

# MATTHEW J. KUKLA

<https://mkukla.net>  $\diamond$  [matt.kukla@verizon.net](mailto:matt.kukla@verizon.net)

## EDUCATION

---

**University of Maryland**

*Mathematics, BSc.*

awarded May 2022

*College Park, Maryland, USA*

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

## PROFESSIONAL EXPERIENCE

---

**The Math Citadel**

*Academic Researcher*

March 2019 - present

- Conduct original research in mathematics, including fuzzy sets/algebras, stochastic geometry, 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

---

**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, L<sup>A</sup>T<sub>E</sub>X

**Libraries**

NumPy, SciPy, BLAS, LAPACK

**Web**

HTML, CSS, OWL, RDF, Gopher, AWS

**Databases**

SQL, Solr, ElasticSearch, Cypher

**Radio**

NEC2, GNURadio, SDR

## PUBLICATIONS AND PREPRINTS

---

**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.*

## SELECTED TALKS

---

### **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

---

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

July 2025

For service of stationary HVACR equipment and handling of refrigerants.