MATTHEW J. KUKLA

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EDUCATION

The George Washington University — starting Fall 2026
Mathematics, PhD — *Washington, DC, USA*

The George Washington University — in progress, expected Fall 2026
Mathematics, MA — *Washington, DC, USA*

University of Maryland — awarded May 2022
Mathematics, BSc — *College Park, Maryland, USA*

PROFESSIONAL EXPERIENCE

The Math Citadel — March 2019 - present
Academic Researcher

· Conduct original research in fuzzy algebra, stochastic geometry, graphical probabilistic models

· Develop software packages:

- Design and implement fuzzy anomaly detection models
- Optimize numerical methods for modeling random processes

BlueHalo Labs — June 2022 - May 2025
Research Engineer — *Rockville, Maryland, USA*

· Researcher in mathematics with a focus on graph theory, scientific computing, formal logic

- Designed, implemented, and deployed novel graph clustering algorithms. Optimized with high-performance linear algebra libraries.
- Constructed systems for knowledge representation, formal ontology, and automated reasoning across large relational structures
- Developed specialized tools for signal processing and harmonic analysis

· Wrote research articles and technical reports for delivery to government, academic, and private-sector customers

SKILLS

Programming Languages	C, OCaml, Python, Fortran, Julia, Prolog, Java, MATLAB
Operating Systems	Linux, UNIX (BSD and Solaris), MS-DOS
Tools	Shell scripting, sed, AWK, Git, LaTeX
Libraries	NumPy, SciPy, BLAS, LAPACK
Web	HTML, CSS, OWL, RDF, Gopher, AWS
Databases	SQL, Solr, ElasticSearch, Cypher
Radio	NEC2, GNURadio, SDR

PUBLICATIONS AND PREPRINTS

Double Orthogonal Factorization Systems
(with C.B. Aberlé, Elena Caviglia, Rubén Maldonado, Luca Mesiti, Dorette Pronk, and Tanjona Ralaivaosoana)
Preprint, arXiv:2509.26343, submitted. (2025)

Logical Limit Laws for Layered Permutations and Related Structures
(with Samuel Braunfeld)
*Published, Enumerative Combinatorics and Applications. **2** no. 4. (2021)*

Colored Convex Linear Orders and Logical Limit Laws
Preprint. (2021)

Rings of Typed Ordered Fuzzy Numbers
(with Cassandra Traylor)
Preprint, arXiv:2010.07764. (2020)

SELECTED TALKS

Double Categories for the Working Graduate Student
Graduate Student Seminar, The George Washington University (2026)

Relational Structures, Logical Limit Laws, and Layered Permutations
Knots in Washington 51, The George Washington University (2025)

First-Order Logical Limit Laws, Ordered Structures, and Permutation Classes
Computability & Complexity Seminar, The George Washington University (2025)

Double Factorization Systems and Double Fibrations
7th International Conference on Applied Category Theory, University of Oxford (2024)

Logical Limit Laws for Layered Permutations and Related Structures
Logic Seminar, University of Maryland (2022)

Categorical Mirror Symmetry of Elliptic Curves (two lecture series)
Geometry and Physics Seminar, University of Maryland (2018)

Generalized Calabi-Yau Manifolds
Geometry and Physics Seminar, University of Maryland (2018)

TEACHING

GW Experimental Mathematics Lab January 2026 - present
Lab Project Assistant *Washington, DC, USA*

· Mentor undergraduate research project studying confinement properties of repulsive-attractive kernels

The George Washington University, Department of Mathematics August 2025 - present
Graduate Instructional Assistant *Washington, DC, USA*

LICENSES AND CERTIFICATIONS

EPA Part 608 Universal Certification July 2025

For service of stationary HVACR equipment and handling of refrigerants.