Andrew M. Sanders

Contact Information

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Research Interests

Geometry, topology, dynamics and geometric analysis. Particularly, surface group representations, dynamics of discrete group actions, complex geometry of locally homogeneous spaces, harmonic maps and Higgs bundles.

Current Employment

- Research Assistant Professor and N.S.F. Postdoctoral fellow at the University of Illinois at Chicago. 2013 - Current.

Past Employment

- Ph.D. student and Graduate Assistant at the University of Maryland, College Park. 2006-2013.

Education

University of Maryland, College Park.
- Ph.D. in Mathematics, 2013.

University of California, Los Angeles.
- B.S. in Mathematics, 2006.
- B.A. in English Literature (Creative writing concentration: Poetry), 2006.

Invited Talks

- Higher Teichmuller theory and Higgs bundles. Conference in Heidelberg, Germany. November 2015.
  Complex deformations of Anosov representations
- Geometric structures and related topics, Conference in Seoul, Korea. August 2015. Lecture series.
  Complex deformations of Anosov representations
- Dynamics on Moduli spaces of geometric structures, Semester at MSRI in Berkeley, January-May, 2015. 3 talks.
  Complexification of real analytic Kahler manifolds and hyper-Kahler geometry
  An overview of Labourie's conjecture on minimal surfaces
  Minimal surfaces and entropy of Hitchin representations
- Workshop on Higgs bundles and Harmonic maps, Conference in North Carolina, January 2015.
  An overview of Labourie's conjecture on minimal surfaces
- Rice University, Geometry seminar. November 2014.
  Minimal surfaces and entropy of Hitchin representations
- Geometric structures and representation varieties, Conference in Seoul, Korea. November 2014.
  Minimal surfaces and entropy of Hitchin representations
- Teichmuller Theory and immersed surfaces in 3-manifolds, Conference in Pisa, Italy. June 2014.
  A new proof of Bowen's theorem on Hausdorff dimension of quasi-circles
- University of Maryland, College Park, Geometry seminar, April 2014.
  Hitchin harmonic maps are immersions
- University of Illinois at Urbana-Champaign, Geometry seminar, March 2014.
  A new proof of Bowen's theorem on the Hausdorff dimension of quasi-circles
- CUNY Graduate Center, Complex analysis and dynamics seminar, March 2014.
  A new proof of Bowen's theorem on the Hausdorff dimension of quasi-circles

- California Institute of Technology, February 2014.
  A new proof of Bowen's theorem on the Hausdorff dimension of quasi-circles
- University of Utah, Geometry Seminar, February 2014.
  A new proof of Bowen's theorem on the Hausdorff dimension of quasi-circles
- University of Illinois at Chicago, Geometry Seminar, September 2013.
  A new proof of Bowen's theorem on the Hausdorff dimension of quasi-circles
- Workshop on Higher Teichmüller-Thurston theory, Maine, June 2013.
  3 Hour minicourse entitled *Harmonic maps and Higgs bundles*
- University of Maryland, College Park, Geometry Seminar. April 2013.
  A new proof of Bowen's theorem on the Hausdorff dimension of quasi-circles
- AMS Special session on geometric and analytic methods in Teichmüller and hyperbolic geometry, January 2013. *Domains of Discontinuity of almost-Fuchsian groups*
- University of Illinois at Urbana-Champaign, Goemetry Seminar, November 2012.
  Domains of Discontinuity for almost-Fuchsian manifolds
- University of Illinois at Chicago, Geometry Seminar. November 2012.
  Domains of Discontinuity for almost-Fuchsian manifolds
- CUNY Graduate Center, Teichmuller Theory Seminar, October 2012.
  Domains of Discontinuity for almost-Fuchsian manifolds
- 1st annual GEAR retreat, UIUC, Urbana-Champaign, Illinois, July 2012.
  Minimal surfaces in quasi-Fuchsian manifolds and Hausdorff dimension.
- Geometry and Analysis of Surface Groups: special seminar, IHP, Paris, France, February 2012.
  Hyperbolization of three manifolds and an introduction to Ricci flow.
- Geometry and Analysis of Surface Groups: special seminar, IHP, Paris, France, February 2012.
  An introduction to the eight Thurston geometries.
- Geometry and Analysis of Surface Groups: research seminar, IHP, Paris, France, February 2012.
  Closed minimal surfaces in hyperbolic three manifolds.
- MRC - Real Projective Structures, Snowbird, Colorado, June 2011.
  Parameterizing real projective structures on closed surfaces.
- Graduate Student and Post-Doc Workshop on Low Dimensional Topology and Geometry, Princeton, March 2011.
  Minimal surfaces in quasi-Fuchsian three manifolds.
- U. Maryland Geometry and Topology Seminar, College Park, September 2009.
  Geometrization of three manifolds and long time behavior of the Ricci flow.

Papers

- *Domains of discontinuity of almost-Fuchsian groups.* Accepted for publication at Transactions of the AMS. Arxiv: 1310.6412
- *Entropy, minimal surfaces, and negatively curved manifolds.* Submitted. Arxiv: 1404.1105
- *Hitchin harmonic maps are immersions.* Preprint. Arxiv: 1407.4513.
- *Hyper-Kahler geometry and complexifications of real analytic Kahler manifolds.* Joint with Brice Loustau. In preparation.
- *Hodge theory and L^2-metrics on character varieties of a closed surface.* In preparation.
- *Complex deformations of Anosov representations.* Joint with David Dumas. In preparation.

Teaching Experience

Professor, U. Illinois at Chicago

- Math 551 - Riemannian Geoometry, Fall 2015.
- Topics seminar - Higgs bundles, Fall 2014.
- Math 320 - Linear Algebra, Fall 2013.

Grader, U. Maryland:

- Math 437 - Differential Forms and Calulus on Manifolds: Spring 2011.
- Math 734 - Second semester of Graduate Algebraic Topology: Spring 2011.

Teaching Assistant (Two biweekly discussion sections, grading), U. Maryland:
- Math 140 - Calculus I: Spring 2008, Fall 2008.
- Math 141 - Calculus II: Fall 2006, Spring 2007, Fall 2007, Spring 2009.
- Math 241 - Calculus III: Fall 2009, Fall 2011.

Instructor (Sole instructor and grader), U. Maryland:
- Math 113 - College Algebra: Summer 2008.
- Math 115 - Precalculus: Summer 2011.

Editorial Experience

- *Journal of Geometry and Topology.* Referee.
- *Journal of Conformal Geometry and Dynamics.* Referee.
- *Geometriae Dedicata.* Referee.

Organizational Experience

Workshop on Harmonic maps and Higgs Bundles, North Carolina, January 2015.
- Co-organizer with Brian Collier and Qiongling Li.

Geometry and analysis of surface groups representations, Seminar at MSRI in Berkeley, CA. January-May 2015.
- Co-organizer with Qiongling Li.

2nd Gear Junior Network Retreat, University of Michigan, Ann Arbor, May 2014.
- Co-organizer with Michelle Lee, Sara Maloni and Laura Schaposnik.

Special Session: Deformation Spaces of Geometric Structures on Low-Dimensional Manifolds. Joint Mathematics Meetings. Baltimore, MD, January 2014.
- Co-organizer.

1st Annual GEAR retreat, UIUC, Urbana-Champaign, July 2012. Teaching assistant.
- Acted as teaching assistant for a short lecture series titled: "Higgs bundles and surface group representations." Duties included assisting participants during problem sessions and posting selected solutions to assigned problems.

EGL: Experimental Geometry Lab, U. Maryland. Asst. lab manager. Summer 2010.
- Guided undergraduate students in research projects related to hyperbolic geometry and Teichmuller theory. Gave a biweekly lecture series on topology and geometry of surfaces. Supervised writing of computer programs to visualize deformation spaces of hyperbolic structures.

Organizer: U. Maryland graduate student Geometry and Topology Seminar.
- Fall & Spring 2009: Focus on Mapping Class group, measured foliations and Teichmuller theory. Gave 4 talks.
- Fall 2011: Assorted topics. Gave 4 talks.

Assistant Organizer: Geometry and Analysis of Riemann Surfaces and Their Moduli: Conference celebrating 60th birthday of Scott Wolpert, U. Maryland. September 2010.

Awards

- National Science Foundation Postdoctoral Research Fellowship. 2013-2016.
- Ann G. Wylie dissertation fellowship. University of Maryland, College Park. Fall 2012.

Other

- Familiar with Mathematica and Latex.