Wöden B. Kusner

Contact Information

Department of Mathematics
Vanderbilt University
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Citizenship USA

Research Interests Discrete and Metric Geometry, Optimization, Geometric Analysis, Emergent Phenomena, Geometric Measure Theory, Integral Geometry, Representation Theory

Education

University of Pittsburgh, Pittsburgh, PA USA

Ph.D., Mathematics, August 2014

Advisor: Professor Thomas C. Hales
Dissertation: *Bounds on packing density via slicing*

M.A., Mathematics, August 2010

Haverford College, Haverford, PA USA

B.S., Mathematics, May 2007

Advisor: Professor John J. Flynn
Thesis: *Results in sphere packing density*

Academic Appointments

Assistant Professor (NTT) August 2017
Department of Mathematics
Vanderbilt University

FWF Postdoctoral Researcher September 2014 to August 2017
Institute of Analysis and Number Theory
Graz University of Technology

Visiting Scholar Fall 2014
Erwin Schrödinger International Institute
University of Vienna

Visiting Scholar Spring 2015
ICERM
Brown University

Papers

Rob Kusner, Wöden Kusner, Jeff Lagarias and Senya Shlosman. The twelve spheres problem. https://arxiv.org/abs/1611.10297 (*submitted/accepted*)

Thomas Hales and Wöden Kusner. Packings of regular pentagons in the plane. https://arxiv.org/abs/1602.07220 (*submitted*)

Yoav Kallus and Wöden Kusner. The local optimality of the double lattice packing. *Discrete Comput. Geom.* **56**(2): 449-471, 2016. https://arxiv.org/abs/1509.02241

Wöden Kusner. On the densest packing of polycylinders in any dimension. *Discrete Comput. Geom.* **55**(3): 638-641, 2016. https://arxiv.org/abs/1405.0497

Wöden Kusner. An upper bound on packing density for circular cylinders of high aspect ratio. *Discrete Comput. Geom.* **52**(4): 964-972, 2014. https://arxiv.org/abs/1309.6996

Talks and Conferences

Aspen Center for Physics, June 2017

Montanuniversität Leoben: *Critical packings and the radius function.* June 2, 2017

CEIM, Universidad de Cantabria: Optimal Point Configurations and Orthogonal Polynomials: *Critical packings (in the sphere).* April 22, 2017

JMM Special Session: Discrete Geometry and Convexity: *Critical packings, rigidity, and the radius function.* January 6, 2017

TU Graz, Fall School: Discrete Geometry and Topology: *Critical packings, rigidity, and the radius function.* September 30, 2016

AIM Workshop on Soft Packings, Nested Clusters and Condensed Matter: *Configurations of spheres.* September 22, 2016

ICERM Workshop on Unusual Configuration Spaces. September 2016

Algebra, Combinatorics, and Geometry Seminar, University of Pittsburgh: *Configurations of spheres.* August 25, 2016

MCQMC, Stanford: *Configurations of points with respect to discrepancy and uniform distribution.* August 17, 2016

Summer Research Program, MSRI: *Critical packings, rigidity, and the radius function.* August 4, 2016

Institut Henri Poincaré Workshop on Optimal and Random Point Configurations, June 2016

Special Session on New Developments in Discrete and Intuitive Geometry, AMS Spring Southeastern Sectional Meeting: *Configurations of points with respect to discrepancy and uniform distribution.* March 6th, 2016

Advanced Topics Seminar, TU Graz: *Configurations of spheres.* January 22nd, 2016

Zahlentheoretisches Kolloquium, TU Graz: *Problems with packing periodicity.* December 11th, 2015

ICERM Research Seminar, Brown University: *Can rods pack space more densely than disks pack in the plane?* April 28th, 2015

ICERM Postdoc and Graduate Student Seminar, Brown University: *Spherical discrepancy.* April 9, 2015

Working Problems Session, TU Graz: *Computing spherical cap discrepancy: proof of concept.* January 22, 2015

Guest Lecture, TU Graz: *Introduction to packing problems.* January 19, 2015

Large Structures Seminar, Aalto University: *Packing density bounds in higher dimensions.* November 22, 2014

ESI Workshop: *A brief analysis of regular pentagon packings in the plane.* October 27, 2014

Researcher, IAS – PCMI: Mathematics and Materials. July 2014.

Oberwolfach Seminar: Recent Methods in Sphere Packing and Optimization: *Packing polycylinders.* June 2014

Dissertation Defense, University of Pittsburgh: *Bounds on packing density via slicing.* May 22, 2014

Seminar, TU Graz: *Packing density bounds via slicing.* May 8, 2014

Erdős Memorial Lectures, University of Memphis: *Revisiting Bezdek and Kuperberg: A sharp upper bound for the packing density of polycylinders in higher dimensions.* March 2014

Fields Institute Workshop in Discrete Geometry, Fields Institute. November 2013

Graduate Student Seminar, University of Pittsburgh: *Some packing problems and an upper bound.* March 28, 2013

Dietrich School of Arts and Sciences Graduate Expo, University of Pittsburgh: *Packing cylinders with high aspect ratio.* March 23, 2013

Algebra, Combinatorics and Geometry Seminar, University of Pittsburgh: *An upper bound on packing density for circular cylinders with high aspect ratio.* February 12, 2013

Topological Dynamics Workshop, Isaac Newton Institute: *Packing circular cylinders.* November 2012

IMA Summer School in Topological Methods, University of Pennsylvania. 2011

Graduate Algebra, Combinatorics and Geometry Seminar, University of 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 College: *Results in sphere packing density.* May 2007

Awards

University of Pittsburgh Honors Convocation 2013, 2014

Outstanding Presentation: University Graduate Expo 2013

University of Pittsburgh Irvis Fellowship 2009, 2012

Bronze Presidential Service Award for AmeriCorps Volunteer Service 2008

Teaching Experience

Graz University of Technology, Graz, AT

Lehrbeauftragter October 2014-January 2015, March-June 2016

Instructor for MAT.670: Packings, Lattices and Configurations
Summer 2016

Assistant for MAT.902: Höhere Analysis
Winter 2014 (1 section)

University of Pittsburgh, Pittsburgh, PA USA

Teaching Fellow September 2010 - December 2011

Assistant for Math 0220: Calculus I
Fall 2011 (3 sections)

Assistant for Math 1700: Topology
Spring 2011

Assistant for Math 1410: Foundations of Mathematics
Spring 2011

Assistant for Math 1250: Abstract Algebra 2
Spring 2011

Assistant for Math 0230: Calculus 2
Fall 2010

Assistant for Math 0220: Calculus 1
Fall 2010 (2 sections)

Teaching Assistant September 2009 - August 2010

Instructor for Math 0120: Business Calculus
Summer 2010
Responsible for lectures and course material

Assistant for Math 0120: Business Calculus
Spring 2010 (3 sections)

Assistant for Math 0240: Calculus 3
Fall 2009 (3 sections)

Sample material and student evaluations available upon request

Professional Service

Representative: Dietrich School of Arts and Sciences Council, 2012 - 2014

Delegate: Arts and Sciences Graduate Student Organization, 2011 - 2014

President: Mathematics Graduate Student Organization, 2013 - 2014

Treasurer: Mathematics Graduate Student Organization, 2011 - 2013

Treasurer: SIAM University of Pittsburgh Chapter, 2010 - 2011

Organizer: Graduate Seminar in Algebra, Combinatorics and Geometry, 2010 - 2011

Technical Skills

TEX (LATEX, BIBTEX), Mathematica. Intermediate German, Intermediate Spanish.

References

Please contact me for references.