

# MATTHEW J. KUKLA

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## EDUCATION

**University of Maryland**  
*Mathematics, BSc.*

awarded May 2022  
*College Park, Maryland, USA*

- Selected for First-Year Innovation and Research Experience

## PROFESSIONAL EXPERIENCE

**The Math Citadel**  
*Academic Researcher*

March 2019 - present

- 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**  
*Research Engineer*

June 2022 - May 2025  
*Rockville, Maryland, USA*

- Researcher in mathematics with a focus on graph theory, scientific computing, 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

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

## PUBLICATIONS AND PREPRINTS

### Double Orthogonal Factorization Systems

(with C.B. Aberlé, Elena Caviglia, Rubén Maldonado, Luca Mesiti, Dorette Pronk, and Tanjona Ralaivaosoaana)  
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 Taylor)

Preprint, arXiv:2010.07764. (2020)

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## SELECTED TALKS

### 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)*

### Double Categorical Limits

*The Adjoint School (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)*

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## LICENSES AND CERTIFICATIONS

### EPA Part 608 Universal Certification

July 2025

For service of stationary HVACR equipment and handling of refrigerants.