

## Wöden Kusner

---

2019

CONTACT INFORMATION	Department of Mathematics Vanderbilt University 1511 Stevenson Center Nashville, TN, 37240, USA	☎ +1 615 322 6651 ☎ +1 484 447 8530 ✉ <a href="mailto:wkusner@gmail.com">wkusner@gmail.com</a> 🌐 <a href="https://wkusner.github.io">wkusner.github.io</a>
CITIZENSHIP	USA	
RESEARCH INTERESTS	Optimal Geometry, Topology of Configuration Spaces, Probability and Measure Theory, Representation Theory, Statistical Mechanics and Condensed Matter.	
EDUCATION	<b>University of Pittsburgh</b> , Pittsburgh, PA USA  Ph.D., Mathematics, August 2014 Advisor: Professor Thomas C. Hales Dissertation: <i>Bounds on packing density via slicing</i>  M.A., Mathematics, August 2010  <b>Haverford College</b> , Haverford, PA USA  B.S., Mathematics, May 2007 Advisor: Professor John J. Flynn Thesis: <i>Results in sphere packing density</i>	
CERTIFICATES	<b>Vanderbilt University</b> , Nashville, TN USA  Certificate in College Teaching, May 2019	
ACADEMIC APPOINTMENTS	<b>Visiting Assistant Professor</b> Department of Mathematics Data Science Institute Faculty Affiliate Vanderbilt University	2017 - Present
	<b>Postdoctoral Associate</b> Center for Constructive Approximation Vanderbilt University	2017 - Present
	<b>FWF Postdoctoral Researcher</b> Institute of Analysis and Number Theory Graz University of Technology	2014 - 2017
	<b>Visiting Scholar</b> ICERM Brown University	2015, 2018
	<b>Visiting Scholar</b> Erwin Schrödinger International Institute University of Vienna	2014

# PAPERS

- with G. Buck and R. Kusner. Stopper knots. (*in preparation*).
- with G. Dietler, E. Rawdon, R. Kusner and P. Szymczak. Chirality for crooked curves. (*in preparation*).
- with R. Kusner. A Gordian pair of links. (*submitted*). <https://arxiv.org/abs/1908.05610>
- with J. Brauchart, P. Grabner and J. Ziefle. Hyperuniform point sets on the sphere: probabilistic aspects. (*submitted*). <https://arxiv.org/abs/1809.02645>,
- with T. Hales. Packings of regular pentagons in the plane. To appear in *Contemporary Mathematics (Festschrift for W. Kuperberg)*. <https://arxiv.org/abs/1602.07220>
- with R. Kusner, J. Lagarias and S. Shlosman. Configuration spaces of equal spheres touching a given sphere: the twelve spheres problem. *Bolyai Society Mathematical Studies: New Trends in Intuitive Geometry*, 2018. <https://arxiv.org/abs/1611.10297>
- with J. Brauchart and P. Grabner. Hyperuniform point sets on the sphere: deterministic aspects. *Constr Approx*, 2018. <https://arxiv.org/abs/1709.02613>
- with Y. Kallus. The local optimality of the double lattice packing. *Discrete Comput Geom*, 2016. <https://arxiv.org/abs/1509.02241>
- On the densest packing of polycylinders in any dimension. *Discrete Comput Geom*, 2016. <https://arxiv.org/abs/1405.0497>
- An upper bound on packing density for circular cylinders of high aspect ratio. *Discrete Comput Geom*, 2014. <https://arxiv.org/abs/1309.6996>

# TALKS AND CONFERENCES

- BIRS-CMO Workshop: *TBA*. 9/\*/19
- Topology and its Applications, WKU: *Gordian configurations* (II). 7/17/18
- ICERM Seminar, Brown: *Gordian configurations* (I). 4/11/18
- ICERM Seminar, Brown: *Computing discrepancy*. 3/9/18
- Aspen Center for Physics, 6/\*/2017
- Montanuniversität Leoben: *Critical packings & the radius function*. 6/2/17
- CEIM, Universidad de Cantabria: *Critical packings (in the sphere)*. 4/22/17
- JMM: Dis. Geo. & Con.: *Critical packings, rigidity, & the radius function*. 1/6/17
- TU Graz, Fall School: *Critical packings, rigidity, & the radius function*. 9/30/16
- AIM Workshop: *Configurations of spheres*. 9/22/16
- ICERM Workshop, Brown 9/\*/16
- ACG Seminar, Pittsburgh: *Configurations of spheres*. 8/25/16
- MCQMC, Stanford: *Config. of pts w.r.t. discrepancy & unif. distribution*. 8/17/16
- SRP, MSRI: *Critical packings, rigidity, & the radius function*. 8/4/16
- Institut Henri Poincaré Workshop, 6/\*/16
- Special Session on New Developments in Discrete and Intuitive Geometry, AMS Spring SE Sectional: *Config. of pts w.r.t. discrepancy & unif. distribution*. 3/6/16
- Advanced Topics Seminar, TU Graz: *Configurations of spheres*. 1/22/16
- Zahlentheoretisches Kolloquium, TU Graz: *Problems with packing periodicity*. 12/11/15
- ICERM, Brown: *Can rods pack space more densely than disks the plane?* 4/28/15
- ICERM, Brown: *Spherical discrepancy*. 4/9/15
- TU Graz: *Computing spherical cap discrepancy: proof of concept*. 1/22/15
- Guest Lecture, TU Graz: *Introduction to packing problems*. 1/19/15
- Large Structures Seminar, Aalto: *Packing density bounds in higher dimensions*. 11/22/14
- ESI Workshop: *A brief analysis of regular pentagon packings in the plane*. 8/27/14

- IAS – PCMI Researcher: Mathematics and Materials. 6/\*/14
- Oberwolfach: *Packing polycylinders*. 6/\*/14
- Dissertation Defense, Pittsburgh: *Bounds on packing density via slicing*. 5/22/14
- Seminar, TU Graz: *Packing density bounds via slicing*. 5/8/14
- Erdős Memorial Lectures, Memphis: *Polycylinder density in higher dimensions*. 3/14
- Fields Institute: Workshop in Discrete Geometry. 11/\*/13
- GSS, Pittsburgh: *Some packing problems & an upper bound*. 3/28/13
- A&S Graduate Expo, Pittsburgh: *Packing cylinders with high aspect ratio*. 3/23/13
- ACG Seminar, Pittsburgh: *An upper bound on packing density for circular cylinders with high aspect ratio*. 2/12/13
- Topological Dynamics Workshop, Newton Institute: *Packing circular cylinders*. 11/\*/12
- IMA Summer School in Topological Methods, Penn. 7/\*/11
- Graduate Algebra, Combinatorics and Geometry Seminar, Pittsburgh:
  - *The Jones Polynomial and the Kauffman Bracket*
  - *Category Theory V (Representable Functors)*
  - *Category Theory IV (Limits Informally/Formally)*
  - *Category Theory III (Slice and Comma Categories)*
  - *Category Theory II (Products and Limits)*
- Senior Thesis Defense, Haverford: *Results in sphere packing density*. 5/\*/07

#### HONORS & AWARDS

- Featured in *Die Presse: Science and Innovation*, ‘17
- University of Pittsburgh Honors Convocation ‘13, ‘14
- Outstanding Lecture/Presentation: University Graduate Expo ‘13
- Irvis Fellow: University of Pittsburgh ‘09, ‘12
- Bronze Presidential Service Award for AmeriCorps Volunteer Service ‘08

#### TEACHING

##### **Vanderbilt University**, Nashville, TN USA

###### *Visiting Assistant Professor*

8/17 - Present

- |   |            |
|---|------------|
| - Instructor for MATH 2300: Vector Calculus (2 sections)    | Fall ‘19   |
| - Supervisor for Undergraduate Summer Research (3 students) | Summer ‘19 |
| - Instructor for MATH 3641: Statistical Inference           | Spring ‘19 |
| - Instructor for MATH 5641: Graduate Statistics             | Spring ‘19 |
| - Instructor for MATH 2300: Vector Calculus                 | Fall ‘18   |
| - Instructor for MATH 1010: Prob. & Stat. Inference I       | Fall ‘18   |
| - Supervisor for MATH 1010 Undergraduate TAs (3 sections)   | Fall ‘18   |
| - Instructor for MATH 3641: Statistical Inference           | Spring ‘18 |
| - Instructor for MATH 5641: Graduate Statistics             | Spring ‘18 |
| - Instructor for MATH 1011: Prob. & Stat. Inference II      | Spring ‘18 |
| - Supervisor for MATH 1011 Undergraduate TAs (3 sections)   | Spring ‘18 |
| - Instructor for MATH 1010: Prob. & Stat. Inference I       | Fall ‘17   |
| - Supervisor for MATH 1010 Undergraduate TAs (3 sections)   | Fall ‘17   |

##### **Graz University of Technology**, Graz, AT

###### *Lehrbeauftragter*

10/14 - 1/15, 3/16 - 6/16

- |   |            |
|---|------------|
| - Instructor for MAT.670: Packings, Lattices and Configurations | Summer ‘16 |
| - Assistant for MAT.902: Höhere Analysis                        | Winter ‘14 |

**University of Pittsburgh, Pittsburgh, PA USA**

*Teaching Fellow*

9/10 - 12/11

- Assistant for Math 0220: Calculus I (3 sections) Fall '11
- Assistant for Math 2700: Graduate Topology Fall '11
- Assistant for Math 1700: Topology Spring '11
- Assistant for Math 1410: Foundations of Mathematics Spring '11
- Assistant for Math 1250: Abstract Algebra 2 Spring '11
- Assistant for Math 0230: Calculus 2 Fall '10
- Assistant for Math 0220: Calculus 1 (2 sections) Fall '10

*Teaching Assistant*

9/09 - 8/10

- Instructor for Math 0120: Business Calculus Summer '10
- Assistant for Math 0120: Business Calculus (3 sections) Spring '10
- Assistant for Math 0240: Calculus 3 (3 sections) Fall '09

Sample material and evaluations available upon request.

- PROFESSIONAL SERVICE
- Active referee and reviewer for various journals and scientific bodies
  - Honors Thesis Committee for David K. Zhang, B.S. High Honors 2019 (Vanderbilt)
  - Dissertation Committee for Oleksandr Vlasiuk, Ph.D. 2018 (Vanderbilt)
  - Organizer: Shanks Workshop (Vanderbilt University) '19
  - Organizer: Computational Analysis Seminar (Vanderbilt University) '18 - '19
  - Organizer: From the Fundamental Lemma to Dis. Geo. to Formal Verification '18
  - Research Mentor for Jonas Zifile (Graz)
  - Representative: Dietrich School of Arts and Sciences Council, '12 - '14
  - Delegate: Arts and Sciences Graduate Student Organization, '11 - '14
  - President: Mathematics Graduate Student Organization, '13 - '14
  - Treasurer: Mathematics Graduate Student Organization, '11 - '13
  - Treasurer: SIAM University of Pittsburgh Chapter, '10 - '11
  - Organizer: Graduate Seminar in Algebra, Combinatorics and Geometry, '10 - '11

TECHNICAL SKILLS       $\text{\TeX}$  ( $\text{\LaTeX}$ ,  $\text{\BibTeX}$ ). Mathematica, Python, Julia. German (AP, B2), Spanish (AP).

REFERENCES      Please contact me for references.