

# Alexander Zupan

---

- CONTACT INFORMATION Department of Mathematics zupan@unl.edu  
203 Avery Hall http://math.unl.edu/~azupan2  
University of Nebraska-Lincoln 402.472.4301  
Lincoln, NE 68588
- RESEARCH INTERESTS Geometry and topology, specifically geometric topology, low-dimensional topology, and knot theory.
- PROFESSIONAL EXPERIENCE **The University of Nebraska–Lincoln**, Lincoln, NE  
Assistant Professor, August 2015 to present  
**The University of Texas at Austin**, Austin, TX  
NSF Postdoctoral Fellow and Instructor, September 2012 to July 2015
- EDUCATION **The University of Iowa**, Iowa City, IA  
Ph.D., Mathematics, July 2012  
Advisors: Maggy Tomova and Charles Frohman  
M.S., Mathematics, July 2009  
**Gustavus Adolphus College**, St. Peter, MN  
B.A., Honors Mathematics and Honors Music, May 2007
- GRANTS **NSF Focused Research Group (FRG) Grant DMS-1664578**, Collaborative Research: Trisections – New Directions in Low-Dimensional Topology, Lead Institution, \$187,051, 2017-2020  
**NSF Established Program to Stimulate Competitive Research (EP-SCoR) First Award OIA-1557417**, Invariants in Higher-Dimensional Knot Theory, \$24,997, 2017-2018  
**Simons Foundation Collaboration Grant** (not eligible to accept), 2017  
**NSF Mathematical Sciences Postdoctoral Research Fellowship DMS-1203988**, \$150,000, 2012-2015
- RESEARCH EXPERIENCE **Publications**  
1. (with Jeffrey Meier) *Genus-two trisections are standard*, *Geom. Topol.* **21** (2017), no. 3, 1583–1630.  
2. (with Jeffrey Meier) *Bridge trisections of knotted surfaces in  $S^4$* , *Trans. Amer. Math. Soc.* **369** (2017), no. 10, 7343–7386.  
3. (with Jessica Purcell) *Independence of volume and genus  $g$  bridge numbers*, *Proc. Amer. Math. Soc.* **145** (2017), no. 4, 1805–1818.

4. (with Jeffrey Meier and Trent Schirmer) *Classification of trisections and the generalized property R conjecture*, Proc. Amer. Math. Soc. **144** (2016), no. 11, 4983–4997.
5. (with B. Jang, A. Kronaer, P. Luitel, D. Medici, and S. Taylor) *New examples of Brunnian theta graphs*, Involve **9** (2016), no. 5, 857–875.
6. (with Samuel Taylor) *Products of Farey graphs are totally geodesic in the pants graph*, J. Topol. Anal. **8** (2016), no. 2, 287–311.
7. *Uniqueness of higher genus bridge surfaces for torus knots*, Math. Proc. Cambridge Philos. Soc. **159** (2015), no. 1, 79–88.
8. (with Ryan Blair) *Knots with compressible thin levels*, Alg. Geom. Top. **15** (2015), no. 3, 1691–1715.
9. (with R. Sean Bowman and Scott A. Taylor) *Bridge spectra of twisted torus knots*, Int. Math. Res. Notices (2015), no. 16, 7336–7356
10. *Bridge spectra of iterated torus knots*, Comm. Anal. Geom. **22** (2014), no. 5, 931–963.
11. *Infinite cardinalities in the Hausdorff metric geometry*, Involve **7** (2014), 285–293.
12. *Bridge and pants complexities of knots*, J. London Math. Soc. (2) **87** (2013), 43–68.
13. *A lower bound on the width of satellite knots*, Top. Proc. **40** (2012), 179–188.
14. *Unexpected local minima in the width complexes for knots*, Alg. Geom. Top. **11** (2011), no. 2, 1097–1106.
15. *Properties of knots preserved by cabling*, Comm. Anal. Geom. **19** (2011), no. 3, 541–562.
16. (with C. Blackburn, K. Lund, S. Schlicker, and P. Sigmon) *A missing prime configuration in the Hausdorff Metric Geometry*, J. Geom. **92** (2009), no. 1-2, 28–59.

### Preprints

17. (with Jeffrey Meier) *Characterizing Dehn surgeries on links via trisections*, 2017, available at [arxiv.org/abs/1707.08955](https://arxiv.org/abs/1707.08955)
18. (with Derek Davies) *Natural properties of the trunk of a knot*, 2016, available at [arxiv.org/abs/1608.00019](https://arxiv.org/abs/1608.00019).

### AWARDS

**Presidential Fellowship**, University of Iowa, 2007-2012

**Catherine Wegner Teaching Award**, University of Iowa, 2010

**NSF Graduate Research Fellowship Honorable Mention**, 2007, 2009

**NCAA Postgraduate Scholarship**, 2007

**First Team Academic All-American**, 2007

**USA Today All-Academic 3rd Team**, 2007

**Barry M. Goldwater Scholarship**, 2006

TEACHING  
EXPERIENCE

**The University of Nebraska-Lincoln**

M990 Topics in Topology, spring 2017  
M314 Linear Algebra, spring 2017 and fall 2015  
M208 Calculus III, spring 2016 and fall 2015  
M221 Differential Equations, spring 2016

**The University of Texas at Austin**

M208L Integral Calculus, fall 2013  
M408C Differential and Integral Calculus, spring 2013

**The University of Iowa**

22M:009 Elementary Functions, fall 2009  
22M:009 Elementary Functions, spring 2009  
*Certificate in College Teaching*  
Issued by the Office of Graduate Teaching Excellence, spring 2011

INVITED TALKS

*The Andrews-Curtis Conjecture and new handle decompositions of the 4-sphere*, Triangle Topology Seminar, April 2017.

*Non-standard bridge trisections of the unknotted 2-sphere in 4-space*, NCSU topology seminar, April 2017.

*Connected trisections and Dehn surgery on links*, Workshop on Trisections and low-dimensional topology, American Institute of Mathematics, March 2017.

*The Andrews-Curtis Conjecture and the topology of the 4-sphere*, Kansas State University math department colloquium, February 2017.

*The search for non-standard bridge trisections of unknotted surfaces*, Kansas State University topology seminar, February 2017.

*Generalized Property R and trisections of 4-manifolds*, Monash University topology seminar, Melbourne, Australia, November 2016.

*Generalized Property R and trisections of the 4-sphere*, Rice University topology seminar, November 2016.

*Trisections of the 4-sphere*, UT Austin topology seminar, October 2016.

*The Generalized Property R Conjecture and fibered ribbon knots*, The Hausdorff Institute for Mathematics, Bonn, Germany, October 2016.

*Decompositions of 4-manifolds*, University of Iowa topology seminar, September 2016.

*New potential counterexamples to the Generalized Property R Conjecture*, George Washington University topology seminar, September 2016.

*Topological decompositions of 3- and 4-manifolds and related problems*, Georgia Topology Conference, University of Georgia, May 2016.

*Generalized Property R and trisections of the 4-sphere*, UC Davis topology seminar, May 2016.

*The trunk of a knot and connected sums*, AMS Central Sectional Meeting, Fargo, ND, April 2016.

*Waldhausen's Theorem, the Generalized Property R Conjecture, and the Andrews-Curtis Conjecture*, BYU math department colloquium, March 2016.

*Hyperbolic volume and higher genus bridge numbers*, Advances in Quantum and Low-Dimensional Topology, University of Iowa, March 2016.

*Handle decompositions of the 4-sphere, Generalized Property R, and trisections*, Synchronizing Smooth and Topological 4-manifolds, Banff International Research Station, February 2016.

*Trisections of 4-manifolds and Dehn surgery*, William Rowan Hamilton Geometry Workshop, Trinity College Dublin, August 2015.

*Classifying trisections of 4-manifolds*, Moab Topology Conference, May 2015.

*Cosmetic surgeries on tunnel number one links*, AMS Western Sectional Meeting, Las Vegas, NV, April 2015.

*Planar diagrams for knotted surfaces in 4-space*, BYU topology seminar, April 2015.

*Diagrams for knotted surfaces in the 4-sphere*, Oklahoma State University mathematics colloquium, February 2015.

*Diagrams for knotted surfaces in the 4-sphere*, University of Nebraska mathematics colloquium, January 2015.

*Bridge number and diagrams of surface links in the 4-sphere*, Knots in Dallas, January 2015.

*Surface knots with small bridge number*, Osaka City University topology seminar, December 2014.

*Bridge spectra of knots in the 3-sphere*, Nara Women's University, Nara, Japan, December 2014.

*Bridge presentations of knotted surfaces in  $S^4$* , Indiana University topology seminar, November 2014.

*A new complexity for knotted surfaces in  $S^4$* , Georgia topology seminar, October 2014.

*Bridge trisections for knotted surfaces in  $S^4$* , The Thin Manifold Conference, University of Iowa, August 2014.

*The bridge number of high distance tangle sums*, Oklahoma State University topology seminar, April 2014.

*Knots with compressible thin levels*, Parameterized Morse Theory in Low-Dimensional and Symplectic Topology, Banff International Research Station, March 2014.

*The geometry of the pants graph*, University of Minnesota differential geometry and symplectic topology seminar, January 2014.

*Totally geodesic subgraphs of the pants graph*, University of Wisconsin geometry/topology seminar, September 2013.

*Strongly irreducible bridge surfaces versus essential surfaces in knot complements*, Low-Dimensional Topology and Geometry in Toulouse, June 2013.

*The bridge spectrum of a knot*, Michigan State University topology seminar, April 2013.

*The classification of bridge surfaces for torus knots*, AMS sectional meeting, Boston College, April 2013.

*The  $(g, b)$ -decompositions of iterated torus knots*, Knots in Washington XXXV, George Washington University, December 2012.

*Generalized bridge numbers of iterated torus knots*, Rice University topology seminar, November 2012.

*The genus  $g$  bridge numbers of cable knots*, University of Pennsylvania topology seminar, October 2012.

*Knots with diverse bridge spectra*, University of Texas topology seminar, September 2012.

*Genus  $g$  bridge numbers for knots in the 3-sphere*, Oklahoma State University topology seminar, April 2012.

*Pants distance, twist number, and volume of hyperbolic 2-bridge knots*, Knots in Washington XXXIII, George Washington University, December 2011.

*The pants complex, the dual curve complex, and bridge splittings of knots*, UC Davis topology seminar, November 2011.

*Bridge and pants complexities of knots*, UCSB topology seminar, November 2011.

*A new distance for bridge splittings of knots*, Rice University topology seminar, September 2011.

*Knot invariants via the pants and dual curve complexes*, University of Texas topology seminar, September 2011.

*Thin position of cable knots*, AMS sectional meeting, University of Iowa, March 2011.

*A comparison of the width complexes for knots and 3-manifolds*, Spring Topology and Dynamics Conference, UT-Tyler, March 2011.

*Unexpected local minima in the width complexes for knots*, Knots in Washington XXXI, George Washington University, December 2010.

*A lower bound on the width of satellite knots*, Knots in Poland III, Banach Center, Poland, July 2010.

#### SERVICE

Co-organizer of the Nebraska Conference for Undergraduate Women in Mathematics, fall 2015 to present.

Co-organizer of the AIM workshop on Trisections and low-dimensional topology, March 2017.

Co-organizer of the Special Session on the Topology of 3- and 4-manifolds, AMS Fall Central Sectional, St. Thomas University, October 2016.

All Girls All Math mini-course instructor, UNL, summer 2016 and 2017.

Co-organizer of the Texas Geometry and Topology Conference, University of Texas, fall 2014.

Co-organizer of the Special Session on Topology of 3-manifolds, AMS Spring Central Sectional, Iowa State University, April 2013.

Referee for Geom. Topol., Comm. Anal. Geom., Alg. Geom. Top., Math. Proc. Cambridge Philos. Soc., Geom. Dedicata, J. Knot Theory Ramifications.

Reviewer for Math Reviews.

Helped to run Putnam exam preparation session, University of Texas, fall 2012.

Helped to organize Sonia Kovalevsky day, University of Iowa, April 2011.

Co-organizer of the graduate student topology seminar, University of Iowa, fall 2010 - spring 2011.

OTHER  
RELEVANT  
EXPERIENCE

UNL Research Development Fellows Program selected participant, 2015-2016.

MAA Project NExT Fellow, 2015-2016.

Co-supervising graduate students Marla Williams (UNL) and Vincent Longo (UNL).

Supervised undergraduate research students Rebecca Sorsen (UNL), Andrew Loken (UNL), Ethan Romary (UNL), Olivia Thiel (UNL), and Derek Davies (UT).

Presented a graduate student workshop, The Thin Manifold Conference, University of Iowa, August 2014.