

Positions	<p><b>Tufts University</b> (January 2023–August 2023) Visiting Scholarship</p> <p><b>Imperial College London</b> (January 2021–December 2022) Research fellowship</p> <p><b>Fields Institute</b> (Spring 2020) <b>Western University</b> (Fall 2019) Joint postdoctoral fellowship</p> <p><b>University of Toronto</b> (2016–2019) Postdoctoral fellowship</p> <p><b>Universidade de São Paulo</b> (2015–2016) Pós-Doutorado de Excelência funded through <b>IMPA</b> (o Instituto Nacional de Matemática Pura e Aplicada) and <b>CAPES</b> (a Coordenação de Aperfeiçoamento de Pessoal de Nível Superior)</p>
Education	<p><b>Tufts University</b> Ph.D. in Mathematics (2015) Advisor: <a href="#">Loring W. Tu</a> Dissertation: <i>On the equivariant cohomology of homogeneous spaces</i></p>
Citizenship	United States
Interests	<p>Equivariant topology: cobordism, K-theory, and Borel cohomology</p> <p>Topology and geometry of group actions on manifolds</p> <p><math>A_\infty</math>-algebras</p> <p>Symplectic geometry</p> <p>Galois cohomology</p> <p>Low-dimensional topology and surface dynamics</p>
Funding	Heilbronn Focused Research Grant: <i>Koszulity and formality in Galois cohomology</i>
Selected invited conference talks	<p><i>The topology of Gelfand–Zeitlin fibers</i>, Workshop on Lie Groups, Singular Spaces, and Higher Structures, <b>Fields Institute, Toronto</b> (Jan. 2023)</p> <p><i>The topology of Gelfand–Zeitlin fibers</i>, AMS Special Session on Integrable Systems and Symplectic Group Actions, <b>Joint Mathematics Meetings, Boston</b> (Jan. 2023)</p> <p><i>The topology of Gelfand–Zeitlin fibers</i>, <a href="#">Gone Fishing 2020–2022</a>, <b>Georgia Southern University, Savannah, Georgia</b> /online (Apr. 2022)</p> <p><i>Multiplicative collapse in the Eilenberg–Moore spectral sequence</i>, <b>Transpennine Topology Triangle, UK</b>/online (Dec. 2020)</p> <p><i>The cohomology of Gelfand–Zeitlin fibers</i>, <a href="#">International Conference: Topology and Geometry of Group Actions</a>, <b>Higher School of Economics, Moscow</b>/online (Nov. 2020)</p> <p><i>Realization of torus representations as fixed-point data</i>, <a href="#">Workshop on Polyhedral Products in Homotopy Theory</a>, <b>Fields Institute, Toronto</b> (Jan. 2020)</p>

$\left\{ \begin{array}{l} \text{Local integration in equivariant cobordism theory,} \\ \text{The equivariant } K\text{-theory of a cohomogeneity-one action,} \end{array} \right.$ 
 “Topology” session,  
 “Equivariant methods in differential and algebraic geometry” session,  
**Canadian Mathematical Society Summer Meeting, Regina, Saskatchewan** (June 2019)

*The equivariant cohomology and K-theory of a cohomogeneity-one action,*  
 Algebraic Topology, Combinatorics, and Mathematical Physics, on the occasion of Victor Buchstaber’s  
 75th birthday, **Steklov Institute** and **Skolkovo Technical Institute, Moscow** (May 2018)

*Equivariant formality beyond Hamiltonian actions,*  
**Mathematical Congress of the Americas, Montreal** (July 2017)

*Equivariant formality in rational cohomology and K-theory,*  
 Conference on Geometry in Algebra and Algebra in Geometry,  
**Universidade de São Paulo** (Nov. 2015)

Selected invited  
seminar talks

*Biquotients and a product on the two-sided bar construction,*  
 International Polyhedral Products Seminar, **Princeton**/online (Oct. 2023)

*Products on Tor,*  
 Algebraic topology seminar, **University of Warwick** (Mar. 2023)

*The topology of Gelfand–Zeitlin fibers,*  
 Interactions between symplectic geometry, combinatorics, and number theory seminar,  
**Universität zu Köln/Philipps-Universität Marburg**/online (Nov. 2022)

*The topology of Gelfand–Zeitlin fibers,*  
 Topology seminar, Heinrich-Heine-**Universität Düsseldorf** (Oct. 2022)

*Equivariant formality of isotropy actions and products of spheres,*  
*Geometry, topology, and group theory seminar,* Westfälische Wilhelms-**Universität Münster** (Oct. 2022)

*The topology of the Gelfand–Zeitlin fiber,*  
 International Polyhedral Products Seminar, **Princeton**/online (Apr. 2022)

*The topology of the Gelfand–Zeitlin fiber,*  
 Symplectic Monday, **IBS Center for Geometry and Physics, Pohang, Korea**/online (Dec. 2021)

*The topology of the Gelfand–Zeitlin fiber,*  
 London Geometry and Topology Seminar, **Imperial College London** (Dec. 2021)

*Products on Tor, homogeneous spaces, and Borel cohomology,*  
 Topology seminar, **University of Rochester**/online (Nov. 2021)

*The topology of the Gelfand–Zeitlin fiber,*  
 Differential geometry and topology seminar, **University of Cambridge** (Nov. 2021)

*Biquotients and a product on the two-sided bar construction,*  
 Algebraic topology seminar, **Universidad Nacional Autónoma de México**/online (May 2021)

*Multiplicative collapse in the Eilenberg–Moore spectral sequence,*  
 Algebraic topology seminar, **University of Michigan**/online (Apr. 2021)

*The K-theory of an isotropy action and an unsolved problem in polynomial rings* (in Portuguese),  
 Seminário Salomônico, **Universidade Federal Fluminense, Niterói, RJ, Brazil** (August 2019)

*Equivariant formality, K-theory, and isotropy,*  
 Topology seminar, **University of Rochester** (October 2018)

*Cohomogeneity-one actions and a little-remarked structure on the Mayer–Vietoris sequence,*  
 Symplectic seminar, **University of Toronto** (March 2017)

*Equivariant formality in rational cohomology and K-theory,*  
 Geometry and topology seminar, **Western University, London, ON, Canada** (December 2016)

Some contributed talks in colorful locations	<p><i>Equivariant formality of isotropy actions in rationalized cohomology and K-theory</i>, Seminário de física matemática, <b>IMPA, Rio de Janeiro</b> (May 2016)</p> <p><i>Products on Tor</i>, Algebraic Topology, in Memory of Hans-Joachim Baues, <b>Max Planck Institute for Mathematics, Bonn</b> (Oct. 2022)</p> <p><i>Products on Tor, homogeneous spaces, and Borel cohomology</i>, Algebraic structures in topology, <b>San Juan, Puerto Rico</b> (May–June 2022)</p> <p><i>Realization of fixed-point data for locally standard torus actions</i>, Glances@Manifolds, <b>Jagiellonian University, Kraków</b> (July 2018)</p> <p><i>Formality and equivariant formality for isotropy actions</i> (in Portuguese), <b>XX Encontro Brasileiro de Topologia</b>, <b>Universidade Tecnológica Federal do Paraná, Curitiba, PR, Brazil</b> (July 2016)</p>
Teaching	<p><b>Course coordinator and lecturer</b>,</p> <ul style="list-style-type: none"> <li>• Commutative Algebra (Imperial College London),</li> <li>• Vector Calculus (University of Toronto, four semesters, <b>supervising</b> an undergraduate TA),</li> <li>• Mathematics of Social Choice (Tufts University)</li> </ul> <p><b>Seminar coordinator and lecturer</b>,</p> <ul style="list-style-type: none"> <li>• Formality (Western University),</li> <li>• Equivariant Cohomology (Universidade de São Paulo)</li> </ul> <p><b>Lecturer</b>,</p> <ul style="list-style-type: none"> <li>• Calculus (University of Toronto &amp; Tufts University, three semesters),</li> <li>• Finite Mathematics (Tufts University)</li> </ul> <p><b>Reading group facilitator</b>,</p> <ul style="list-style-type: none"> <li>• <i>Foundations of Algebraic Geometry</i> (Western University) (mentor, Directed Reading Program in Mathematics),</li> <li>• Topologia Diferencial (Universidade de São Paulo)</li> </ul> <p><b>Teaching assistant</b> (all at Tufts University),</p> <ul style="list-style-type: none"> <li>• Differential Forms in Algebraic Topology,</li> <li>• Mathematical Neuroscience,</li> <li>• History of Mathematics,</li> <li>• Number Theory,</li> <li>• Complex Analysis,</li> <li>• Real Analysis I &amp; II</li> </ul> <p><b>Tutor</b> for eight students, ranging from Year 1 to M.S. (Imperial College London, 2021–2022)</p> <p><b>Fellow</b> of the Graduate Institute for Teaching (Tufts University, Summer 2010)</p>
Memberships	<p>Association for Women in Mathematics (AWM)</p>
Service	<p><b>Organizer</b>, Special Session on Equivariant Cohomology, AMS Spring Eastern Virtual Sectional Meeting (2022, with Loring W. Tu)</p> <p>“Equivariant geometry and topology” session, CMS Winter Meeting, Niagara, Ontario (2016, with Elisheva Adina Gamse).</p>

**Referee**, seven venues including *Trans. Amer. Math. Soc.*, *J. Differential Geom.*, and *J. Topol.*

My version of refereeing involves following through and verifying every detail of each argument, generates several pages of commentary, and requires at least a week for a first pass, with less time spent on each subsequent revision.

**Quick opinions**, *Trans. Amer. Math. Soc.* and *J. Reine Angew. Math.*

**Reviewer**, *Mathematical Reviews*.

**Editorial board**, [Poincaré Institute for Mathematics Education](#), Summer 2013

The Poincaré Institute is a NSF-funded collaboration between Tufts University and the non-profit Technical Education Research Centers designed to improve middle school mathematics education through graduate-level online courses offered to in-service middle school mathematics teachers.

#### Edited books and articles by Loring Tu (selected)

- *Introductory Lectures on Equivariant Cohomology*, Annals of Math. Studies 204, Princeton Univ. Press, Princeton, New Jersey, 2020.
- *Elements of Equivariant Cohomology*, with Raoul Bott, unpublished.
- *Differential Forms in Algebraic Topology*, 2nd edition, with Raoul Bott, edition in progress.
- *Differential Geometry: Connections, Curvature, and Characteristic Classes*, Grad. Texts in Math. 275, Springer, New York, 2017.
- *An Introduction to Manifolds*, [first and] second edition, Universitext, Springer, New York, 2011.
- Raoul Bott: *Collected Papers*, volume 5 [collection of permissions], Birkhäuser, Basel, 2017.
- From sheaf cohomology to the algebraic de Rham theorem (with Fouad El Zein), pp. 69–121 in *Hodge Theory*, eds. Eduardo Cattani, Fouad El Zein, Phillip A. Griffiths, and Lê Dũng Tráng, Princeton Univ. Press, Princeton, New Jersey, 2014.
- Computing characteristic numbers using fixed points, in *A Celebration of the Mathematical Legacy of Raoul Bott*, CRM Proceedings and Lecture Notes, vol. 50, American Mathematical Society, Providence, RI, 2010, pp. 185–206.

#### Feedback on and copyediting of other books

- *Mathematical Logic and Computation*, Jeremy Avigad, Cambridge University Press, 2022.
- *An Introduction to Modeling Neuronal Dynamics*, Christoph Börgers, Texts in Applied Mathematics vol. 66, Springer, New York, 2017.
- *A Primer on Mapping Class Groups*, Benson Farb and Dan Margalit, Princeton Mathematical Series vol. 49, Princeton University Press, Princeton, NJ, 2011.
- *Category Theory*, Steven Awodey, Oxford Logic Guides vol. 52, Oxford Univ. Press, New York, 2006.
- *Computability and Learnability*, Kevin Kelly, unpublished.
- Introduction to the calculus of variations, William Hrusa, unpublished.

Languages

English: native (polished if ornate, a byproduct of formal overeducation)

Portuguese: fluent at the level of the news, but not of poetry

Mandarin: basic conversation (but worsening accent), menu comprehension

References

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Books	<ol style="list-style-type: none"> <li>1. Solutions to <i>Introduction to Commutative Algebra</i> by Atiyah–MacDonald (2011, revised 2021, 134pp.) <a href="http://www.ma.imperial.ac.uk/~jcarlson/intro_comm_alg(2021).pdf">www.ma.imperial.ac.uk/~jcarlson/intro_comm_alg(2021).pdf</a></li> <li>2. <i>The Rational Cohomology of Homogeneous Spaces</i> (under revision for Springer’s <i>Developments in Mathematics</i> series, 155pp., 2018). <a href="http://www.ma.imperial.ac.uk/~jcarlson/homogeneous_space_book.pdf">www.ma.imperial.ac.uk/~jcarlson/homogeneous_space_book.pdf</a></li> </ol>
Preprints	<ol style="list-style-type: none"> <li>1. Products on Tor (submitted, 2022, 23pp.) <a href="http://www.ma.imperial.ac.uk/~jcarlson/prod.pdf">www.ma.imperial.ac.uk/~jcarlson/prod.pdf</a></li> <li>2. The topology of Gelfand–Zetlin fibers (submitted, 2021, 39pp., with Jeremy Lane) <a href="https://arxiv.org/abs/2107.02721">arxiv.org/abs/2107.02721</a></li> <li>3. Fixed points and semifree bordism (submitted, 2019, 13pp.) <a href="http://www.ma.imperial.ac.uk/~jcarlson/semifree.pdf">www.ma.imperial.ac.uk/~jcarlson/semifree.pdf</a></li> <li>4. The K-theory of cohomogeneity-one actions (under revision for <i>Adv. Math.</i>, 2018, 40pp.) <a href="http://www.ma.imperial.ac.uk/~jcarlson/cohom1KAdvances2clean.pdf">www.ma.imperial.ac.uk/~jcarlson/cohom1KAdvances2clean.pdf</a></li> <li>5. Realization of abstract GKM isotropy data (2016–, with Elisheva Adina Gamse and Yael Karshon) <a href="http://math.toronto.edu/jcarlson/realization.pdf">math.toronto.edu/jcarlson/realization.pdf</a></li> <li>6. Commensurability of two-multitwist pseudo-Anosovs (2010, 33pp.) <a href="https://arxiv.org/abs/1011.0247">arxiv.org/abs/1011.0247</a></li> </ol>
Publications	<ol style="list-style-type: none"> <li>1. The cohomology of homogeneous spaces in historical context (to be published in <i>Contemp. Math.</i> volume <i>Group Actions and Equivariant Cohomology</i>, 2023, 33pp.)</li> <li>2. A ring structure on Tor (to be published in <i>Forum Math. Sigma</i>, 2022, 44pp.) <a href="https://arxiv.org/abs/2306.04860">arxiv.org/abs/2306.04860</a></li> <li>3. Equivariant formality of corank-one isotropy actions and products of rational spheres (to be published in <i>Math. Z.</i>, 2022, 45pp., with Chen He) <a href="https://arxiv.org/abs/2204.00135">arxiv.org/abs/2204.00135</a></li> <li>4. The cohomology of biquotients via a product on the two-sided bar construction (to be published in <i>Algebr. Geom. Topol.</i>, 2020, 48pp., appendix joint with Matthias Franz) <a href="https://arxiv.org/abs/2106.02986">arxiv.org/abs/2106.02986</a></li> <li>5. K-theory and formality (<i>Int. Math. Res. Not.</i>, 2022, 46pp.) <a href="https://academic.oup.com/imrn/advance-article/doi/10.1093/imrn/rnac106/6612200">academic.oup.com/imrn/advance-article/doi/10.1093/imrn/rnac106/6612200</a></li> <li>6. Grassmannians and the equivariant cohomology of isotropy actions (<i>Proc. Amer. Math. Soc.</i>, 2021, 15pp.) <a href="https://arxiv.org/abs/1611.01175">arxiv.org/abs/1611.01175</a></li> <li>7. The K-theory of the conjugation action (<i>C. R. Math. Acad. Sci., Paris</i>, 2021, 2pp.) <a href="https://comptes-rendus.academie-sciences.fr/mathematique/articles/10.5802/crmath.235">comptes-rendus.academie-sciences.fr/mathematique/articles/10.5802/crmath.235</a></li> <li>8. The equivariant cohomology ring of a cohomogeneity-one action (<i>Geom. Dedicata</i>, 2019, 18pp., with Chen He, Oliver Goertsches, and Liviu Mare) <a href="https://arxiv.org/abs/1802.02304">arxiv.org/abs/1802.02304</a></li> <li>9. Equivariant formality of homogeneous spaces (<i>J. London Math. Soc.</i>, 2018, 23pp., with Chi-Kwong Fok) <a href="https://arxiv.org/abs/1511.06228">arxiv.org/abs/1511.06228</a></li> <li>10. Equivariant formality of isotropic torus actions (<i>J. Homotopy and Relat. Struct.</i>, 2018, 34pp.) <a href="https://arxiv.org/abs/1410.5740">arxiv.org/abs/1410.5740</a></li> <li>11. Conceptions of topological transitivity (<i>Topology Appl.</i>, 2012, 15pp., with Ethan Akin) <a href="https://arxiv.org/abs/1108.4710">arxiv.org/abs/1108.4710</a></li> </ol>