

Education

- May 2019** PhD Mathematics - Arizona State University
Hybrid subgroups of complex hyperbolic isometries.
Advisor: Dr. Julien Paupert
- May 2016** MA Mathematics - Arizona State University
- May 2013** BS Mathematics - Arizona State University

Research Interests

My research interests are generally in the areas surrounding complex hyperbolic geometry, especially low-dimensional topology and discrete subgroups of Lie groups. My dissertation research under the guidance of Dr. Julien Paupert was aimed at finding a complex hyperbolic analogue to the hybrid lattice construction produced by Gromov and Piatetsky-Shapiro.

Teaching Experience

- Aug 2019 - current** Virginia Tech, Blacksburg, VA 24061
Instructor
Courses Taught:
- Calculus of a Single Variable I (Fall 2019)
 - Discovering Mathematics II - First Year Research (Spring 2020)
 - Introduction to Linear Algebra (Spring 2020)
- Aug 2013 - May 2019** Arizona State University, Tempe, AZ 85281
Teaching Assistant
Courses Assisted:
- Calculus with Analytic Geometry I (Fall 2013).
 - Calculus with Analytic Geometry II (Spring/Fall 2014).
 - Calculus with Analytic Geometry III (Spring 2015,2019).
 - Geometry and Topology of Manifolds I (Fall 2015,2016).
 - Geometry and Topology of Manifolds II (Spring 2017).
- Courses Taught:**
- Calculus for Engineering II (Summer 2016, Fall 2017, Fall 2018).
 - Calculus for Engineering II Online (Spring 2018, 2019).
 - Calculus for Engineering I (Spring 2016).
 - Precalculus (Summer 2015).

Non-Teaching Experience

May 2017 - Air Force Research Labs, Wright State University, Dayton, OH 45435
Aug 2017 *ATR Center Research Intern*
Information geometry and applying techniques from Riemannian geometry to covariance estimation.

Awards

- Outstanding Teaching Assistant (Spring 2018)

Publications and Preprints

Preprints are available on my website (joseph-wells.com) or by request.

Research

- “Non-arithmetic hybrid lattices in $PU(2, 1)$ ”. *Geom. Dedicata* (To appear). DOI: 10.1007/s10711-019-00506-5
- (with J. Paupert) “Hybrid lattices and thin subgroups of Picard modular groups”. *Topology Appl.* 269 (2020). p. 10698.
- (with M. Cook, K. Cameron, B. Robinson) “Fisher-Rao distances on the covariance cone”. *Preprint* (2018).

Expository

- “Hyperbolic groups are finitely presented.” Submitted (2020).

Other

- “Hybrid subgroups of complex hyperbolic isometries”. *PhD Thesis*. (2019).
- Course notes: Calculus I. (2016).
- Course notes: Calculus II. (2018).

Talks and Presentations

Future

- *Geometry/Topology Seminar* at Virginia Tech. Talk: “Surface Automorphisms I: An Introduction to Mapping Class Groups” February 06, 2020.
- *Geometry/Topology Seminar* at Virginia Tech. Talk: “Surface Automorphisms II: The Nielsen-Thurston Classification” February 13, 2020.

Past

- *Geometry/Topology Seminar* at Virginia Tech. Talk: “Complex Hyperbolic Geometry II: Spherical CR Structures.” November 07, 2019.
- *Geometry/Topology Seminar* at Virginia Tech. Talk: “Complex Hyperbolic Geometry I: An Introduction.” October 31, 2019.
- *Differential Geometry Seminar* at Arizona State University. Talk: “Putting hyperbolic manifolds where they don’t belong.” October 18, 2019.
- *LG&TBQ* at University of Michigan. Talk: “Hybrid subgroups of Mostow’s lattices in $PU(2, 1)$.” June 13, 2019.
- *Graduate Student Conference in Algebra, Geometry, and Topology* at Temple University. Talk: “Hybrid subgroups of complex hyperbolic isometries.” June 01, 2019.
- *MathConnections* at University of California, Riverside. Talk: “Nonarithmetic hybrid subgroups of $PU(2, 1)$.” May 18, 2019.
- *Differential Geometry Seminar* at Arizona State University. Talk: “Medium-scale curvature for Cayley graphs.” April 16, 2019.
- *Joint Math Meetings* at Baltimore. *AMS Special Session on Geometry and Dynamics of Continued Fractions*. Talk: “Hybrid subgroups of lattices in $PU(2, 1)$.” January 16 - 19, 2019.
- *Texas Geometry and Topology Conference* at Rice University. Poster: “Hybrid subgroups of lattices in $PU(2, 1)$.” November 9 - 11, 2018.
- *Differential Geometry Seminar* at Arizona State University. Talk: “Hybrid subgroups of lattices in $PU(2, 1)$.” October 19, 2018.
- *Graduate Student Seminar* at Arizona State University. Talk: “Continued fractions and the Heisenberg group.” October 2, 2018.
- *Graduate Student Seminar* at Arizona State University. Talk: “Surface automorphisms.” February 6, 2018.
- *Differential Geometry Seminar* at Arizona State University. Talk: “Discrete subgroups of complex hyperbolic isometries.” November 03, 2017.
- *Graduate Student Seminar* at Arizona State University. Talk: “Complex hyperbolic lattices.” September 20, 2017.
- *Differential Geometry Seminar* at Arizona State University. Talk: “A short introduction to $CAT(0)$ cube complexes.” April 14, 2017.
- *Candidacy Advancement* at Arizona State University. Talk: “Discrete subgroups of complex hyperbolic isometries.” November 21, 2016.
- *Topology Students Workshop* at Georgia Institute of Technology. Short talk: “A geometric construction of thin subgroups of $SU(2, 1)$.” June 10, 2016.
- *Differential Geometry Seminar* at Arizona State University. Talk: “Exploring lattices in complex hyperbolic space.” April 15, 2016.
- *Differential Geometry Seminar* at Arizona State University. Talk: “Mapping class groups and surface automorphisms.” November 13, 2015.
- *SoMSS Research Fair* at Arizona State University. Poster: “Lattices and complex hyperbolic space.” November 19, 2014.
- *Differential Geometry Seminar* at Arizona State University. Talk: “The Hairy Ball Theorem.” April 16, 2014.

Conference Attendance

Future

- *Arithmetic reflection groups and crystallographic packings* at AIM, San Jose, CA. March 16 - 20, 2020.
- *Beyond Hyperbolicity* at the Ohio State University, Columbus, OH. July 6 - 10, 2020.
- *Complex Hyperbolic Geometry and Related Topics* at CIRM, Luminy, France. November 09 - 13, 2020.

Past

- *Tech Topology Conference* at Georgia Institute of Technology. December 6 - 8, 2019.
- *Mid-Atlantic Topology Seminar* at University of Virginia. October 26, 2019.
- *Young Geometric Group Theory VIII* at Bilbao, Spain. June 30 - July 5, 2019.
- *Redbud Topology Conferece* at University of Oklahoma. April 26 - 28, 2019.
- *Thin Groups in Number Theory, Geometry, and Topology* at Rice University. May 14 - 18, 2018.
- *Texas Geometry and Topology Conference* at University of Texas, Austin. November 17 - 19, 2017.
- *2017 Virginia Topology Conference* at University of Virginia. November 10 - 12, 2017.
- *Geometric Structures and Representation Varieties Junior Retreat* at Stanford University. July 30 - August 5, 2017.
- *4th Annual AFRL Workshop on the Mathematical Foundations of Probability, Uncertainty, and Decision* at Wright State University. June 20 - 21, 2017.
- *Conference on Low-Dimensional Topology and Geometry and 32nd annual Shanks Lecture* at Vanderbilt University. May 15 - 19, 2017.
- *MSRI Workshop: Groups acting on $CAT(0)$ spaces* at University of California, Berkeley. September 27 - 30, 2016.
- *Joelfest* at University of California, Berkeley. May 20 - 22, 2016.
- *Graduate Student Conference in Algebra, Geometry, and Topology* at Temple University. May 14 - 15, 2016.
- *Tech Topology Conference* at Georgia Insitute of Technology. December 4 - 6, 2015.
- *First Chicago Summer School in Geometry and Topology* at University of Chicago. June 22 - 26, 2015.
- *Graduate Student Topology and Geometry Conference* at University of Illinois, Urbana-Champaign. March 28 - 29, 2015.
- *Texas Geometry and Topology Conference* at University of Texas, Austin. November 14 - 16, 2014.
- *Geometric Structures and Representation Varieties Junior Retreat* at University of Michigan. May 23 - June 1, 2014.
- *Curves and Automorphic Forms* at Arizona State University. March 10 - 14, 2014.
- *Southwest Undergraduate Mathematics Research Conference* at University of Arizona. March 30 - April 1, 2012.

Additional Leadership Roles and Outreach

- 2019 - 2020: Organizer of Virginia Tech's weekly Geometry/Topology Seminar.
- 2019: Mentored graduate teaching assistants at Virginia Tech.
- 2018: Assisted *Set* activity at ASU's Math Day.

- 2018: Hosted ASU's Math Circle activity on *Conway's Rational Tangles*.
- 2018: Spoke at the ASU Math department's graduate recruiting weekend for potential incoming graduate students.
- 2017 - 2019: Started up and led a seminar for mathematics graduate students.
- 2017: Joined the ASU Math department's mentoring program to mentor incoming mathematics and statistics TAs.
- 2016: Assisted with ASU Math department's week-long TA Training Program for incoming TAs.
- 2014, 2017: Assisted with ASU's annual *Night of the Open Door* (a community outreach event).
- 2013 - 2017: Assisted with ASU's annual *CryptoRally* (a cryptography-based scavenger hunt).