Paul A. Fili

Professional experience

8/2020 – present — Associate Professor of Mathematics
Oklahoma State University, Department of Mathematics, Stillwater, OK.

8/2014 – 7/2020 — Assistant Professor of Mathematics
Oklahoma State University, Department of Mathematics, Stillwater, OK.

8/2013 – 7/2014 — Visiting Assistant Professor of Mathematics
Oklahoma State University, Department of Mathematics, Stillwater, OK.

7/2010 – 6/2013 — Visiting Assistant Professor of Mathematics
University of Rochester, Department of Mathematics, Rochester, NY.

Education

8/2004 – 5/2010 — Ph.D. in Mathematics
University of Texas at Austin, Department of Mathematics, Austin, TX.
Ph.D. Dissertation — *Orthogonal Decompositions of the Space of Algebraic Numbers Modulo Torsion*
Advisor — Prof. Jeffrey D. Vaaler

9/2000 – 6/2004 — A.B. Mathematics and Physics, Language Citation Classical Greek
Harvard University, Cambridge, MA.
Honors Thesis — *On the Elliptic Curve Method of Factorization*
Advisor — Dr. Frank Calegari

Publications

1. *On the non-Archimedean metric Mahler measure* (with C.L. Samuels). J. Number Theory 129 (2009), no. 7, 1698–1708. dx.doi.org/10.1016/j.jnt.2008.12.009
2. *Orthogonal decomposition of the space of algebraic numbers and Lehmer's problem* (with Z. Miner). J. Number Theory 133 (2013), no. 11, 3941–3981. dx.doi.org/10.1016/j.jnt.2013.05.004
3. *Norms extremal with respect to the Mahler measure* (with Z. Miner). J. Number Theory 132 (2012), no. 1, 275–300. dx.doi.org/10.1016/j.jnt.2011.07.006
4. *A generalization of Dirichlet's unit theorem* (with Z. Miner). Acta Arith. 162 (2014), no. 4, 355–368.
5. *On the heights of totally p-adic numbers.* J. Théor. Nombres Bordeaux 26 (2014), no. 1, 103–109.
6. *Energy integrals over local fields and global height bounds* (with C. Petsche). Int. Math. Res. Not., 2015(5):1278–1294, 2015. dx.doi.org/10.1016/10.1093/imrn/rnt250

7. *Equidistribution and the heights of totally real and totally p-adic numbers* (with Z. Miner). Acta Arith. 170 (2015), no. 1, 15–25.
8. *Height bounds for algebraic numbers satisfying splitting conditions* (with I. Pritsker). J. Number Theory, vol. 175 (June 2017), 250–264.
9. *Energy integrals and small points for the Arakelov height* (with C. Petsche and I. Pritsker). Archiv der Mathematik, vol. 109 (2017), no. 5, 441–454.
10. *Quantitative height bounds under splitting conditions* (with L. Pottmeyer). Trans. Amer. Math. Soc., vol. 372, no. 7 (October 2019), 4605–4626.
11. *On the behavior of Mahler's measure under iteration* (with L. Pottmeyer and M. Zhang). Monatshefte für Mathematik, vol. 193, (2020), 61–86.
12. *Wandering points for the Mahler measure* (with L. Pottmeyer and M. Zhang). Acta Arith. 204 (2022), no. 3, 225–252.
13. *Dynatomic polynomials, necklace operators, and universal relations for dynamical units* (with J.R. Doyle and T. Hyde), New York J. Math. 28 (2022), 534–556.

Preprints

14. *Stochastic Equidistribution and Generalized Adelic Measures* (with J. Doyle and B. Tobin). Preprint available at arXiv:2111.08905.

In Preparation

15. *Julia sets for stochastic dynamical systems* (with J. Doyle and B. Tobin).
16. *Polynomials with small elliptic Mahler measure via genetic algorithms* (with J.M. Clark).
17. *A metric of mutual energy and unlikely intersections for dynamical systems.* Revision in progress. Earlier preprint available at arXiv:1708.08403.

Selected Honors and Awards

2021 Regents' Distinguished Teaching Award, Oklahoma State University.

2019 Named one of the five best professors at Oklahoma State University in student newspaper, *OSU Professors: Who is the best?*, O'Colly, Aug. 16, 2019.

2007 Frank Gerth III Teaching Excellence Award (with prize of $1,000), University of Texas at Austin

2005 Frank Gerth III Graduate Excellence Award (for outstanding performance in graduate courses), University of Texas at Austin

Selected Talks

Nov. 2021 *Stochastic Dynamics and Equidistribution* (invited talk), Algebraic Dynamics and its Connections to Difference and Differential Equations workshop, Banff International Research Station.

Feb. 2020 *Techniques and ideas for teaching Number Theory and Cryptography*, Northern Oklahoma Math Teachers' Circle, Stillwater.

Apr. 2019 *Teaching the Mathematics of Codebreaking*, UT Austin Teachers' Circle, Austin, Texas.

Mar. 2019 *Techniques in effective unlikely intersections*, Arithmetic Geometry special session, HINT 2019, University of Hawai'i.

Mar. 2019 *Iteration of Mahler's measure*, AMS Special Session on Arithmetic Dynamics, Spring Central and Western Joint Sectional Meeting, Honolulu.

Apr. 2018 *Unlikely Intersections in Arithmetic Dynamical Systems*, Essen Algebra, Geometry and Number Theory Seminar, University of Duisberg-Essen, Germany.

Jan. 2018 *Height Bounds Under Splitting Conditions*, AMS Special Session on Diophantine Approximation and Analytic Number Theory in Honor of Jeffrey Vaaler at the Joint Mathematics Meetings, San Diego.

Jan. 2018 *Effective Unlikely Intersections and a Metric of Mutual Energy*, AMS Special Session on Arithmetic Dynamics at the Joint Mathematics Meetings, San Diego.

Oct. 2017 *Techniques and ideas for teaching Number Theory and Cryptography*, Math Circle, University of Texas at Austin.

Sept. 2017 Co-organizer of Sage IMA Coding Sprint on Scheme Coercion, Institute for Mathematics and its Applications, University of Minnesota.

Aug. 2017 *Effective results on unlikely intersections of dynamical systems*, invited at IV International AMMCS Interdisciplinary Conference held at Waterloo, Ontario.

Mar. 2017 *Unlikely intersections in arithmetic dynamics*, invited talk given at a conference in honor of Robert Rumely, University of Georgia.

July 2016 Participated in six-person week-long Collaborate@ICERM workshop on Arithmetic Dynamics and Sage, included informal presentations amongst the team.

Oct. 2015 *Effective bounds for unlikely intersections in arithmetic dynamics*, The Geometry, Algebra, and Analysis of Algebraic Numbers, Banff International Research Station.

Grants

2022 NSF grant #2152935, Equidistribution and Arithmetic Dynamics, conference grant (joint with I. Pritsker).

2021-2022 NSA grant, Equidistribution and Arithmetic Dynamics Conference (joint with I. Pritsker).

Nov. 2019 NSF #1906266, Sage-Days workshop on Computational Arithmetic Dynamics 2019 (joint with B. Hutz and A. Towsley).

Research Interests

Heights of algebraic numbers, arithmetic potential theory, arithmetic dynamics, unlikely intersections, Mahler measure, and Lehmer's problem.

Professional

Member, American Mathematical Society, 2004 – Present

Referee for Trans. of the A.M.S., J. of Number Theory, Int. Journal of Number Theory, Experimental Math., Research in Number Theory, Security and Communication Networks, et al.