# MATTHEW J. KUKLA

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## EDUCATION

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

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

## PROFESSIONAL EXPERIENCE

**The Math Citadel** March 2019 - present
*Academic Researcher*

· 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** June 2022 - May 2025
*Research Engineer* *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 logical reasoning 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, LaTeX |
| **Libraries** | NumPy, SciPy, BLAS, LAPACK |
| **Web** | HTML, CSS, OWL, RDF, Gopher, AWS |
| **Databases** | SQL, Solr, ElasticSearch, Cypher |

## 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.*
*Preprint, arXiv:2010.07764. (2020)*

## 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)*