

# MATTHEW J. KUKLA

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## EDUCATION

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### University of Maryland

*Mathematics, BSc.*

awarded May 2022

*College Park, Maryland, USA*

- Selected for First-Year Innovation and Research Experience (FIRE)

## PROFESSIONAL EXPERIENCE

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### The Math Citadel

*Academic Researcher*

March 2019 - present

- Conduct original research in mathematics, including fuzzy sets/algebras, graphical probabilistic models
- Develop software packages:
  - Build digital signal processing plugins
  - Develop and implement fuzzy anomaly detection techniques
  - Optimize numerical methods
- Contribute to technical articles and professional lecture material

### BlueHalo Labs

*Research Engineer*

June 2022 - May 2025

*Rockville, Maryland, USA*

- Researcher in mathematics with a focus on automated reasoning, graph theory, scientific computing, signal processing
  - Designed, implemented, and deployed novel graph clustering algorithms. Optimized with high-performance linear algebra libraries.
  - Constructed systems for knowledge representation and inference across large relational structures
- Wrote research articles, technical reports for delivery to government, academic, and private-sector customers

## SKILLS

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### 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,  $\text{\LaTeX}$

### Libraries

NumPy, SciPy, BLAS, LAPACK

### Web

HTML, CSS, OWL, RDF, Gopher, AWS

### Databases

SQL, Solr, Elasticsearch, Cypher

### Radio

NEC2, GNURadio, SDR

## PUBLICATIONS AND PREPRINTS

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### Logical Limit Laws for Layered Permutations and Related Structures

*Joint 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

*Joint with Rachel Traylor.*

*Preprint, arXiv:2010.07764. (2020)*

## SELECTED TALKS

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### **Relational Structures, Logical Limit Laws, and Layered Permutations**

*Knots in Washington 51, George Washington University (2025)*

### **First-Order Logical Limit Laws, Ordered Structures, and Permutation Classes**

*Computability & Complexity Seminar, 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)*

## LICENSES AND CERTIFICATIONS

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### **EPA Part 608 Universal Certification**

July 2025

For service of stationary HVACR equipment and handling of refrigerants.