# Curriculum Vitae
## Ben Webster

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| Office Address: | Department of Pure Mathematics | Email: | ben.webster@uwaterloo.ca |
| | University of Waterloo | Website: | https://uwaterloo.ca/scholar/b2webste |
| | Waterloo, ON, Canada | | |

## Employment/Education:

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| 2017 – | **Associate Professor**, University of Waterloo. |
| 2017 – | **Associate Faculty**, Perimeter Institute. |
| 2016 – 2017 | **Associate Professor**, University of Virginia. |
| 2013 – 2016 | **Assistant Professor**, University of Virginia. |
| 2011 – 2013 | **Assistant Professor**, Northeastern University. |
| 2010 – 2011 | **Assistant Professor**, University of Oregon. |
| 2008 – 2010 | **C.L.E. Moore Instructor** and **NSF Postdoctoral Fellow**, M.I.T. |
| | Sponsoring Scientist: R. Bezrukavnikov. |
| 2007 – 2008 | **Member** and **NSF Postdoctoral Fellow**, Institute for Advanced Study. |
| 2002 – 2007 | **Ph.D. in Mathematics**, University of California, Berkeley. |
| | Supervisor: N. Reshetikhin. |
| | Thesis: "Algebraic Poisson Geometry in Representation Theory and Combinatorics." |
| 1998 – 2002 | **B.A. in Mathematics**, Simon's Rock College. |
| | Supervisor: W. Dunbar |

*As visitor*

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| 2014  Spring | **Junior Chair**, Université Denis Diderot–Paris VII, |
| | sponsored by Fondation Sciences Mathématiques de Paris. |
| 2006  Fall | Center for the Topology and Quantization of Moduli Spaces (Århus, Denmark). |
| 2001  Spring | Budapest Semesters in Mathematics (Budapest, Hungary). |

## Scientific/Academic Honors and Grants:

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| 2016 | Cory Family Teaching Award (recognizes excellence in lower division teaching; one awarded for all STEM fields at UVA per year) |
| 2015 | Kavli Fellow, National Academy of Sciences |
| 2015 | International Researcher Collaboration Award from Sydney University |
| 2014 – 2016 | Sloan Research Fellowship ($50,000) |
| 2012 – 2017 | NSF CAREER grant: "Representation theory of symplectic singularities" ($416,905) |
| 2013 | NSF conference grant "Algebra, Combinatorics, and Representation Theory." ($40,000) |
| 2010 – 2012 | NSA Young Investigator Grant ($30,000) |
| 2007 – 2011 | NSF Postdoctoral Research Fellowship |
| 2007  June | Clay Liftoff Fellowship |
| 2003 – 2007 | NSF Graduate Research Fellowship |

## Research Interests:

Knot theory and representation theory via algebraic geometry.

## Publications:
available at http://people.virginia.edu/~btw4e/publications.html

2017  1. *Rouquier's conjecture and diagrammatic algebra.* to appear in Forum of Mathematics Sigma
arXiv:1306.0074

2. *A geometric construction of colored HOMFLYPT homology* (with G. Williamson).
Geometry & Topology **21-5** (2017), 2557–2600. arXiv:0905.0486

3. *On generalized category $\mathcal{O}$ for a quiver variety.* Mathematische Annalen **368** (2017), no. 1–2, 483–536. `arXiv:1409.4461`

4. *Geometry and categorification.* "Categorification in Geometry, Topology and Physics," 1–22, Contemp. Math., **680**, AMS, 2017. `arXiv:1602.05992`

5. *Comparison of canonical bases for Schur and universal enveloping algebras.* Transformation Groups, **22(3)**, 869–883. `arXiv:1503.08734`

6. *Current algebras and categorified quantum groups* (with A. Beliakova, K. Habiro and A. Lauda). Journal of the London Mathematical Society, **95**, 248–276 `arXiv:1412.1417`

7. *Knot invariants and higher representation theory.* Memoirs of the American Mathematical Society **250**, no. 1191, pp. 133. `arXiv:1309.3796`

2016 8. *Quantizations of conical symplectic resolutions II: category $\mathcal{O}$ and symplectic duality.* (with T. Braden, A. Licata and N. Proudfoot). Astérisque No. 384, 75–179. `arXiv:1407.0964`

9. *Quantizations of conical symplectic resolutions I: local and global structure* (with T. Braden and N. Proudfoot). Astérisque No. 384, 1–73. `arXiv:1208.3863`

10. *Tensor product algebras, Grassmannians and Khovanov homology.* "Physics and mathematics of link homology," 23–58, Contemp. Math., **680**, AMS, 2016. `arXiv:1312.7357`

11. *Cyclicity for categorified quantum groups* (with A. Beliakova, K. Habiro and A. Lauda). Journal of Algebra **452**, 118–132. `arXiv:1506.04671`

12. *Mirković-Vilonen polytopes and Khovanov-Lauda-Rouquier algebras* (with Peter Tingley). Compositio Mathematica **152**, no. 8, 1648–1696. `arXiv:1210.6921`

13. *Tensor product categorifications and the super Kazhdan-Lusztig conjecture* (with Jonathan Brundan and Ivan Losev). to appear in International Mathematics Research Notices. `arXiv:1310.0349`

2015 14. Appendix to *Indecomposable Soergel bimodules for univeral Coxeter groups* (by Ben Elias and Nicolas Libedinsky). to appear in Transactions of the AMS. `arXiv:1401.2467`

15. *On uniqueness of tensor products of irreducible categorifications* (with Ivan Losev). Selecta Math. (N.S.) **21**, no. 2, 345–377. `arXiv:1303.1336`

16. *Canonical bases and higher representation theory.* Compositio Mathematica **151**, no. 1, 121–166. `arXiv:1209.0051`

2014 17. *Yangians and quantizations of slices in the affine Grassmannian* (with J. Kamnitzer, A. Weekes and O. Yacobi). Journal of Algebra and Number Theory **8** (2014), no. 4, 857–893. `arXiv:1209.0349`

2012 18. *An introduction to categorifing quantum knot invariants.* "The FreedmanFest," Geometry and Topology Monographs, **18**, Mathematical Sciences Publishers, Berkeley

19. *2-block Springer fibers: convolution algebras and coherent sheaves* (with C. Stroppel). Commentarii Mathematici Helvetici **87** (2012), no. 2, 477–520. `arXiv:0802.1943`

20. *Hypertoric category $\mathcal{O}$* (with T. Braden, A. Licata, and N. Proudfoot). Advances in Mathematics. **231** (2012), no. 3-4, 1487–1545. `arXiv:1010.2001`

21. *Schur-Weyl-type duality for $\mathfrak{gl}(1|1)$, the Burau representation of braid groups, and invariants of tangled graphs* (with N. Reshetikhin and C. Stroppel). "Perspectives in analysis, geometry, and topology," 389–401, Progress in Mathematics, **296**, Birkhuser/Springer, New York, 2012.

2011 22. *Localization algebras and deformations of Koszul algebras* (with T. Braden, A. Licata, C. Phan and N. Proudfoot). Selecta Mathematica, **17** (2011) 533–572. `arXiv:0905.1335`

23. *The geometry of Markov traces* (with G. Williamson). Duke Mathematics Journal, **160** (2011) 401–419. `arXiv:0911.4494`

24. *Singular blocks of parabolic category $\mathcal{O}$ and finite W-algebras.* Journal of Pure and
      Applied Algebra **215** (2011), no. 12, 2797–2804. `arXiv:0909.1860`

2010 25. *Gale duality and Koszul duality* (with T. Braden, A. Licata, and N. Proudfoot).
      Advances in Mathematics, **225** (2010) 2002–2049. `arXiv:0806.3256`

2008 26. *A geometric model for the Hochschild homology of Soergel bimodules* (with G. Williamson).
      Geometry and Topology, **12** (2008) 1243–1263. `arXiv:0707.2003`.

27. *Cramped subgroups and generalized Harish-Chandra modules.*
      Procedings of the AMS, **136** (2008), 3809–3814. `arXiv:math.RT/0609846`.

2007 28. *Small linearly equivalent G-sets and a construction of Beaulieu.*
      Journal of Algebra, **317** (2007), no. 1, 306–323. `arXiv:math.GR/0610205`.

29. *Khovanov-Rozansky homology via a canopolis formalism.*
      Algebraic and Geometric Topology, **7** (2007), 673–699. `arXiv:math.GT/0610650`.

30. *A Deodhar type stratification of the double flag variety* (with M. Yakimov).
      Transformation Groups, **12** (2007), no. 4, 769–785. `arXiv:math.SG/0607374`.

31. *Intersection cohomolgy of hypertoric varieties* (with N. Proudfoot).
      Journal of Algebraic Geometry **16** (2007), 39–63. `arXiv:math.AG/0411350`.

2006 32. *Stabilization phenomena in Kac-Moody algebras and quiver varieties.* `arXiv:math.RT/0505619`.
      International Mathematics Research Notices, vol. 2006, Article ID 36856.

## Preprints:

1. *A quantum Mirković–Vybornov isomorphism.* (with A. Weekes and O. Yacobi).
      `arXiv:1706.03841`

2. *Koszul duality between Higgs and Coulomb categories $\mathcal{O}$.* `arXiv:1611.06541`

3. *Representation theory of the cyclotomic Cherednik algebra via the Dunkl-Opdam subalgebra.*
      `arXiv:1605.03780`

4. *Categorification of quantum symmetric pairs I.* (with H. Bao, P. Shan and W. Wang).
      `arXiv:1605.03780`

5. Appendix to *Coulomb branches of 3d $\mathcal{N} = 4$ quiver gauge theories and slices in the affine
      Grassmannian.* (with A. Braverman, M. Finkelberg, J. Kamnitzer, R. Kodera, H. Nakajima,
      and A. Weekes). `arXiv:1604.03625`

6. *Unfurling Khovanov-Lauda-Rouquier algebras.* `arXiv:1603.06311`

7. *Highest weights for truncated shifted Yangians and product monomial crystals*
      (with J. Kamnitzer, P. Tingley, A. Weekes and O. Yacobi). `arXiv:1511.09381`

8. *Centers of KLR algebras and cohomology rings of quiver varieties.* `arXiv:1504.04401`

9. *Categorified skew Howe duality and comparison of knot homologies* (with Marco Mackaay).
      `arXiv:1502.06011`

10. *On graded presentations of Hecke algebras and their generalizations.* `arXiv:1305.0599`

11. *Weighted Khovanov-Lauda-Rouquier algebras.* `arXiv:1209.2463`

12. *A categorical action on quantized quiver varieties.* `arXiv:1208.5957`

13. *Quiver Schur algebras and q-Fock space* (with C. Stroppel). `arXiv:1110.1115`

## Selected Lectures (since 2014):

2017 Jun.  **Newton Institute** (Quantum topology and categorified representation theory):
      *Representation theory and the Coulomb branch*

Apr. **GWU** (Knots in Washington): *Knot invariants via quantizations of Hecke modifications*

Mar. **UCLA** (Gauge Theory and Categorification):
  *Knot invariants via quantizations of Hecke modifications*

Mar. **Perimeter Institute**:  *3-dimensional mirror symmetry: a mathematical perspective*

Jan. **Texas** (Colloquium): *Representation theory of symplectic singularities*

Jan. **Rice** (Colloquium): *Representation theory of symplectic singularities*

2016 Dec. **Waterloo** (Colloquium): *Representation theory of symplectic singularities*

Oct. **UNC** (Symplectic Varieties and Geometric Representation Theory):
  *Representation theory and the Coulomb branch*

June **City University London** (London Algebra Colloquium):
  *The discreet charm of the Coulomb branch*

June **Imperial** (Geometry Seminar): *Representation theory of symplectic singularities*

May **Michigan** (Advances in Geometric Representation Theory):
  *The discreet charm of the Coulomb branch*

May **NCSU** (Knots in the Triangle) *Annular homology and Hochschild homology*

Apr. **Perimeter Institute** (Symplectic Duality and Gauge Theory):
  *Symplectic duality for hyperkähler quotients*

2015 Oct. **NCSU** (Workshop on Algebraic and Combinatorial Representation Theory):
  *Unexpected gradings in representation theory*

Sept. **Loyola** (Algebra Seminar): *Gradings on (q-)Schur algebras and quiver representations*

July **ANU** (Algebra Seminar): *Mirror symmetry for hypertoric varieties*

July **Melbourne** (Algebra Seminar): *Representation theory of symplectic singularities*

June **Sydney** (series of 4 talks): *Representation theory through the lens of categorical actions*

May **Cargèse, France** (Categorification in Algebra, Geometry and Physics):
  *Isomorphisms of knot homologies and skew Howe duality*

Mar. **Bonn** (On the interaction of representation theory with geometry and combinatorics):
  *Categorical restrictions*

Mar. **Warwick** (Derived categories in representation theory):
  *The discreet charm of the Coulomb branch*

Mar. **LSU** (Algebra Seminar): *Representation theory of symplectic singularities*

Mar. **Georgetown** (AMS Sectional): *Uniqueness (or lack thereof) for categorical restrictions*

Mar. **Georgetown** (AMS Sectional): *On isomorphisms between categorified $\mathfrak{sl}_n$ invariants*

Jan. **George Mason** (Topology, Arithmetic, and Dynamics Seminar):
  *Representation theory of symplectic singularities*

Jan. **UNAM** (US-Mexico Meeting on Noncommutative Algebra):
  *Uniqueness (or lack thereof) for categorical restrictions*

2014 Oct. **Greensboro** (AMS Sectional): *On isomorphisms between categorified $\mathfrak{sl}_n$ invariants*

June **Glasgow** (Algebra seminar): *Representation theory of symplectic singularities*

May **Newcastle** (Algebra seminar): *Symmetric groups and Lie algebras*

May **Oberwolfach** (Interactions between Algebraic Geometry and Noncommutative Algebra):
  *Category $\mathcal{O}$ and KLR algebras*

May **Lausanne** (Geometry Seminar): *Representation theory of symplectic singularities*

May **Zürich** (Math Physics seminar): *On isomorphisms between categorified $\mathfrak{sl}_n$ invariants*

Apr. **Geneva** (Conference on Quantization of Moduli Spaces):
  *Evidence for S-duality from quantization*

Apr. **Paris VII** (Journée catégorification et théorie des noeuds):
  *Why all known categorifications of type Reshetikhin-Turaev invariants are the same*

Mar. **Caen** (Journées d'algèbre à Caen): *Pictures of Cherednik category $\mathcal{O}$*

Mar. **Edinburgh** (Hodge seminar): *Representation theory of symplectic singularities*

**Professional Activities:**

- Journals refereed:

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| Selecta Mathematica | Journal of the EMS |
| American Journal of Mathematics | Moscow Mathematical Journal |
| Advances in Mathematics | Algebraic & Geometric Topology |
| Representation Theory | Quantum Topology |
| Transactions of the AMS | International Mathematics Research Notices |
| Banach Center Publications | Duke Mathematics Journal |
| Nagoya Math Journal | Mathematische Zeitschrift |
| Compositio Mathematica | International Journal of Mathematics |
| Proceedings of the LMS | & Mathematical Sciences |
| Journal of Algebra | Journal of the AMS |
| SIGMA | Inventiones Mathematicae |
| Fundamenta Mathematicae | Acta Mathematica |
| Math Annalen | Journal of the LMS |
| Birkhäuser Festschriften | Algebra and Number Theory |

- *Math Reviews* reviewer.
- Mentor for UVA Mentoring Insititute and Association for Women in Mathematics.
- Departmental committees served:

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| Assessment committee (UVA) | Graduate and graduate admissions committees (UVA) |
| Undergraduate advisor (UVA) | Postdoctoral search committee (NU) |
| Graduate Open House committee (NU) | Niven and Moursund Lectures committee (UO) |

- External committees served:

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| AMS Web Editorial Group (2014–2016) | AMS Committee on Publications (2015–2018) |

- Reviewed grants for:

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| NSA Mathematics | Portuguese Foundation for Science and Technology |
| NSF Mathematics | France Berkeley Fund |

- Expository talks given:

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| Simon's Rock College Math Club | Boston Math Circle |
| Northeastern incoming math majors | Western Albemarle High School |
| UVA Math Club | LSU graduate colloquium |

- Conferences co-organized:

  - "Virginia Topology Conference 2016" in Charlottesville (2016)
  - "Algebraic Groups, Quantum Groups and Geometry" in Charlottesville (2016)
  - "Categorification and Geometric Representation Theory" in Montréal (2014)
  - "Workshop on Quiver Representations and Geometric Representation Theory" in Paris (2014)
  - "Algebra, Combinatorics and Representation Theory: an international conference in memory of Andrei Zelevinsky" in Boston (2013)
  - "Representation Theory and Geometry" in Berkeley (2005)

**Teaching Activities:**

*At UVA:*
2017 Spring   Taught "Algebraic Topology I" (MATH 7800)

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| 2017 | Spring | Taught "Homological Algebra" (MATH 7600) |
| 2016 | Fall | Taught "Transition to Higher Mathematics" (MATH 3000) |
| 2016 | Spring | Taught "Algebra II" (MATH 7752) |
| 2015 | Fall | Taught "Algebra I" (MATH 7751) |
| 2015 | Spring | Taught "Algebra IV: Quivers" (MATH 7754) |
| 2014 | Fall | Taught "Calculus III" (MATH 2130) |
| 2013 | Fall | Taught "Bilinear Forms and Group Representations" (MATH 5657) |

*At NU, UO and MIT:*

undergrad: Calculus, Differential Equations with Linear Algebra, Number Theory, Project Lab in Mathematics

graduate: Measure Theory, Lie Groups, Symplectic Geometry, reading courses on categorification, geometric representation theory and quiver varieties.