Osama Khalil

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Education & Academic Employment

2022 -	Assistant Professor (tenure-track). University of Illinois Chicago.
2019-2022	Wylie Research Assistant Professor (postdoc). University of Utah.
2013-2019	PhD, Mathematics. The Ohio State University.
2006-2013	M.D., Kasr Alainy School of Medicine, Cairo University, Egypt.
2006-2011	B.Sc., Mathematics and Computer Science. The American University in Cairo, Egypt.

Publications & Preprints

Jun. 2024 *Fourier Decay From L^2-Flattening*.
Joint with Simon Baker and Tuomas Sahlsten.

Apr. 2023 *Exponential Mixing Via Additive Combinatorics*.
Submitted. arXiv:2305.00527. 82 pages.

Dec. 2023 *On the Space of Ergodic Measures for the Horocycle Flow on Moduli Spaces of Abelian Differentials*.
Accepted to **Annales Scientifiques de L'ENS.** Joint with Jon Chaika and John Smillie. 64 pages.

Dec. 2022 *Random Walks Spectral Gaps, and Khintchine Theorem on Fractals*.
Inventiones Mathematicae. Joint with Manuel Luethi. 119 pages.

Jan. 2021 *Exceptional Trajectories for the Teichmueller Geodesic Flow and Hausdorff Dimension*.
Journal of the European Mathematical Society. Joint with H. Al-Saqban, P. Apisa, A. Erchenko, S. Mirzadeh, and C. Uyanik. 53 pages.

Aug. 2020 *Bounded & Divergent Orbits and Expanding Curves on Homogeneous Spaces*.
Transactions of the American Mathematical Society. 52 pages.

Apr. 2020 *Singular Vectors on Fractals & Projections of Self-similar Measures*.
Geometric and Functional Analysis (GAFA). 54 pages.

Feb. 2019 *Geodesic Planes in Geometrically Finite Manifolds*.
Discrete & Continuous Dynamical Systems Series A. 22 pages.

Jul. 2018	*Pointwise Ergodic Theorems and Translates of Measures on Homogeneous Spaces.* **Ergodic Theory and Dynamical Systems.** 24 pages.

Awards & Grants

2024-2029	NSF CAREER Grant DMS-2337911 (PI). Award Amount: $438,848. Title: Mixing and Equidistribution in Number Theory and Geometry.
2021-2024	NSF Grant DMS-2247713 (PI). Award Amount: $143,738. Title: Dynamical Methods in Counting Problems and Diophantine Approximation.
2021-2024	NSF Grant DMS-2230827 (co-PI). Award Amount: $39,756. Title: Midwest Dynamical Systems Conferences: 2022 and 2024.
2021	Outstanding Postdoc Award. Utah Math Department.
Jan. 2019	The Ohio State Graduate School Presidential Fellowship.
2016	The Ohio State Graduate Associate Teaching Award. Amount: $1500.
2017, 2018	Departmental Fellowships, Ohio State: 2 semesters teaching relief.

Service & Mentorship

2022-present	Steering Committee for the Annual Midwest Dynamics Conference. With Roland Roeder and Daniel Thompson, we obtain NSF funding, select conference location, and assist local organizers.
Oct. 2023	Co-organizer of the Midwest Dynamics Conference at UIC.
Jun. 2023	Co-organizer of a 2 week Summer School in Dynamical Systems at Northwestern.
Apr. 2023	Co-organizer of the Chicago Action Now Rotating Seminar at UIC.
Aug. 2022 - present	Co-organizer of the Departmental Colloquium, Dynamics Seminar, and Dynamics Learning Seminar at UIC.
2021	TA for a minicourse at CMI-HIMR Dynamics and Geometry Online Summer School.
May 2019	Co-organized the Annual Early Career Midwest Dynamics Conference, Ohio State.

2018-2019	Department Colloquium Committee, Ohio State.
2018	Mentor: TA training for incoming PhD Students, Ohio State.

PhD Exam Committees

May 2024	Thesis Defense. Samuel Dodds. UIC.
May 2024	Thesis Defense. Ozkan Demir. UIC.
April 2024	Thesis Defense. Zihan Xia. UIC.
2020, 2021	Candidacy Exam Committee: Rebekah Eichberg, Carlos Ospina. Utah.

Outreach

Feb. 2023	AIMS Conference for beginning graduate students: Big Ideas in Dynamics (virtual). Title: *Counting Via Dynamics*.
2021	Undergraduate Colloquium. University of Utah. Talk title: *From Quantum Donuts to Coloring the Primes, What is Ergodic Theory?*
2021	Professional development panel on careers in STEM (virtual). Achievement First University Prep High School, Brooklyn, New York. Target audience: would-be first generation college students.
2021	pre-REU Colloquium talk for undergraduates at the University of Utah (virtual). Talk title: *On the Shape of Numbers*.
2020	AWM K-12 Outreach Lecture. East High School, Salt Lake City. Talk title: *What is hyperbolic about hyperbolic geometry?*

Undergraduate Teaching

Fall 2022, 2023	Instructor of record: Math 210 (Calc III). UIC.
2019-2022	Instructor of record: Calc II, Discrete Mathematics. Utah.
2014-2019	TA: Calc I, II, III (7 semesters), Ohio State.
Summer 2015	Instructor of record: Calc II, Ohio State.

Graduate Teaching

Fall 2023	Instructor of record: Graduate Topics Course in Homogeneous Dynamics, UIC.
Spring 2022	Instructor of record: Graduate Topics Course in Homogeneous Dynamics, Utah.
Aug. 2017	TA: Analysis Qualifying Exam Prep. for incoming PhD students, Ohio State.

Select Invited Talks

Sept. 2024, Manchester, England. Workshop titled: Dynamical Systems, Number Theory, and Quantum Chaos: New connections and directions.
Title: *Fourier Transforms of Dynamically Defined Measures.*

Jul. 2024, Switzerland. Conference titled: Distribution of Orbits: Arithmetic and Dynamics.
Title: *Random Walks, Rigidity, and Diophantine Approximation on Fractals.*

Mar. 2024, The Ohio State University, Ergodic Theory Seminar.
Title: *Exponential Mixing Via Additive Combinatorics.*

Feb. 2024, George Mason University, Department Colloquium.
Title: *Recent Progress on Mahler's Problem in Diophantine Approximation.*

Feb. 2024, University of Maryland, Dynamics Seminar
Title: *Exponential Mixing Via Additive Combinatorics.*

Feb. 2024, U. of Michigan, Geometry Seminar.
Title: *Exponential Mixing Via Additive Combinatorics.*

Nov. 2023, Penn. State Annual Dynamics Workshop.
Title: *Exponential Mixing Via Additive Combinatorics.*

Apr. 2023, Yale Group Actions and Dynamics Seminar.
Title: *Exponential Mixing Via Additive Combinatorics.*

Dec. 2022, Institute of Advanced Study, Princeton, Special Year Seminar.
Title: *Exponential Mixing and Fractal Uncertainty.*

Dec. 2022, ICTS Bangalore, India, Ergodic Theory & Dynamical Systems Conference in Honor of Dani's 75th Birthday (virtual).
Title: *Exponential Mixing Via Additive Combinatorics.*

Nov. 2022, Northwestern University, Chicago Action Now Rotating Seminar.
Title: *Exponential Mixing Via Additive Combinatorics.*

Jun. 2022, U. of Chicago, Ergodic Geometry, Number Theory, and Margulis' Legacy: the Next Generation. Conference in Honor of Margulis' 75th Birthday.
Title: *Horocycles in the Level Aspect and a Question of Mahler.*

Apr. 2022, U. of California San Diego Group Actions Seminar (virtual).
Title: *Exponential Mixing on Geometrically Finite Locally Symmetric Spaces*.

Apr. 2022, Penn State Dynamics Seminar.
Title: *Exponential Mixing on Geometrically Finite Manifolds*.

Mar. 2022, Maryland Annual Dynamics Workshop.
Title: *On the Mozes-Shah Phenomenon for Horocycle Flows on Moduli Spaces*.

Nov. 2021, Virtual Lecture Series at Tata Institute, India.
Title: *Random Walks, Spectral Gaps, and Khintchine Theorem on Fractals*.

Jun, 2021, U. of California San Diego Group Actions Seminar (virtual).
Title: *On the Mozes-Shah Phenomenon on Moduli Spaces*.

Apr. 2021, Yale Geometry & Topology Seminar (virtual).
Title: *On the Mozes-Shah Phenomenon on Moduli Spaces*.

Oct. 2021, Wisconsin Dynamics Seminar.
Title: *Generalized Hecke Operators and Mahler's Problem in Diophantine Approximation*.

Mar. 2021, Billiards and Surfaces alà Teichmüller and Riemann, Online (BiSTRO) (virtual).
Title: *On the Mozes-Shah Phenomenon on Moduli Spaces*.

Nov. 2020, Midwest Early Career Dynamics Conference.
Title: *Random Walks, Spectral Gaps, and Khintchine Theorem on Fractals*.

Apr. 2020, Annual Maryland Dynamics Workshop (virtual).
Title: *Random Walks, Spectral Gaps, and Khintchine Theorem on Fractals*.

Mar. 2020, Homogeneous Dynamics Conference at Hausdorff Institute, Bonn Germany (virtual).
Title: *Diophantine Approximation on Fractals and Homogeneous Flows*.

Apr. 2019, Yale Group Actions Seminar.
Title: *Diophantine Approximation on Fractals and Homogeneous Flows*.

Earlier Talks:

Warwick, Bristol, New England NT seminar, York DAHD Seminar, Tel Aviv, Maryland, Penn State, Michigan, Chicago, Northwestern, Indiana, Purdue, Utah, Ohio State, Dynamics Workshop at Penn State.