Ben Knudsen

Contact information	Mathematics Department Northeastern University 360 Huntington Ave Boston, MA 02115	b.knudsen@northeastern.edu knudsen.sites.northeastern.edu

Employment

Northeastern University

Assistant Professor, 2019–

Harvard University

NSF Postdoctoral Fellow and Lecturer, 2016–2019
Sponsor: Michael Hopkins

Education

Northwestern University

Ph.D. in Mathematics, 2016

Advisor: John Francis
Dissertation: *Higher enveloping algebras and configuration spaces of manifolds*

Princeton University

B.A. in Mathematics, 2011

Advisor: Zoltán Szabó
Thesis: *On odd Khovanov homology and its mutation invariance*

Research interests

Homotopy theoretic approaches to manifolds. Factorization homology and Goodwillie–Weiss manifold calculus. Applications to configuration spaces and related moduli spaces. Graph braid groups. Topological robotics. Lie algebras and their homology. Stability phenomena. Stratified differential topology.

Journal articles

Edge stabilization in the homology of graph braid groups, with Byung Hee An and Gabriel C. Drummond-Cole. Geom. Topol. 24 (2020), 421-469.

Subdivisional spaces and graph braid groups, with Byung Hee An and Gabriel C. Drummond-Cole. Doc. Math. 24 (2019), pp. 1513–1583.

Configuration spaces of products, with William Dwyer and Kathryn Hess. Trans. Amer. Math. Soc. 371 (2019), pp. 2963–2985.

Higher enveloping algebras. Geom. Topol. 22-7 (2018), 40143–4066.

Betti numbers of configuration spaces of surfaces, with Gabriel C. Drummond-Cole. J. London Math. Soc. 96-2 (2017), 367–393.

Betti numbers and stability for configuration spaces via factorization homology. Algebr. Geom. Topol. 17-5 (2017), 3137–3187.

Preprints

Farber's conjecture on the topological complexity of pure graph braid groups. Submitted, arXiv:2010.13530.

On the second homology of planar graph braid groups, with Byung Hee An. Submitted, arXiv:2008.10371.

Embedding calculus and smooth structures, with Alexander Kupers. Submitted, arXiv:2006.03109.

Asymptotic homology of graph braid groups, with Byung Hee An and Gabriel C. Drummond-Cole. Submitted, arXiv:2005.08286.

The Lubin–Tate theory of configuration spaces: I, with Lukas Brantner and Jeremy Hahn. Submitted, arXiv:1908.11321.

A Künneth theorem for configuration spaces, with Kathryn Hess. Submitted, arXiv:1810.02249.

EXPOSITORY · *Configuration spaces in algebraic topology.* arXiv:1803.11165.

INVITED TALKS · Applied Algebraic Topology Research Network Topological Complexity online seminar (2021)

University of Bonn topology seminar (January 2021)

Purdue topology seminar (November 2020)

Smooth structures and embedding calculus. MIT topology seminar (October 2020)

Embedding calculus and smooth structures. "Spaces of Embeddings: Connections and Applications," Banff International Research Station (October 2019).

Connectivity and growth in the homology of graph braid groups. "Arrangements at Western," University of Western Ontario (May 2019).

Higher enveloping algebras and configuration spaces of manifolds. Indiana University topology seminar (May 2019).

Connectivity and growth in the homology of graph braid groups. "Graduate Student Topology and Geometry Conference," UIUC (March 2019).

Connectivity and growth in the homology of graph braid groups. University of Michigan topology seminar (March 2019).

Connectivity and growth in the homology of graph braid groups. University of Louisiana at Lafayette topology seminar (January 2019).

How to build a surface of genus six. University of Louisiana at Lafayette colloquium (January 2019).

Configuration spaces and Lie algebras away from characteristic zero. "Manifolds," Isaac Newton Institute (December 2018).

Configuration spaces of manifolds and graphs. Special seminar, Northeastern University (November 2018).

Connectivity and growth in the homology of graph braid groups. "Upstate New York Topology Seminar," SUNY Albany (November 2018).

Connectivity and growth in the homology of graph braid groups. University of Massachusetts at Amherst geometry and topology seminar (November 2018).

Toward the cohomology of the pure elliptic braid group. MIT topology seminar (October 2018).

Connectivity and growth in the homology of graph braid groups. University of Georgia topology seminar (October 2018).

Connectivity and growth in the homology of graph braid groups. Isaac Newton Institute (July 2018).

Edge stabilization in the homology of graph braid groups. SUNY Albany topology seminar (May 2018).

Edge stabilization in the homology of graph braid groups. University of Minnesota topology seminar (May 2018).

Homology of surface and graph braid groups. AMS Special Session "Arrangements of hypersurfaces," Northeastern University (April 2018).

Edge stabilization in the homology of graph braid groups. University of Chicago topology and geometry/topology joint seminar (April 2018).

Edge stabilization in the homology of graph braid groups. Northwestern topology seminar (April 2018).

Homology of surface and graph braid groups. Brandeis topology seminar (February 2018).

Homology of surface and graph braid groups. Oberwolfach workshop "Topology of Arrangements and Representation Stability" (January 2018).

Subdivisional spaces and graph braid groups. MPIM topology seminar (January 2018).

Subdivisional spaces and graph braid groups. University of Oregon topology seminar (December 2017).

Subdivisional spaces and graph braid groups. MIT topology seminar (November 2017).

Higher enveloping algebras. "Lie Theory and Mathematical Physics," MIT (July 2017).

Configuration spaces of products. IBS Center for Geometry and Physics (June 2017).

Homology of surface and graph braid groups. ICMS workshop "Braids in algebra, geometry and topology" (May 2017).

Subdivisional spaces and graph braid groups. University of Pennsylvania mathematical physics seminar (March 2017).

From Lie algebras to configuration spaces. EPFL topology seminar (February 2017).

A local-to-global approach to configuration spaces. Heidelberg University physical mathematics seminar (February 2017).

Higher enveloping algebras and configuration spaces of manifolds. MIT topology seminar (November 2016).

Higher enveloping algebras. AMS Special Session "Quantum field theories and geometric representation theory," University of St. Thomas (October 2016).

Higher enveloping algebras and configuration spaces of manifolds. "Midwest Topology Seminar," Purdue University (September 2016).

Betti numbers of configuration spaces of surfaces. Purdue topology seminar (September 2016).

Higher enveloping algebras. Oberwolfach workshop "Factorization Algebras and Functorial Field Theories" (May 2016).

Higher enveloping algebras and configuration spaces of manifolds. IBS Center for Geometry and Physics seminar (April 2016).

Configuration spaces, Lie algebras, and factorization. University of Copenhagen topology and algebra seminar (January 2016).

Rational homology of configuration spaces via factorization homology, Ohio State University K-theory and homotopy theory seminar (November 2015)

Rational homology of configuration spaces via factorization homology. University of Chicago topology and geometry/topology joint seminar (November 2015)

Rational homology of configuration spaces via factorization homology. Notre Dame topology seminar (October 2015)

Rational homology of configuration spaces via factorization homology. Johns Hopkins topology seminar (September 2015)

Rational homology of configuration spaces via factorization homology. University of Virginia topology seminar (September 2015)

Rational homology of configuration spaces via factorization homology. University of Illinois at Urbana-Champaign topology seminar (April 2015)

Rational homology of configuration spaces via factorization homology. IBS Center for Geometry and Physics (March 2015)

An algebraic approach to configuration spaces. UIC homotopy algebras seminar (February 2015)

Rational homology of configuration spaces via factorization homology. Northwestern topology seminar (February 2015)

Rational homology of configuration spaces via factorization homology. Purdue topology seminar (October 2014)

Rational homology of configuration spaces via factorization homology. Stanford topology seminar (September 2014)

Rational homology of configuration spaces via factorization homology. University of Wisconsin topology seminar (September 2014)

CONTRIBUTED TALKS

Homology of surface and graph braid groups. ICM Satellite Conference "Braid groups, configuration spaces and homotopy theory," Federal University of Bahia (July 2018).

Subdivisional spaces and graph braid groups. Topology Ecuador, Galapagos Science Center (August 2017).

Subdivisional spaces and graph braid groups. Homotopy Theory: Tools and Applications, UIUC (July 2017).

Higher enveloping algebras and configuration spaces of manifolds. Young Researchers in Homotopy Theory and Categorical Structures, Max Planck Institute, Bonn (February 2017).

Betti numbers of configuration spaces of surfaces. Union College Mathematics Conference (December 2016).

Configuration spaces and higher enveloping algebras. Young Topologists Meeting, Center for Symmetry and Deformation, Copenhagen (July 2016).

Higher enveloping algebras and configuration spaces of manifolds. Topology of Manifolds, University of Lisbon (June 2016).

Configuration spaces in characteristic zero. Young Topologists Meeting, Center for Symmetry and Deformation, Copenhagen (July 2014)

Factorization homology and the rational homology of configuration spaces. Manifolds, K-theory, and Related Topics, Inter-University Center, Dubrovnik (June 2014)

Factorization homology and configuration spaces. Graduate Student Topology and Geometry Conference, University of Texas at Austin (April 2014)

TEACHING

2020	Topology 2, Northeastern
2020	Readings in topology, Northeastern
2020	Topology 1, Northeastern
2019	Algebra 1, Northeastern
2019	Classical geometry, Harvard
2018	Calculus, series, and differential equations, Harvard
2018	Linear algebra and differential equations, Harvard
2017	Configuration spaces in algebraic topology, Harvard

HONORS AND AWARDS

2020   Conference Grant DMS 2017119
Mid-Atlantic Topology Conference 2020
National Science Foundation

2019   Research Grant DMS 1906174
New perspectives on configuration spaces
National Science Foundation

2019   Travel Grant
American Mathematical Society and Simons Center

	2016	Postdoctoral Research Fellowship DMS 1606422 National Science Foundation
	2016	Departmental thesis prize Northwestern University
	2014	Departmental teaching award Northwestern University
SHORT TERM VISITS	2020	Guest program Max Planck Institute for Mathematis
	2019	"Arrangements at Western" intensive research period University of Western Ontario
	2018	"Homotopy Harnessing Higher Structures" programme Isaac Newton Institute for Mathematical Sciences
	2015	"Homotopy Theory, Manifolds, and Field Theories" trimester Hausdorff Research Institute for Mathematics

ORGANIZATION AND SERVICE	2020	Faculty search committee Northeastern University Committee Member
	2020	Colloquium committee Northeastern University Chair
	2020	National Science Foundation review panel Panelist
	2020	Mid-Atlantic Topology Conference University of Pennsylvania (postponed) Organizer
	2020	Workshop on "Configuration spaces of graphs" American Institute of Mathematics Organizer
	2020	Departmental tea Northeastern University Organizer
	2020	Postdoctoral hiring committee Northeastern University Committee member
	2019	Topology "kickoff" mini-conference Northeastern University Organizer
	2019–	Graduate committee Northeastern University Committee member
	2019–	Topology seminar Northeastern University Organizer
	2018–19	"Thursday" seminar Harvard University Organizer
	2018–19	Qualifying exam committee Harvard University Committee member
	2016–	Geom. Topol., Compos. Math., Math. Ann., Adv. Math., Notices Am. Math. Soc., Algebr. Geom. Topol., Homol. Homotopy Appl., Order Referee

REFERENCES   **Alexandru Suciu** (faculty mentor), Northeastern University, `a.suciu@northeastern.edu`

Michael Hopkins (postdoctoral supervisor), Harvard University, `mjh@math.harvard.edu`

John Francis (Ph.D. advisor), Northwestern University, `jnkf@math.northwestern.edu`

Jameel Al-Aidroos (teaching), Harvard University, `jameel@math.harvard.edu`