

# 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

## Publications

“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.

- Publications in Preparation** “Profinite structures on residually finite groups,” with Jerzy Dydak and James Keesling.
- Undergraduate 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.  
 “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.
- Awards**
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| Pending proposal | “Bifurcations in Complex Dynamics,” submitted to the American Institute of Mathematics – SQuaRE program. |
| Pending proposal | “Finite Approximations in $p$ -adic Dynamics,” submitted to the DMS – Analysis Program at the NSF.       |
| Summer 2015      | AWM-NSF Mentoring Travel Grant   |
| Spring 2013      | Graduate Assistance in Areas of National Need (GAANN) Fellowship   |
| Summer 2010      | Pre-Dissertation Travel Award  |
- 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  
Talks**

- Oct. 7, 2017                      University of Illinois                      Urbana-Champaign, IL
- “The Denjoy-Koksma lemma and convergence of the one-sided ergodic Hilbert transform,” Geometry, Groups and Dynamics Workshop.
- 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. 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.
- Aug. 15-19, 2016                      IUPUI                      Indianapolis, IN
- “Application of the compactness theorem for subharmonic functions to Brodin’s Theorem,” learning talk for Connections between Complex Dynamics, Statistical Physics, and Limiting Spectra of Self-similar Group Actions.
- 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. 10-13, 2016                      Baylor University                      Waco, TX
- “Sizes of  $p$ -adic Julia sets,” 50<sup>th</sup> Spring Topology and Dynamical Systems Conference.
- 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).

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. 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.

Apr. 24-26, 2015          Agnes Scott College          Decatur, GA

- “A comparison of Julia sets in two fourth-degree families,” Carolina Dynamics Symposium.

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.

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.
- 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.

**Seminar Talks**

- Apr. 28, 2017      The University of Tennessee, Knoxville      Knoxville, TN
- “Measure and Hausdorff dimension for  $p$ -adic Julia sets,” Topology/Geometry Seminar.
- Feb. 10, 2017      Jacobs University      Bremen, Germany
- “Complex dynamics of rational families that converge to an exponential family.”
- Jan. 20, 2017      South Dakota State University      Brookings, SD
- “Complex dynamics, parameter spaces, and approximation.”
- Oct. 24, 2016      University of Michigan      Ann Arbor, MI
- “Rational families converging to a transcendental family,” Complex Analysis, Dynamics and Geometry Seminar.
- 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.
- Oct. 22, 2015      Smith College      Northampton, MA
- “Perils and pleasures in  $p$ -adic calculus,” Math Lunch Talk.
- Oct. 20, 2014      University of Massachusetts      Lowell, MA
- “Singular  $p$ -adic transformations,” Mathematics Department Colloquium.
- Nov. 26, 2013      Northwestern University      Evanston, IL
- “Ergodic properties and dynamics of  $p$ -adic transformations,” Dynamical Systems Seminar.
- Aug. 10, 2010      Ajou University      Seoul, South Korea
- “Orbit equivalence and transformation types.”

## 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.

## Service

### Referee

- American Mathematical Monthly (2016)
- Applied Mathematics-A Journal of Chinese Universities (2017)
- Journal of Difference Equations and Applications (2017)
- Reviewer for Mathematical Reviews (2015-present)

### Member of organizing committee

- Fifth Annual Midwest Women in Mathematics at IUPUI (Feb. 25, 2017)
- Midwest Dynamical Systems Seminar at IUPUI (Nov. 4-6, 2016)
- Connections Between Complex Dynamics, Statistical Physics, and Limiting Spectra of Self-similar Group Actions at IUPUI (Aug. 15-19, 2016)
- Dynamics and Analysis Seminar at Wesleyan University (2014-2015)

Organized writing circles at Wesleyan University (Spring 2015) and Dickinson College (Spring 2014)

### Community outreach

- Sonia Kovalevsky Day at UNC Chapel Hill (May 5, 2012 and Apr. 4, 2009)
- UNC Science Expo (Sept. 25, 2010)
- Family Math Day at UNC Chapel Hill (Oct. 17, 2009)
- Dynamics and Analysis Seminar at Wesleyan University (2014-2015)

Graduate and Professional Student Federation Senator at UNC Chapel Hill (2011-2012)