

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, low-dimensional topology, and geometric structures on manifolds. I'm especially interested in certain discrete subgroups Lie groups, namely non-arithmetic lattices of complex hyperbolic isometries. Under the guidance of Dr. Julien Paupert was aimed at finding a complex hyperbolic analogue to the non-arithmetic lattice construction produced by Gromov and Piatetsky-Shapiro.

Teaching Experience

- Aug 2019 - current** Virginia Tech, Blacksburg, VA 24061
Instructor
Courses Coordinated:
- Calculus of a Single Variable I
- Courses Taught:**
- Discovering Mathematics II - First Year Research
 - Calculus of a Single Variable I
 - Introduction to Linear Algebra
 - Vector and Complex Analysis for Engineers
- Aug 2013 - May 2019** Arizona State University, Tempe, AZ 85281
Teaching Assistant
Courses Assisted:
- Calculus with Analytic Geometry I, II, & III
 - Geometry and Topology of Manifolds I, & II
- Courses Taught:**
- Precalculus
 - Calculus for Engineering I & II (both in-person and online)

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

- (with I. Pasquinelli) “The geometry of Deligne–Mostow lattices in $PU(3, 1)$ with four-fold symmetry”. In preparation.
- (with J. Paupert) “Hybrid lattices and thin subgroups of Picard modular groups”. *Topology Appl.* 269 (2020). pp. 106918, 15.
- “Non-arithmetic hybrid lattices in $PU(2, 1)$ ”. *Geom. Dedicata* 208 (2020). pp 1–11.
- (with M. Cook, K. Cameron, B. Robinson) “Fisher-Rao distances on the covariance cone”. *arXiv e-prints* (Oct 2020). arXiv:2010.15861.

Expository

- “Hyperbolic groups are finitely presented.” *Newsletter of the Ramanujan Math Society.* 31.1 (June 2020), pp. 9–12.

Other

- “Hybrid subgroups of complex hyperbolic isometries”. *PhD Thesis.* (2019).
- Course notes: Calculus I. (2016).
- Course notes: Calculus II. (2018).
- Course notes: Linear Algebra. (2020).
- Course notes: Complex Analysis. (2020).

Talks and Presentations

Recent Invited

- *AWM Research Days* at Virginia Tech. Talk: “What is the fundamental group and why is it so fundamental?” March 22, 2021.

- *Bristol Geometry & Topology Seminar* at University of Bristol, UK. Talk: “Complex hyperbolic hybrids.” December 01, 2020.
- *Topology Postdocs Workshop* at Georgia Institute of Technology. Talk: “Hybrid subgroups of Mostow’s Lattices in $PU(2, 1)$.” July 28, 2020.
- *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.

Recent Department

- *Geometry/Topology Seminar* at Virginia Tech. Talk: “Triangle Groups II: Beyond Triangles (Arithmetic Hyperbolic Reflection Groups).” November 17, 2020.
- *Geometry/Topology Seminar* at Virginia Tech. Talk: “Triangle Groups I: Arithmeticity and Takeuchi’s Classification.” November 03, 2020.
- *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.
- *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.

Conference Attendance

Recent

- *Artin groups, $CAT(0)$ geometry, and related topics* at the Ohio State University, Columbus, OH. July 5 - 9, 2021.
- *Beyond Hyperbolicity* at the Ohio State University, Columbus, OH. June 28 - July 21, 2021.
- *Topics at the Interface of Low Dimensional Group Actions and Geometric Structures* IMS at Nat’l Inst. of Singapore. January 04 - 15, 2021.
- *Arithmetic reflection groups and crystallographic packings* at AIM, San Jose, CA. December 14 - 18, 2020.
- *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 Conference* at University of Oklahoma. April 26 - 28, 2019.

Additional Leadership Roles and Outreach

- 2020: Assisted Virginia Tech K–12 Outreach Event.
- 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).