SEAN LAWTON

Born 1976, U.S. citizen

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PROFESSIONAL EXPERIENCE

University of Maryland: Visiting Lecturer, August 2008-Present

Instituto Superior Técnico: Research Fellow, August 2007-Present

Kansas State University: Visiting Assistant Professor, August 2006- August 2007

EDUCATION

Ph.D. Mathematics Universtiy of Maryland, May 2006. Advisor: William Goldman,
Thesis: $\mathrm{SL}(3,\mathbb{C})$-*Character Varieties and* $\mathbb{RP}^2$-*Structures on a Trinion*.

M.A. Mathematics University of Maryland, May 2003. Advisor: John Millson,
Thesis: *Deformation Spaces of Polygons in the Euclidean Plane*.

B.S. with Honors in Mathematics University of Maryland, May 2000. Advisor: Lawrence Washington,
Thesis: *Puzzles, Graphs, and Permutation Groups*.

RESEARCH INTERESTS

Moduli of Lie group valued representations of finitely generated groups. In particular, the classical topology, geometry, singularity theory, algebraic geometry, and Poisson geometry of character varieties.

PUBLICATIONS [all articles marked as accepted or submitted are available on arXiv]

Journal Articles:

1. *Generators, relations and symmetries in pairs of* 3×3 *unimodular matrices* , Journal of Algebra Volume 313, Issue 2, 15 July 2007, Pages 782-801
2. *Spin Networks and* $\mathrm{SL}(2,\mathbb{C})$-*Character Varieties* (with Elisha Peterson), Handbook of Teichmüller Theory Volume II, EMS, to appear 2008.
3. *Poisson Geometry of* $\mathrm{SL}(3,\mathbb{C})$-*Character Varieties Relative to a Surface with Boundary*, Transactions of the AMS, to appear 2008.
4. *Minimal Affine Coordinates for* $\mathrm{SL}(3,\mathbb{C})$ *Character Varieties of Free Groups*, Journal of Algebra, accepted 2008.
5. *Algebraic Independence and Symmetry in* $\mathrm{SL}(3,\mathbb{C})$ *Character Varieties of Free Groups*, submitted 2008.
6. *Obtaining the One-Holed Torus from the Pair-of-Pants: Duality in an SL(3,C)-Character Variety*, submitted 2008.
7. *The topology of moduli spaces of free group representations* (with Carlos Florentino), submitted 2008.
8. *Computing* $\mathrm{SL}(2,\mathbb{C})$ *Central Functions with Spin Networks* (with Elisha Peterson), in preparation, [*Mathematica* code available at `wolframlibrary.com`]
9. *Outer Automorphisms and Permuting Parameters of SL(3,C)-Character Varieties of Free groups*, work in progress
10. *On the global and local singularities of character spaces of free groups* (with C. Florentino), work in progress

Books:

1. *Mathematics, It's not just Calculus*, co-author and managing editor of collaborative book, preliminary acceptance by AK Peters, expected to be in print summer 2009.

SELECTED PRESENTATIONS (most recent 22)

1. *The topology of the moduli of free group representations*, Geometry-Topology Seminar, University of Maryland, 6 October 2008
2. *Algebraic Independence in SL(3,C)-Character Varieties of Free Groups*, Algebra Seminar, Instituto Superior Técnico, 15 July 2008
3. *On the topology of the moduli of free group representations*, Geometry-Topology Special Session, Encontro Nacional da Sociedade Portuguesa de Matemática, 26 June 2008
4. *A picture book of the topology of some character varieties*, seminar, Brooklyn College, 7 April 2008 (invited)
5. *Some recent results on character varieties of surface groups*, colloquium, Saint Louis University, 10 March 2008 (invited)
6. *Obtaining the One-Holed Torus from Pants: Duality in an SL(3,C)-Character Variety*, Geometria em Lisboa, Instituto Superior Técnico, 20 November 2007 (invited)
7. *Poisson structures on moduli of surface group representations into SL(3,C)* Geometry Seminar, Universidade do Porto, 9 November 2007 (invited)
8. *Minimal Affine Coordinates for SL(3,C) Character Varieties of Free Groups*, Algebra Seminar, Instituto Superior Técnico, 11 October 2007
9. *Generators of SL(2,C)-Character Varieties of Arbitrary Rank Free Groups* (1 hour lecture), 7th KAIST Geometric Topology Fair (Daejeon, Korea), 9 July 2007 (invited)
10. *Central Functions and SL(2,C)-Character Varieties* (1 hour lecture), 7th KAIST Geometric Topology Fair (Daejeon, Korea), 10 July 2007 (invited)
11. *Minimal Generators for SL(3,C)-Character Varieties of Free Groups*, Algebra Seminar, Kansas State University, 23 April 2007
12. *Algebraic Independence and Symmetry in SL(3,C)-Character Varieties of Free Groups*, Algebra Seminar, Kansas State University, 30 April 2007
13. *Obtaining the One-Holed Torus from Pants: Duality in an SL(3,C)-Character Variety*, Geometry, Topology & Physics Seminar, Kansas State University, 9 April 2007 (invited)
14. *Poisson structures on moduli of surface group representations into SL(3,C)* , Geometry & Topology Seminar, McMaster University, 27 February 2007 (invited)
15. *Symmetry in SL(3, C)-Character Varieties* (25 minute talk), AMS Special Session on Invariant Theory, New Orleans, LA, 6 January 2007
16. *Symplectic Foliation on SL(3)-Character Varieties*, Geometry, Topology & Physics Seminar, Kansas State University, 6 November 2006 (invited)
17. *On the Moduli of* $\mathrm{SL}(3,\mathbb{C})$*-Bundles over a Surface of Euler Characteristic -1* (40 minute talk), AMS Special Session on Algebraic Geometry and Moduli Spaces, Storrs, CT, 29 October 2006
18. *Poisson Structure on SL(3)-Character Varieties Relative to a Punctured Surface* (20 minute talk), AMS Special Session on Low Dimensional Topology and Geometry, Salt Lake City, UT, 8 October 2006
19. *Poisson Structures on Moduli of SL(3)-Bundles over a Punctured Surface* (1 hour lecture), Park City Mathematics Insitute, Park City, UT, 7 July 2006
20. *Poisson Structure of Flat SL(3)-bundles over a Thrice Punctured Sphere*, Geometria em Lisboa, Instituto Superior Técnico, 7 June 2006 (invited)
21. *Poisson Structure on SL(3)×SL(3)//SL(3) Relative to a Trinion*, Colloquium, Kansas State University, 11 May 2006 (invited)
22. *Symmetries in the SL(3, C)-Character Variety of a Rank 2 Free Group*, Knots in Washington XXII, George Washington University, Washington DC 7 May 2006 (invited)

TEACHING EXPERIENCE

1. Visiting Lecturer, University of Maryland, Mathematics Department, Fall 2008–Spring 2009
   - Taught Calculus I (large lecture) and managed 5 teaching assistants.
   - Taught Honors Calculus I (small class)
   - Taught senior level Euclidean and Non-Euclidean Geometry course (used Geometer's Sketchpad to explore concepts).
2. Visiting Assistant Professor, Kansas State University, Mathematics Department, Fall 2006–Spring 2007
   - Taught Experimental College Algebra (small class, innovative curriculum using Excel spreadsheets to explore concepts)
   - Taught Traditional College Algebra (large lecture with standard curriculum)
   - Received Dean's citation for good teaching (response to student praise) within 2 weeks of starting (fall 2006)
   - Fellow of the Center of Quantative Education at Kansas State University: assisting in the developement of a new College Algebra course at Kansas State University under the supervision of Professor Andrew Bennett.
3. Teaching Assistant, University of Maryland, College Park, Mathematics Department, Fall 2000–Spring 2006
   - Departmental Advisor for undergraduate Math Club, (Fall 2005)
   - Taught Calculus I Course as Lecturer, (Summer 2005)
   - Undergraduate Academic Advisor, (Fall 2004- Spring 2005)
   - Organized William Goldman's Research Interaction Team on Moduli Spaces, (Spring 2004)
   - Teaching Assistant for Undergraduate Topology & Differential Geometry Courses, (Fall 2004)
   - Experimental Geometry Lab Manager, (Fall 2004)
   - Graded Graduate Algebra Course, (Fall 2003)
   - Taught Recitation Courses: Linear Algebra (Spring 2003), Calculus I (Fall 2002), Calculus II (Spring 2001, Fall 2000)
   - Graded Senior Complex Analysis Course, (Spring 2002)
   - Graded Senior Linear Algebra Course & Senior Abstract Algebra Course (Fall 2001)
4. Instructor, Montgomery County Community College, Rockville Campus, Mathematics Department, Fall 2004–Spring 2006
   - Taught Linear Algebra Course, (Spring 2006)
   - Taught Multi-Variable Calculus Course, (Fall 2005)
   - Taught Calculus II Course, (Summer 2005)
   - Taught Calculus I Course, (Spring 2005)
   - Taught Pre-Calculus Course, (Fall 2004)
   - Prepared and evaluated: homework, quizzes, MATLAB & calculator projects, tests, lectures
5. Instructor, Center for Talented Youth, South Hadley, MA, Summers 2002, 2003, 2004
   - Developed course exploring inductive & deductive reasoning in sentential logic as conjecture & proof in math
   - Taught logic, algebra, number theory, and non-Euclidean geometry to children from 10-12 years old
   - Supervised teaching assistant
6. Teaching Assistant, Center for Talented Youth, Los Angeles, CA, Summer 2001
7. Math Intern, Academic Achievement Programs, Summer 1998 - Spring 2000
   - Taught Pre-Calculus Course (Fall 1999 - Spring 2000)
   - Taught Recitation Course for Pre-Calculus (Fall 1998 - Spring 1999)
   - Worked with students "who display the potential to be successful...even though their academic profile may be less competitive."

CONFERENCES ORGANIZED

1. Special Session on *Geometry, Topology, and Algebra of Character Varieties* at Joint Mathematics Meeting 2009.

AWARDS AND HONORS

1. Awarded Research Fellowship from Fundação para a Ciência e a Tecnologia (FCT) to work at Insituto Superior Técnico (IST), 2007
2. Awarded full funding as participant in American Institute of Mathematics (AIM), Workshop on Surface Group Representations, 19-23 March 2007
3. Awarded full funding as research participant in Park City Mathematics Institute (PCMI), UT, 25 June- 8 July 2006 (Research Topic: Low Dimensional Topology)
4. Awarded VIGRE Research Grant, University of Maryland, Spring 2006
5. Accepted with Scholarship to Mathematical Research Institute's (MRI) Spring School, Utrecht, Netherlands, Spring 2004
6. Awarded Nagel Travel Grant, University of Maryland, Spring 2004
7. Nominated 16^{th} Annual Excellence in Teaching Award for Graduate Assistants, University of Maryland, Fall 2002
8. President-elect, Pi Mu Epsilon Chapter Alpha, University of Maryland, Spring 2000

SERVICE AND OUTREACH

1. Reviewer for AMS Mathematical Reviews (5 reviews), Spring 2007 - Present
2. Volunteered to give Girls Researching Our World (GROW) presentation at Kansas State University for middle school girls, Summer 2007
3. Created and organized a funded weekly Student Geometry-Topology Seminar, Spring 2005–Spring 2006
4. "Maryland Day" mathematics department volunteer (community outreach), Spring 2004 & Spring 2000
5. Maryland Junior Science and Humanities Symposium judge (high school competition), Spring 2004
6. Gave geometry presentations for University of Maryland to Flowers & Potomac High Schools, Spring & Summer 2004
7. Spotlight on Graduate Research judge (student led research competition), Fall 2003

SOME RECENT CONFERENCES ATTENDED

1. Conference on vector bundles in honour of S. Ramanan at Miraflores de la Sierra (Madrid, Spain) [16-20 June 2008]
2. International School on Geometry and Physics at CIEM (Cantabria, Spain) [25-29 Feb. 2008]
3. Minicourse at Universidade do Porto by Peter Newstead on Moduli of Vector Bundles on Algebraic Curves [Oct.15,18,19, 2007]
4. American Institute of Mathematics workshop on Surface Group Representations [3/19/07-3/23/07]

PROFESSIONAL MEMBERSHIPS

1. American Mathematical Society (AMS)
2. European Mathematical Society (EMS)
3. Mathematical Association of America (MAA)
4. Pi Mu Epsilon