSW 2006  
emily.cliff@sydney.edu.au

**EMPLOYMENT** *Lecturer in Pure Mathematics* July 2019–present  
School of Mathematics and Statistics, University of Sydney, Australia

*J.L. Doob Research Assistant Professor* August 2016–August 2019  
Department of Mathematics, University of Illinois at Urbana–Champaign, USA

*Research Fellow in Geometry and Representation Theory* August 2015–August 2016  
Mathematical Institute, University of Oxford, United Kingdom

**DEGREES** *Doctor of Philosophy, Mathematics* October 2011–September 2015  
University of Oxford, Oxford, United Kingdom

- *Universal  $D$ -modules, and factorisation structures on Hilbert schemes of points*
- Supervised by Kobi Kremnitzer.

*Master of Science, Mathematics* September 2010–August 2011  
University of Toronto, Toronto, Ontario, Canada

- GPA 4.0
- Master's project: *Lie bialgebras following Belavin-Drinfeld*  
Supervised by Dror Bar-Natan and Joel Kamnitzer.

*Bachelor of Arts,* September 2006–April 2010  
*Combined Honours in Mathematics and Linguistics*  
University of Alberta, Edmonton, Alberta, Canada

- First class honours (GPA 4.0)
- Honours thesis: *Type frequency in exemplar-based phonology*  
Supervised by Robert Kirchner, 2009–2010.
- Summer project: *Two-parameter affine Hecke algebras*  
Supervised by Nicolas Guay, 2010.
- Summer project: *Maximal singularities in affine Schubert varieties*  
Supervised by Jochen Kuttler, 2009.

**PUBLICATIONS** Cliff, E., T. Nevins, and S. Shen: On the Kirwan map for moduli of Higgs bundles, to appear in Algebraic Geometry. arXiv:1808.10311

Cliff, E.: Universal factorization spaces and algebras,  
Mathematical Research Letters (2019). doi:10.4310/MRL.2019.v26.n4.a5

D. Berwick-Evans, E. Cliff, N. Ganter, A. Tripathy, and J. Wen: Representation theory and the elliptic frontier,  
Notices of the American Mathematical Society (2019). doi: 10.1090/noti1805

Cliff, E.: Universal  $\mathcal{D}$ -modules and stacks of étale germs of  $n$ -dimensional varieties,  
European Journal of Mathematics (2017). doi:10.1007/s40879-017-0135-7

Cliff, E.: Factorisation structures on Hilbert schemes of points,  
Oberwolfach Reports, Report No. 25 (2016).

<b>PREPRINTS</b>	Factorization algebras, chiral algebras, and Borchers's singular commutative rings approach to vertex algebras. arxiv:1911.01627	
	Moduli spaces of 2-groups bundles on Riemann surfaces (in preparation, joint with Eric Berry, Daniel Berwick-Evans, Apurva Nakade, Emma Phillips, and Laura Murray).	
<b>THESIS</b>	<i>Universal D-modules, and factorisation structures on Hilbert schemes of points.</i> University of Oxford, 2015.	
<b>GRANTS</b>	<i>NSF conference grant (for Elliptic Cohomology Days).</i> Joint with Daniel Berwick-Evans and Arnav Tripathy.	June 2019.
	<i>AMS-Simons Travel Grant (\$4000).</i>	July 2017–July 2019.
<b>TEACHING EXPERIENCE</b>	<i>MATH1004/1904: Discrete mathematics</i> <ul style="list-style-type: none"> <li>Lecturer and tutor, University of Sydney</li> <li>In 2020, lectures and tutorials were delivered online</li> </ul>	Semester 2 2019, 2020
	<i>MATH1014: Introduction to linear algebra</i> <ul style="list-style-type: none"> <li>Lecturer and tutor, University of Sydney</li> </ul>	Intensive January 2020
	<i>MATH 241: Vector calculus</i> <ul style="list-style-type: none"> <li>Lecturer, UIUC</li> </ul>	Spring 2019
	<i>MATH 595: Factorization algebras</i> <ul style="list-style-type: none"> <li>Lecturer, UIUC</li> </ul>	Fall 2018
	<i>MATH 595: Modern algebraic geometry II—sheaf cohomology</i> <ul style="list-style-type: none"> <li>Lecturer, UIUC</li> </ul>	Spring 2018
	<i>MATH 595: Modern algebraic geometry III—curves and surfaces</i> Spring 2018 <ul style="list-style-type: none"> <li>Lecturer, UIUC</li> </ul>	Spring 2017, Spring 2018
	<i>MATH 402: Non-Euclidean geometry</i> <ul style="list-style-type: none"> <li>Lecturer, UIUC</li> </ul>	Fall 2016, Fall 2017, Fall 2018
	<i>Retaining-fee lecturer in pure mathematics</i> <ul style="list-style-type: none"> <li>Somerville College, University of Oxford</li> </ul>	October 2014–June 2016

*Third/fourth year algebra courses* October 2011–June 2014  
 • Representation theory; groups and character theory; Galois theory  
 • Teaching assistant, class tutor, University of Oxford

*MAT135: Calculus I* September 2010–April 2011  
 • Teaching assistant, University of Toronto

**STUDENTS SUPERVISED**

Cameron Egghins, Honours student September 2020–present

**TEACHING AWARDS**

*UIUC list of teachers ranked as excellent.* Fall 2016, Spring 2017, Fall 2018

*Shortlist for the Oxford University Students' Union "Outstanding Tutor" award in the mathematical, physical, and life sciences division.* May 2016

**WORKSHOPS/ SEMINARS ORGANIZED**

Co-organizer for SMRI Algebra and Geometry Online May 2020–present

Co-organizer for Elliptic Cohomology Days, UIUC June 2019

Co-organizer for AMS mathematics research community on equivariant elliptic cohomology and geometric representation theory June 2019

Organizer for UIUC algebraic geometry seminar 2017–2018

Co-organizer for special session of the AMS sectional meeting: quantum field theories and geometric representation theory October 2016

Co-organizer for Deformation Week (workshop for graduate students), University of Oxford April 2013

**INTERNAL SEMINARS ORGANIZED**

Co-organizer for learning seminar on Hilbert schemes August–December 2020

Organizer for graduate summer school on  $D$ -modules July 2017

Co-organizer for learning seminar on the WZW model and CFT May 2017

Co-organizer for reading group on twisted  $K$ -theory and moduli spaces of principal  $G$ -bundles Fall 2016

Co-organizer for reading group on quantum groups and affine Lie algebras Hilary and Trinity 2016

Co-organizer for reading group on "Tensor structures arising from affine Lie algebras I–IV" (Kazhdan–Lusztig) Hilary and Trinity 2016

Organizer for reading group on derived categories Trinity 2012

**SCHOOL  
SERVICE**

Member: Equity, Diversity, and Inclusion Committee      September 2020–present  
School of Mathematics and Statistics, University of Sydney

Member: Equity, Diversity, and Inclusion Working Party      February–March 2020  
School of Mathematics and Statistics, University of Sydney

**INVITED  
TALKS**

*Upcoming:* IMPA (Brazil), *Workshop on representation theory, vertex and chiral algebras*, May 2022.

*Upcoming:* Australian National University (Australia), *Workshop: the mathematics of conformal field theory II*, June/July 2021.

*Upcoming:* IMPA (Brazil), *String-Math*, June 2021. *Online.*

*Upcoming:* Northeastern (USA), *Geometry, physics, and representation theory seminar*, February 2021. *Online.*

Ruhr-Universität Bochum (Germany), *Topology seminar*, December 2020. *Online.*

MSRI Berkeley (USA), *Workshop: tensor categories and topological quantum field theories*, March 2020. *Online.*

Mooloolaba (Australia), *Conference: New connections in representation theory*, February 2020.

Australian National University (Australia), *Algebra and topology seminar*, November 2019.

University of New South Wales (Australia), *Pure maths seminar*, November 2019.

University of Melbourne (Australia), *Pure maths seminar*, September 2019.

Simons Center for Geometry and Physics (USA), *Workshop on current trends on spectral data for Higgs bundles*, May 2019.

Louisiana State University (USA), *Southeastern Lie theory Workshop XI*, May 2019.

IHES (France), *Conference on non-local aspects of holomorphic and topological field theory*, January 2019.

University of Toronto/Fields Institute (Canada), *Geometric representation theory seminar*, November 2018.

University of Ottawa (Canada), *Algebra seminar*, November 2018.

Indiana University (USA), *Algebra seminar*, October 2018.

University of Saskatchewan (Canada), *Workshop on geometry and physics of gauge theories at infinity*, August 2018.

RIMS Kyoto (Japan), *Conference on vertex operator algebras and symmetries*, July 2018.

IPMU Tokyo (Japan), *Conference on vertex algebras and factorization algebras*, July 2018.

University of Notre Dame (USA), *Conference on geometric representation theory*, June 2018.

University of Washington (USA), *Conference on non-commutative algebra and related fields*, March 2018.

Rutgers University, New Brunswick (USA), *Lie group/quantum mathematics seminar*, February 2018.

Perimeter Institute for Theoretical Physics (Canada), *Mathematical physics seminar*, January 2018.

University of Sydney (Australia), *Conference on future directions in representation theory*, December 2017.

Northern Illinois University (USA), *Colloquium*, November 2017.

University of Oxford (UK), *Mini-course at graduate summer school on modern moduli theory*, September 2017.

University of Chicago (USA), *Introductory talk at conference on interactions between representation theory and algebraic geometry*, August 2017.

University of Lancaster (UK), *Colloquium*, June 2017.

University of Illinois at Chicago (USA), *Geometry, topology, and dynamics seminar*, April 2017.

University of Illinois at Urbana–Champaign (USA), *Doob colloquium*, April 2017.

University of Saskatchewan (Canada), *Algebra, geometry, and number theory seminar*, March 2017.

University of Saskatchewan (Canada), *Colloquium*, March 2017.

Plymouth University (UK), *Pure maths seminar*, February 2017.

University of Illinois at Urbana–Champaign (USA), *Algebraic geometry seminar*, August 2016.

Max Planck Institute for Mathematics (Germany), *Higher differential geometry seminar*, July 2016.

Oberwolfach (Germany), *Workshop on factorization algebras and functorial field theories*, May 2016.

Bristol (UK), *Bristol Leicester Oxford Colloquium (BLOC) meeting at the British Mathematical Colloquium*, March 2016.

Edinburgh (UK), *MAXIMALS algebra seminar*, February 2016.

University of Illinois at Urbana-Champaign (USA), *Algebraic geometry seminar*, February 2016.

Mooloolaba (Australia), *Conference on geometric and categorical representation theory*, December 2015.

Kioloa (Australia), *Workshop on topology and representation theory*, November 2015.

University of East Anglia (UK), *Pure maths seminar*, October 2015.

University of Oxford (UK), *Workshop on derived structures in geometry and representation theory*, September 2015.

EPFL (Switzerland), *Geometry seminar*, April 2015.

University of Copenhagen (Denmark), *Geometry and topology seminar*, February 2015.

University of Alberta (Canada), *Algebra seminar*, January 2015.

University of Alberta (Canada), *Special talk*, January 2015.

Perimeter Institute for Theoretical Physics (Canada), *Mathematical physics seminar*, January 2015.

Imperial College (UK), *MAGIC (algebraic geometry) seminar*, October 2014.

Rice University (USA), *Algebraic geometry and number theory seminar*, September 2014.

University of Oxford (UK), *Deformation Week (graduate summer school)*, April 2013.

*I have also given over 35 talks at internal reading groups and learning seminars.*