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ELİF USKUPLU

May 26, 2025

RESEARCH INTERESTS

- Homotopy type theory and its extensions
- Formalized mathematics and proof assistants
- Categorical semantics of type theories
- (Secondary) Combinatorial design theory and its application in coding theory

EDUCATION

2023 **University of Southern California**
Ph.D. in Mathematics, 3.70/4.00

Advisor: Aaron Lauda, University of Southern California
Advisor: Michael Shulman, University of San Diego

2019 **Koç University**
M.S. in Mathematics, 3.99/4.00

2017 **Istanbul Bilgi University**
B.Sc. in Mathematics, 3.65/4.00

2013 **Istanbul Technical University**
Mathematical Engineering, *Left due to undergraduate transfer*

PUBLICATIONS AND PREPRINTS

3. **Formalizing two-level type theory with cofibrant exo-nat**, Elif Uskuplu, Available on arXiv, (2023).
   arXiv:2309.09395.

2. **QC-LDPC codes from difference matrices and difference covering arrays**, Diane Donovan, Asha Rao, Elif Uskuplu, Emine Ş. Yazıcı, *IEEE Access*, vol. 11, pp. 52141-52157, (2023).
   DOI:10.1109/ACCESS.2023.3279327

1. **High-rate LDPC codes from partially balanced incomplete block designs**, Diane Donovan, Aiden Price, Asha Rao, Elif Uskuplu, Emine Ş.Yazıcı, *Journal of Algebric Combinatorics*, Volume 55, 259–275 (2022).
   DOI:10.1007/s10801-021-01111-0

CONFERENCE ABSTRACT PAPERS

3. **Internal relational parametricity, without an interval**, Thorsten Altenkirch, Ambrus Kaposi, Michael Shulman, Elif Uskuplu, *30th International Conference on Types for Proofs and Programs TYPES 2024*, (2024).

2. **Cofibrancy of The Exo-type of Natural Numbers**, Elif Uskuplu, *The Second International Conference on Homotopy Type Theory*, (2023).
   Abstract paper

1. **An Experiment with 2LTT Features in Agda**, Elif Uskuplu, *Workshop on Homotopy Type Theory/ Univalent Foundations*, (2022).
   Abstract paper

NOTES

1. **Two-Level Type Theory**, Elif Uskuplu with Agda contributors, *Documentation for the two-level flag in Agda Library*.
   Link

EMPLOYMENT & EXPERIENCE

August 2024 –	Indiana University, Bloomington, IN. **Zorn Postdoctoral Fellow**
January 2024 – May 2024	University of Southern California, Los Angeles, CA. **Lecturer**
September 2019 – December 2023	University of Southern California, Los Angeles, CA. **Teaching Assistant**
September 2017 – August 2019	Koc University, Istanbul, Turkey. **Teaching Assistant**
September 2018 – August 2019	Istanbul Bilgi University, Istanbul, Turkey. **Teaching Assistant**

HONORS & AWARDS & FUNDING

8. The Edward and Dolores Blum Research Prize, Awarded to select doctorate students in recognition to their outstanding research in the Department of Mathematics at USC, 2023

7. Research Support by the grant of Michael Shulman, the Air Force Office of Scientific Research under award number FA9550-21-1-0009

6. Research support by the grant of Aaron Lauda, the NSF grant DMS-1902092, the Army Research Office W911NF-20-1-0075, and Simons Foundation

5. Outstanding Teaching Award, Koç University

4. The Scientific and Technological Research Council of Turkey (TUBITAK), ARDEB 1001 Research Project Scholarship, Grant Number: 116F166, Grant Provider: E. Şule Yazici

3. İstanbul Bilgi University the Board of Trustee Scholarship

2. Turkish Math Society, Cahit Arf Scholarship

1. Higher Education Student Student Loans and Dormitories Institution State Scholarship, Turkey

TALKS & PRESENTATIONS

May 17 2025	Monotonicity and Natural Logic: Tracking Meaning with Arrows, *The AWM Research Symposium, Logic Across Mathematics Session*.
January 25 2025	Formalizing locally nameless syntax with cofinite quantification, *WITS 25*.
September 25 & October 2 2024	From Propositions to Proof Assistants: A Journey through Type Theory, *IUB Logic Seminars*.
Feb 2024	Navigating the New Frontier: Formalized Mathematics, *WiMSoCal 2024*.
May 2023	Cofibrancy of The Exo-type of Natural Numbers, *2nd International Conference on Homotopy Type Theory*.
December 2022	Homotopy Type Theory vs Set Theory, *GSU Research Seminars*.
August 2022	Proof Assistants: Agda for Beginners, *SageDays Istanbul*.
July 2022	An Experiment with 2LTT Features in Agda, *Workshop on Homotopy Type Theory/Univalent Foundation*.
July 2022	Formalization of 2LTT in Agda, *MURI Meeting at CMU*.
February 2022	A Brief Introduction to Homotopy Type Theory, *USC Math Grad Colloquium*.

PEER REVIEWER

1. Reviewer in *The 31st International Conference on Computational Linguistics, COLING 2025*

PROJECTS & ACTIVITIES

6. **USC Women in Mathematics Group**, research event coordinator, link.

5. **Formalization of 2LTT & Univalence Principle in Agda**, github repository.

4. **Univalent mathematics in Agda (as a contributor)**, github repository.

3. **Simply Typed Lambda Calculus with de Bruijn Indices in Lean4**, github repository.

2. **Directed Reading Program Türkiye**, mentorship, link.

1. **Mathematics Solidarity Platform**, volunteer, link.

PARTICIPATIONS

11. **Formalization of Mathematics**, *The Simons Laufer Mathematical Sciences Institute (formerly MSRI)*, June, 2023.

10. **HoTT '23 and MURI '23 (joint event)**, *Carnegie Mellon University*, May, 2023.

9. **HoTTEST Summer School 2022**, *online participation*, July - August, 2022.

8. **MURI Meeting '22**, *Carnegie Mellon University*, June, 2022.

7. **Logic and Higher Structures**, *Centre International De Rencontres Mathematiques*, February, 2022.

6. **Istanbul Design Theory Workshop**, *Koc University*, September, 2018.

5. **Workshop on Graph Theory and its Applications**, *Gebze Technical University*, November, 2017.

4. **Undergraduate and Graduate Summer School**, *Nesin Mathematical Village,*, June, 2017.

3. **TMD Analysis Summer School**, *Feza Gursey Institute*, July, 2016.

2. **Logic Summer School**, *Feza Gursey Institute*, August, 2015.

1. **Philosophy and Mathematics Symposium**, *Yeditepe University*, February, 2014.