

# Joanna Furno

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## Education

May 2013 University of North Carolina Chapel Hill, NC

- Ph.D. in Mathematics.
- Ph.D. thesis title: Ergodic Theory of  $p$ -adic Transformations.
- Thesis advisor: Jane Hawkins.

May 2008 Wisconsin Lutheran College Milwaukee, WI

- B.S. in Mathematics.

## Academic Employment

Sept. 2017—Present University of Houston Houston, TX

### Research Associate 1, Lecturer

Aug. 2015—June 2017 Indiana University – Purdue University Indianapolis Indianapolis, IN

### Postdoctoral Fellow

Sept. 2014—June 2015 Wesleyan University Middletown, CT

### Visiting Assistant Professor of Mathematics

July 2013—June 2014 Dickinson College Carlisle, PA

### Visiting Assistant Professor

Aug. 2008—July 2013 University of North Carolina Chapel Hill, NC

### Graduate Assistant

## Papers

“Rational families converging to a family of exponential maps,” with Jane Hawkins and Lorelei Koss, *Journal of Fractal Geometry*, accepted.

“Everywhere divergence of the one-sided ergodic Hilbert transform for circle rotations by Liouville numbers,” with David Constantine, *New York Journal of Mathematics*, Vol. 23, 2017, 273-294.

“Haar measures and Hausdorff dimensions of  $p$ -adic Julia sets.” in *Ergodic Theory, Dynamical Systems, and the Continuing Influence of John C. Oxtoby*, *Contemporary Mathematics*, Vol. 678, 2016, 187-196.

“Approximations for  $p$ -adic transitive isometries.” *Topology Proceedings*, Vol. 26, Oct. 2015, 323-338.

“Singular  $p$ -adic transformations for Bernoulli product measures.” *New York Journal of Mathematics*, Vol. 20, 2014, 799-812.

“Orbit equivalence of  $p$ -adic transformations and their iterates.” *Monatshefte für Mathematik*, Vol. 175, Issue 2, Oct. 2014, 249-276.

**Awards**

Summer 2015 AWM-NSF Mentoring Travel Grant  
Spring 2013 Graduate Assistance in Areas of National Need (GAANN) Fellowship  
Summer 2010 Pre-Dissertation Travel Award

**Invited Talks**

- July 24-28, 2017 Mathematical Congress of Montréal, Canada  
the Americas
- “Ultrafilter constructions for group topologies,” Session on Shape, Homotopy, and Attractors.
- June 27-30, 2017 University of Dayton Dayton, OH
- “Liouville numbers and one-sided ergodic Hilbert transforms,” Topology + Dynamics and Continuum Theory session of the 32nd Summer Conference on Topology and its Applications.
- Apr. 28, 2017 The University of Knoxville, TN  
Tennessee, Knoxville
- “Measure and Hausdorff dimension for  $p$ -adic Julia sets,” Topology/Geometry Seminar.
- Apr. 7-9, 2017 Eastern Illinois University Charleston, IL
- “One-sided ergodic Hilbert transforms for circle rotations by Liouville numbers,” Eastern Illinois Integrated Conference in Geometry, Dynamics, and Topology.
- Jan. 4-7, 2017 Joint Mathematics Meetings Atlanta, GA
- “Radon-Nikodym derivatives for rational  $p$ -adic translations,” AMS Special Session on Measure and Measurable Dynamics (In Memory of Dorothy Maharam, 1917-2014).
- Nov. 4-6, 2016 IUPUI Indianapolis, IN
- “Rational families converging to an exponential family of maps,” Midwest Dynamical Systems Seminar.
- Oct. 24, 2016 University of Michigan Ann Arbor, MI
- “Rational families converging to a transcendental family,” Complex Analysis, Dynamics and Geometry Seminar.
- Jul. 1-5, 2016 AIMS Conference on Dynamical Orlando, FL  
Systems, Differential Equations and Applications
- “Cantor sets within Cantor sets: Hausdorff dimensions of  $p$ -adic Julia sets,” Fractal Geometry, Dynamical Systems, and Their Applications Special Session.
- Mar. 29, 2016 Wesleyan University Middletown, CT
- “Measuring balls and Julia sets in finite extensions of the  $p$ -adic numbers,” DnA (Dynamics and Analysis) Seminar.

- Mar. 10-13, 2016      Baylor University      Waco, TX
- “Sizes of  $p$ -adic Julia sets,” 50<sup>th</sup> Spring Topology and Dynamical Systems Conference.
- Oct. 22, 2015      Smith College      Northampton, MA
- “Perils and pleasures in  $p$ -adic calculus,” Math Lunch Talk.
- Mar. 27-29, 2015      University of Alabama      Huntsville, AL
- “Two fourth-degree families: A comparison of Julia sets,” AMS Special Session on Fractal Geometry and Ergodic Theory.
- Jan. 10-13, 2015      Joint Mathematics Meetings      San Antonio, TX
- “A measure-preserving transformation on the  $p$ -adic numbers,” AMS Special Session on Topological Measures of Complexity: Inverse Limits, Entropy, and Structure of Attractors.
- Oct. 20, 2014      University of Massachusetts      Lowell, MA
- “Singular  $p$ -adic transformations,” Mathematics Department Colloquium.
- Oct. 18-19, 2014      Dalhousie University      Halifax, Canada
- “Approximations and digraph representations of  $p$ -adic transformations,” Special Session on Symbolic Dynamics and Combinatorics on Words, Fall Eastern AMS Sectional Meeting.
- Mar. 21-23, 2014      University of Tennessee      Knoxville, TN
- “Haar measures and Hausdorff dimensions of non-Archimedean Julia sets,” Special Session on Fractal Geometry and Ergodic Theory, Southeastern Spring AMS Sectional Meeting.
- Mar. 13-15, 2014      University of Richmond      Richmond, VA
- “Cutting and stacking in  $p$ -adic dynamics,” 48th Spring Topology and Dynamics Conference.
- Jan. 15-18, 2014      Joint Mathematics Meetings      Baltimore, MD
- “Haar measures and Hausdorff dimensions of  $p$ -adic Julia sets,” AMS Special Session on Complex Dynamics.
  - “Orbit equivalence classes of  $p$ -adic transformations,” AMS Special Session on Ergodic Theory and Symbolic Dynamics.
- Nov. 26, 2013      Northwestern University      Evanston, IL
- “Ergodic properties and dynamics of  $p$ -adic transformations,” Dynamical Systems Seminar.

**Classes  
Taught**

**University of Houston**

- Math 3338, Probability – Fall 2017

**Indiana University-Purdue University Indianapolis**

- Math 16500, Analytic Geometry & Calculus – Fall 2015 (2 sections)
- Math 27600, Discrete Mathematics and Its Applications – Spring 2016
- Math 30000, Logic and the Foundations of Algebra – Fall 2016
- Math 35100, Linear Algebra – Fall 2016
- Math 45600, Number Theory – Spring 2017

**Wesleyan University**

- Math 121, Calculus I, Part I – Fall 2014
- Math 122, Calculus I, Part II – Spring 2015 (2 sections)
- Math 221, Vectors and Matrices – Spring 2015
- Math 222, Multivariable Calculus – Fall 2014

**Dickinson College**

- Math 121, Elementary Statistics – Fall 2013 (2 sections), Spring 2014 (2 sections)
- Math 171, Multivariable Calculus – Fall 2013

**University of North Carolina at Chapel Hill**

- Math 110, Algebra – Spring 2009
- Math 118, Selected Topics in Mathematics – Fall 2009, Spring and Summer 2010, Spring and Fall 2012
- Math 231, Calculus 1 – Fall 2010
- Math 232, Calculus 2 – Spring 2011, Fall 2011 (2 sections), and Summer 2012
- Math 521, Advanced Calculus I – Summer 2013

**Conference  
Organization**

Feb. 25, 2017                      Fifth Annual Midwest Women in Mathematics  
Symposium

- Member of organizing committee with Julia Arciero and Olga Buse.

Nov. 4-6, 2016                      Midwest Dynamical Systems Seminar

- Member of organizing committee with William Geller, Michal Misiurewicz, Rodrigo Pérez, and Roland Roeder.

Aug. 15-19, 2016                      Connections Between Complex Dynamics, Statistical  
Physics, and Limiting Spectra of Self-similar Group Actions

- Member of organizing committee with Scott Kaschner, Rodrigo Pérez, and Roland Roeder.

**Contributed  
Talks**

- Aug. 15-19, 2016 IUPUI Indianapolis, IN
- “Application of the compactness theorem for subharmonic functions to Broliin’s Theorem,” learning talk for Connections Between Complex Dynamics, Statistical Physics, and Limiting Spectra of Self-similar Group Actions
- Aug. 17-21, 2015 Jacobs University Bremen, Germany
- “Bifurcation loci for quadratic rational maps,” Dynamical Developments: A Conference in Complex Dynamics and Teichmüller Theory, Young People Seminar (joint presentation with Daniel Cuzzocreo and Scott Kaschner).
- Apr. 24-26, 2015 Agnes Scott College Decatur, GA
- “A comparison of Julia sets in two fourth-degree families,” Carolina Dynamics Symposium.
- Apr. 12-14, 2013 University of North Carolina Chapel Hill, NC
- “A transformation preserving Haar measure on the  $p$ -adic numbers,” Carolina Dynamics Symposium.
- Jan. 9-12, 2013 Joint Mathematics Meetings San Diego, CA
- “Haar measures of  $p$ -adic Julia sets,” AMS Session on Difference Equations, Dynamical Systems, and Applications.
- Dec. 7-9, 2012 University of Michigan Ann Arbor, MI
- “Orbit equivalence of  $p$ -adic transformations,” RTG Workshop and Lecture Series on Complex and Non-Archimedean Dynamics.
- April 13-15, 2012 Clemson University Clemson, SC
- “Measures of  $p$ -adic Julia sets,” Carolina Dynamics Symposium.
- Feb. 23, 2011 University of North Carolina Chapel Hill, NC
- “Connecting with South Korean women mathematicians,” Center for Global Initiatives’ Global Projects Showcase.
- Aug. 10, 2010 Ajou University Seoul, South Korea
- “Orbit equivalence and transformation types.”
- April 25-26, 2008 Madison Area Technical College Madison, WI
- “Generalized cranks and multipartition congruences,” Annual Spring Meeting of the Wisconsin Section of the Mathematical Association of America
- Nov. 2-3, 2007 St. Norbert College De Pere, WI
- “Generalized cranks of multipartitions,” Twenty-Second Annual Pi Mu Epsilon Regional Undergraduate Math Conference.

**Posters**

- Apr. 11-12, 2015      University of Maryland      College Park, MD
- “A comparison of two families of fourth-degree rational maps,” AWM Research Symposium Poster Session.
- Nov. 7-9, 2014      University of Michigan      Ann Arbor, MI
- “A comparison of two families of fourth-degree rational maps,” Midwest Dynamical Systems Meeting Poster Session.
- Nov. 1-3, 2013      University of Illinois      Urbana-Champaign, IL
- “A  $p$ -adic transformation preserving infinite Haar measure,” Midwest Dynamical Systems Meeting Poster Session.
- Feb. 13-17, 2012      ICERM      Providence, RI
- “Type III transformations in  $p$ -adic dynamics,” Complex and  $p$ -adic Dynamics Poster Session.
- Sept. 17-18, 2011      Brown University      Providence, RI
- “Ergodic theory of  $p$ -adic transformations,” AWM 40 Years and Counting Poster Session.

**Physics Publications**

- Kuehn, Kerry, Jonathan Polfer, Joanna Furno, and Nathan Finke. “Apparatus for real-time acoustic imaging of Rayleigh-Bénard convection.” *Review of Scientific Instruments*, Vol. 78, Issue 11, Nov. 2007.
- Furno, Joanna and Kerry Kuehn. “Tidal pattern instabilities on multi-moon planets.” *Icarus*, Vol. 189, Issue 1, Jul. 2007, 246-255.

**REU Notes**

- “Investigations regarding partitions and multipartitions,” (with Patrick Waters, advised by Holly Swisher) Proceedings of the Research Experiences for Undergraduates Program in Mathematics, Oregon State University, Summer 2007.  
[http://www.math.oregonstate.edu/~math\\_reu/proceedings/REU\\_Proceedings/Proceedings2007/2007JF\\_PW.pdf](http://www.math.oregonstate.edu/~math_reu/proceedings/REU_Proceedings/Proceedings2007/2007JF_PW.pdf).

**Conferences Attended**

- Families of Algebraic Dynamical Systems  
 June 12-16, 2017      Université de Rennes 1      Rennes, France
- Houston Summer School on Dynamical Systems  
 May 17-25, 2017      University of Houston      Houston, TX
- AMS Spring Central Sectional Meeting  
 April 1-2, 2017      Indiana University      Bloomington, IN
- Joint Mathematics Meeting  
 Jan. 6-9, 2016      Washington State Convention Center      Seattle, WA
- RTG Workshop in Arithmetic Dynamics  
 Dec. 3-6, 2015      University of Michigan      Ann Arbor, MI

Midwest Dynamical Systems Meeting Oct. 30-Nov. 1, 2015	Ohio State University	Columbus, OH
Non-Archimedean Geometry and its Applications Jun. 1-5, 2015	University of Michigan	Ann Arbor, MI
IMS XXV Celebrating 25 Years of Low-Dimensional Dynamics at Stony Brook May 8-12, 2015	Institute for Mathematical Sciences	Stony Brook, NY
Ahlfors-Bers Colloquium Oct. 23-26, 2014	Yale University	New Haven, CT
Workshop on Dynamical Systems and Related Topics April 11-13, 2014	University of Maryland	College Park, MD
Oct. 17-20, 2013	Pennsylvania State University	University Park, PA
April 4-7, 2013	University of Maryland	College Park, MD
70th Birthday Conference in Honor of John Franks and Clark Robinson Dec. 7, 2013	Northwestern University	Evanston, IL
AMS Mathematics Research Community in Complex Dynamics June 9-15, 2013		Snowbird, UT
Complex Dynamics (and Arithmetic Geometry) Conference June 5-7, 2013	University of Illinois	Chicago, IL
Rice Dynamics Meeting May 3-5, 2013	Rice University	Houston, TX
Ergodic Theory Workshop March 21-24, 2013	University of North Carolina	Chapel Hill, NC
March 22-25, 2012	University of North Carolina	Chapel Hill, NC
March 17-20, 2011	University of North Carolina	Chapel Hill, NC
April 29-May 2, 2010	University of North Carolina	Chapel Hill, NC
Model Theory Workshop July 23-Aug. 3, 2012	Mathematical Sciences Research Institute	Berkeley, CA
Algebraic Dynamics Workshop May 10-13, 2012	University of California	Berkeley, CA
Carolina Dynamics Symposium March 26-27, 2011	Furman University	Greenville, SC
April 24, 2010	Meredith College	Raleigh, NC
Oxtoby Centennial Conference Oct. 30-31, 2010	Bryn Mawr College	Bryn Mawr, PA

Brylawski Memorial Conference  
Oct. 17-19, 2008      University of North Carolina      Chapel Hill, NC

## **Service**

2016-Present      Referee

- American Mathematical Monthly (2016)
- Applied Mathematics-A Journal of Chinese Universities (2017)
- Journal of Difference Equations and Applications (2017)

2015-Present      Reviewer for Mathematical Reviews

2014-2015      Dynamics and Analysis Seminar

- Invited and scheduled speakers for the seminar.

2014      Writing Circle

- Helped organize meetings for new faculty at Dickinson College to set and discuss writing goals.

May 5, 2012      Sonia Kovalevsky Day

- Used hexaflexagons to discuss mathematical concepts with middle and high school girls.

Aug. 2011 – May 2012      GPSF Senator

- Represented the mathematics department at senate meetings of the Graduate and Professional Student Federation.

Sept. 25, 2010      UNC Science Expo

- Used a laser plane to interactively explore cross-sections of geometric solids with children and their parents.

Oct. 17, 2009      Family Math Day

- Guided a fractal activity for children and their parents.

April 4, 2009      Sonia Kovalevsky Day

- Graded activity sheets that had been completed by high school girls.

## **Professional Memberships**

American Mathematical Society (AMS)  
Association for Women in Mathematics (AWM)  
Mathematical Association of America (MAA)  
Society for Industrial and Applied Mathematics (SIAM)