

SAMUEL A. BALLAS

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Current Employment

Florida State University

- Assistant Professor

Tallahassee, Florida
August 2016-Present

Previous Employment

University of California at Santa Barbara

- RTG Visiting Assistant Professor

Santa Barbara, California
July 2013-July 2016

Education

University of Texas at Austin

- Ph.D., Mathematics

Thesis: *Flexibility and Rigidity of Three-Dimensional Convex Projective Structures.*

Advisor: Alan Reid

Austin, Texas

May 2013

- M.A., Mathematics

May 2011

Emory University

- B.S. Mathematics., *Summa cum Laude*

Thesis: *Geometrically Finite Fuchsian Groups and the Patterson-Sullivan Measure.*

Advisor: David Borthwick

Atlanta, Georgia

May 2007

Research Interests

Low-dimensional topology, hyperbolic geometry, real projective geometry, discrete groups, deformation theory, higher Teichmüller theory.

Publications and Preprints

- *The moduli space of marked generalized cusps in real projective manifolds*
(with D. Cooper and A. Leitner), arXiv:2008.09553, submitted 2020.
- *Gluing equations for real projective structures on 3-manifolds*
(with A. Casella), arXiv:1912.12508, submitted 2019
- *Thin subgroups isomorphic to Gromov–Piatetski-Shapiro lattices*
Pacific J. Math. 309 (2020), no 2, 257–266.
- *Constructing thin subgroups of $SL(n + 1, \mathbb{R})$ via bending*
(with D.D. Long), Algebr. Geom. Topol. 20-4 (2020), 2071–2093
- *Constructing convex projective 3-manifolds with generalized cusps*
arXiv:1805.09274, to appear in J. London. Math. Soc.
- *Generalized cusps in real projective manifolds: classification*
(with D. Cooper and A. Leitner), J. Topol. 13-4 (2020) 1455–1496

- *Properly convex bending of hyperbolic manifolds*
(with L. Marquis), Groups, Geom, & Dynam 14 (2020), no. 2, 653-688.
- *Convex projective structures on non-hyperbolic 3-manifolds*
(with J. Danciger and G.S. Lee), Geom. & Topol 22 (2018) 1593–1646.
- *Constructing thin subgroups commensurable with the figure-eight knot group*
(with D.D. Long), Algebr. Geom. Topol. 15 (2015) no. 5, 3011-3024.
- *Finite volume properly convex deformations of the figure-eight knot*,
Geom. Dedicata 178 (2015), 49-73.
- *Deformations of non-compact, projective manifolds*,
Algebr. Geom. Topol. 14 (2014), no. 5, 2595-2625.

In Preparation

- *Complex projective structures on the thrice punctured sphere*
(with P. Bowers, A. Casella, and L. Ruffoni).
- *Convex projective Dehn filling*
(with J. Danciger, G.S. Lee, and L. Marquis).
- *Neumann–Zagier relations for projective gluing equations*
(with A. Casella).

Selected Talks

- *Triangulations in Low Dimensional Geometry and Topology*
Cal Poly San Luis Obispo, Colloquium Feb 2021
- *Gluing Equations for Projective Structures on 3-manifolds*
Oklahoma State University, Topology Seminar Apr 2020
- *Gluing Equations for Projective Structures on 3-manifolds*
Trends in Low Dimensional Topology, Online Seminar Jun 2020
- *Gluing Equations for Projective Structures on 3-manifolds**
Oklahoma State University, Topology Seminar Apr 2020
- *Gluing Equations for Projective Structures on 3-manifolds**
AMS Sectional Meeting, Special Session on Trends in Teichmüller Theory Mar 2020
- *Gluing Equations for Projective Structures on 3-manifolds*
FRG Workshop, University of Michigan Dec 2019
- *Gluing Equations for Projective Structures on 3-manifolds*
Geometry Seminar
Stanford University Mar 2019
- *Thin Groups via Bending*
Topology Seminar
Rice University Feb 2019

*Cancelled due to COVID-19 pandemic

- *Thin Groups from Projective Geometry*
Thin Groups in Number Theory, Geometry and Topology
Rice University May 2018
- *Convex Projective Structures in Low Dimensions*
University of Georgia, Topology Seminar April 2018
- *Generalized Cusps in Convex Projective Manifolds*
GEAR Retreat, Stanford University August 2017
- *Generalized Cusps in Convex Projective Manifolds*
Dynamics on Character Varieties Workshop, University of Rennes I June 2017
- *Rank 1 Deformations of Non-cocompact Hyperbolic Lattices*
University of Texas Topology Seminar March 2017
- *Geometric Structures on Manifolds*
UF/FSU Topology and Dynamics Meeting
University of Florida February 2017
- *Classification of Generalized Cusps*
Joint Mathematics Meetings, Special Session on Group Actions and Geometric Structures,
Atlanta, GA January 2017
- *Classification of Generalized Cusps*
California Institute of Technology, Geometry and Topology Seminar April 2016
- *Geometric Structures on Manifolds*
Mathematics Colloquium
Florida State University January 2016
- *Gluing Convex Projective Manifolds*
Higher Teichmüller theory and Higgs bundles: interactions and new trends
Heidelberg November 2015
- *Convex Projective Structures on Manifolds*
A Mini Course at Workshop on Geometric Structures
KIAS, Seoul, South Korea November 2014
- *Geometry of Cusps in Convex Projective Manifolds*
Workshop on Geometry and Physics, Univeristy of Pittsburgh May 2014
- *Geometry of Cusps in Convex Projective Manifolds*
RTG Workshop on Geometric Structures and Discrete Groups, UT Austin May 2014
- *A Geometric Description of $(P)SL_4(\mathbb{R})$ Hitchin Representations*
Workshop on Higher Teichmüller-Thurston Theory, Northport, Maine June 2013
- *Convex Projective Structures on Non-compact 3-manifolds*
California Institute of Technology, Geometry and Topology Seminar May 2013
- *Convex Projective Deformations of the Figure-8 Knot Complement*
AMS Special Session on Algebraic and Geometric Structures of 3-manifolds April 2013
- *Convex Projective Deformations of Non-Compact Manifolds*
Arizona State University Differential Geometry Seminar January 2013

- *Convex Projective Deformations of Non-Compact Manifolds*
Purdue University Geometric Analysis Seminar January 2013
- *Convex Projective Structures on 3-manifolds*
University of California at Santa Barbara Topology Seminar October 2012
- *Twisted Cohomology and Deformation Theory*
GEAR Junior Retreat, Urbana, Illinois July 2012

Teaching Experience

Florida State University

- *MTG 5932, Geometric Structures on Manifolds* Spring 2021
- *MAD 3105, Discrete Math II* Fall 2020
- *MAC 2313, Calculus II* Spring 2020
- *MAC 2313, Calculus III* Fall 2019
- *MAC 2312, Calculus II* Spring 2019
- *MTG 5327, Graduate Topology II* Spring 2019
- *MAC 2313, Calculus III* Fall 2018
- *MTG 5326, Graduate Topology I* Fall 2018
- *MAP 2303, ODEs* Spring 2018
- *MAC 2312, Calculus II* Spring 2017
- *MAC 2313, Calculus III* Fall 2016

University of California, Santa Barbara

- *Math 260P, Projective Structures on Manifolds* Spring 2016
- *Math 108A, Introduction to Linear Algebra* Fall 2015
- *Math 8, Transition to Higher Mathematics* Fall 2015
- *Math 260P, The Casson Invariant* Spring 2015
- *Math 6A, Vector Calculus* Winter 2015
- *Math 108A, Introduction to Linear Algebra* Fall 2014
- *Math 260P, Representations of Surface Groups* Spring 2014
- *Math 8, Transition to Higher Mathematics* Winter 2014
- *Math 103, Introduction to Group Theory* Fall 2013

Mentorship

Ph.D. Students

- Jared Miller Current

Postdocs Supervised

- Alex Casella Fall 2018-Spring 2021

Ph.D. Committee Member

- Paul Eugenio (advisor Oskar Vafek, Physics)
- Anindya Chanda (advisor Sergio Fenley)
- Aamir Rasheed (advisor Wolfgang Heil)
- Jay Leach (advisor Kathleen Petersen)
- Opal Graham (advisor Phil Bowers)
- John Bergschneider (advisor Wolfgang Heil)

- Leona Sparaco (advisor Kathleen Petersen)

Independent Study

- Daniel Hartman (2018, graduate student, geometric structures and characteristic classes)
- Jose Bousa (2017, undergraduate, projective geometry)

Funding and Awards

Grants Awarded

- First Year Assistant Professor Award, Council for Research and Creativity, Florida State University, \$20,000, Summer 2017
- NSF research grant -DMS 1709097- *Geometry and topology of convex projective manifolds*, \$139,278, 2017-2020

Professional and University Service

Florida State University

2016-present

- Faculty Senator 2021-Present
- Organizer of Academic Job Application Workshop Sept 2019.
- Organizer of AMS Sectional Meeting
on Geometric Structures on Manifolds Nov 2019.
- Organizer of UF/FSU Topology and Geometry Meeting Feb 2019
- Organizer of FSU Topology Seminar 2018-Present
- Organizer of GEAR network Junior Retreat, Summer 2017
- Referee for several journals
(e.g. Journal of Differential Geometry, Journal of the London Mathematical Society, Pacific Journal of Mathematics, Proceedings of the AMS etc.).
- Reviewer for Mathematical Reviews 2014-Present

Honors, Awards, and Fellowships

- Research Training Grant Postdoc, UC Santa Barbara 2013-2016
- Research Training Grant Fellowship, UT Austin 2011-2012
- Deborah Jackson Award recipient, Emory University 2007

Professional Memberships and Associations

- Member of the American Mathematical Society (AMS) 2007-present.

Last updated March 10, 2021