# Dr. Jessica Bariffi

## Curriculum Vitae

E-Mail **jessica.bariffi@tum.de** Location **Munich, Germany**
Website `https://user.math.uzh.ch/bariffi/` Current Position **Postdoc at the Technical University of Munich (TUM)**

## Education

### Ph.D. Program in Mathematics
**University of Zurich**
July 2020 - April 2024

- Supervisor: Prof. Joachim Rosenthal
- Dissertation: *Analysis and Decoding of Linear Lee-Metric Codes with Application to Code-Based Cryptography*

### Master of Science in Mathematics
**University of Zurich**
April 2018 - June 2020

- Supervisor: Prof. Joachim Rosenthal
- Thesis: *A Finite Geometry Construction for MDPC Codes*

### Lehrdiplom für Maturitätsschulen, Mathematik (not completed)
**University of Zurich**
September 2019 - June 2020

- Completed Courses: *Pädagogische Psychologie, Fachdidaktik Mathematics I - III, Hospitationspraktikum, Übungslektionen im Rahmen der Fachdidaktik (10 Lektionen, davon 5 underrichtet)*

### Bachelor of Science in Mathematics
**University of Zurich**
September 2014 - March 2018

## Work Experience

### Postdoc – Full time
**Technical University Munich**
01.07.24 - today

- TUM School of Computation, Information and Technology
- Supervisor: Prof. Antonia Wachter-Zeh
- Chair of Coding Theory and Cryptography

### Group-fitness Trainer – Minijob
**All Inclusive Fitness**
01.02.25 - today

### Research Scientist – Full time
**German Aerospace Cener (DLR)**
01.07.20 - 30.06.24

- Institute for Communications and Navigation
- In the group of Dr. Hannes Bartz

### Mathematics Teacher – part time 20%
**Academia Group Schweiz**
23.05.18 - 30.06.20

- Private lessions for $A$-Levels Mathematics
- Total of 7 students

## Teaching Experience

### Channel Coding
**Technical University Munich, Institute for Communications Engineering**

- Lecture of $5$ weekly contact hours per semester
- Co-Lecturer – 10 - 20 % of the lectures
- Winter semester 2024 and 2026

### Coding Theory for Storage and Networks
**Technical University Munich, Institute for Communications Engineering**

- Lecture of $4$ weekly contact hours per semester
- Co-Lecturer – 50% of the lectures
- Summer semester 2025 and 2026

### Security in Communications and Storage
**Technical University Munich, Institute for Communications Engineering**

- Lecture of $4$ weekly contact hours per semester
- Co-Lecturer – 50% of the lectures
- Winter semester 2024

### Combinatorics
**Technical University Munich, Department für Mathematics**

- Lecture of $4$ weekly contact hours per semester
- Co-Lecturer – $2$ Lectures as a substitution for Prof. Violetta Weger
- Summer semester 2026

## Teaching Assistance

### For Mathematics Students
**University of Zurich, Institute for Mathematics**

- Cryptography
  - ca. $2$h/week/semester
  - Spring semester 2022
- Linear Algebra
  - ca. $2$h/week/semester
  - Fall semester 2022
- Programming in MATLAB
  - Block course — one-week intensive course, ca. $40$h
  - February 2021

### For students at the Zurich University of Teacher Education (PHZH)
**University of Zurich, Institute for Mathematics**

- Linear Algebra
  - ca. $2$h/week/semester
  - Spring semester 2020 and Fall semester 2017
- Geometry
  - ca. $2$h/week/semester
  - Fall semester 2018
- Foundations of Mathematics
  - ca. $2$h/week/semester
  - Spring semester 2018

## Supervising Activities

### Master Theses
with a duration of 6 months each

**University of Zurich (under Prof. Rosenthal)**

- Yves Krähenbühl – Spring semester 2023
  *Overview of Classes of MDP Convolutional Codes and Their Erasure Decoding Algorithms*

**Technical University Munich (under Prof. Antonia Wachter-Zeh)**

- Xinyi Cai – Winter semester 2026
- Thirawat Yimsiri – Winter semester 2026

### Research Internships
with a duration of 9-15 weeks each

**Technical University Munich (under Prof. Antonia Wachter-Zeh)**

- Xinyi Cai – Summer semester 2026
  *Sequence Reconstruction for Coloring Channel Models ander Substitution Errors*
- Ramazan Tan – Summer semester 2026
  *SC-LDPC Codes for the IDS Channel*

## Organization of Conferences

**SIAM AG**

- Co-Organizer of Minisymposium, *Advances in Code-based Signatures*, with Prof. Violetta Weger, June 2023.

## Key Competences

Algebra | Combinatorics | Coding Theory | DNA-data storage | Probability Theory | Cryptography | Information Theory

## Programming Languages

Python | SageMath | LaTeX | MATLAB | Git

## Languages

| | |
|---|---|
| **(Swiss-) German** | Native language – C2 |
| **Italian** | Native language – C2 |
| **English** | C2 |
| **French** | B1 |

## Grants

**Travel Grants**

- *PhD Student Travel Grant*, in connection with the workshop on combinatorics in digital communication, February 2023.
- *ComSoc Student Travel Grant*, in connection with the 2022 IEEE Globecom Conference, November 2022.

## Publications

**Journale**

1. Jessica Bariffi, Drisana Bhatia, Giuseppe Cotardo, Violetta Weger. *Weak Composition Lattices and Ring-Linear Anticodes*. (Akzeptiert für Publikation in *Designs, Codes and Cryptography*), 2026.
2. Frederik Walter, Hrishi Narayanan, Jessica Bariffi, Anne Lüscher, Rawad Bitar, Robert Grass, Antonia Wachter-Zeh, Zohar Yakhini. *A Security Framework for Chemical Functions*. (Publiziert in *IEEE Transactions on Molecular, Biological, and Multi-Scale Communications*), 2026.
3. J. Bariffi, V. Weger *Better Boands on the Minimum Lee Distance*. (Publiziert in *SIAM Journal of Discrete Mathematics*), 2026.
4. H. Sauerbier Couvée, T. Jerkovits, J. Bariffi. *Boands on Sphere Sizes in the Sum-rank Metric and Coordinate-additive Metrics*. (Publiziert in *Designs, Codes and Cryptography*), 2025.
5. J. Bariffi, H. Bartz, G. Liva, J. Rosenthal. *Error-Correction Performance of Regular Ring-Linear LDPC Codes over Lee Channels*. (Publiziert in *IEEE Transactions on Information Theory*), 2024.
6. J. Bariffi, S. Mattheus, A. Neri, J. Rosenthal. *Moderate Density Parity-Check Codes from Projective Bandles*. (Publiziert in *Designs Codes and Cryptography*), 2022.

**Conference Proceedings and Book Chapters**

1. J. Bariffi, A. Wachter-Zeh, E. Yaakobi. *Sequence Reconstruction over Coloring Channels for Protein Identification*. 2025 IEEE International Symposium on Information Theory (ISIT25), Ann Arbor (MI), USA.
2. H. Sauerbier Couvée, T. Jerkovits, J. Bariffi. *Boands on Sphere Sizes in the Sum-rank Metric and Coordinate-additive Metrics*. Workshop of Coding and Cryptography, 2024.
3. J. Bariffi, K. Khathuria, V. Weger *Information Set Decoding for Lee-Metric Codes using Restricted Balls*. Code-Based Cryptography 10th International Workshop, CBCrypto 2022, Trondheim, Norway, May 29–30, 2022, Revised Selected Papers, 2022.
4. J. Bariffi, H. Bartz, G. Liva, J. Rosenthal. *Analysis of Low-Density Parity-Check Codes over Finite Integer Rings for the Lee Channel*. IEEE Globecom 2022, Rio de Janeiro, Brazil.
5. J. Bariffi, H. Bartz, G. Liva, J. Rosenthal. *On the Properties of Error Patterns in the Constant Lee Weight Channel*. International Zürich Seminar on Information and Communication 2022, Zürich, Schweiz.

**Preprints**

1. F. Walter, J. Bariffi, A. Wachter-Zeh. *Orthogonal SC-LDPC Codes for the IDS Channel*. arXiv:2610.14308, 2026.
2. J. Bariffi, G. Cavicchioni, V. Weger. *Coarsest Fourier-reflexive Partitions for the Lee, Homogeneous and Subfield Metric*. arXiv:2409.11926, 2024.

## Talks at International Conferences

**Invited Talks**

- *Coding Theory for DNA Storage*, 2026 Foundations of Future Communication Systems: Innovations in Communication, February 2026, Braunschweig (Germany).

- *Information-theoretic Bounds on the Size of Spheres in the Lee Metric*, SIAM Conference on Applied Algebraic Geometry, July 2025, Madison, Wisconsin (US).
- *Partition-based MacWilliams Identities in the Lee, Homogeneous and Subfield Metric*, Galois Geometries and Their Applications: Young Seminar, April 2025, (online).
- *Sequence Reconstruction over Coloring Channels for Protein Identification*, Workshop on Post-Shannon Theory and Molecular Communication, March/April 2025, Braunschweig (Germany).
- *Constructing Moderate-Density Parity-Check Codes from Projective Bundles*, SIAM Conference on Applied Algebraic Geometry, July 2023, Eindhoven (The Netherlands).
- *Analysis and Properties of Error Patterns in the Lee Channel*, Baby Seminar, Eindhoven University of Technology, October 2021.
- *Channel Coding in the Lee Metric*, Postgraduate International Coding Theory Seminar (PICS), September 2021 (online).

**Contributed Talks**

- *Sequence Reconstruction over Coloring Channels for Protein Identification*, IEEE International Symposium on Information Theory (ISIT), June 2025, Ann Arbor, Michigan (US)
- *MacWilliams-Type Identities in the Lee and Homogeneous Metric*, Doctoral Seminar, Technical University of Munich, July 2024, Munich (Germany).
- *The Existence of MacWilliams-Type Identities for the Lee, Homogeneous and Subfield Metric*, Combinatorics 2024, June 2024, Carovigno (Italy).
- *Analysis and Decoding of Ring-Linear Lee-Metric codes with Application to Code-Based Cryptography*, Swiss Seminar, University of Zurich, April 2024, Zurich (Switzerland).
- *Bounds on the Minimum Lee Distance*, Institute Colloquium, German Aerospace Center, October 2023, Munich (Germany).
- *The Geometry and Error Probability of the Lee channel*, Workshop on Combinatorics in Digital Communications, April 2023, Eindhoven (Netherlands).
- *Analysis of Low-Density Parity-Check Codes over Finite Integer Rings for the Lee Channel*, IEEE Global Communications Conference, December 2022, Rio de Janeiro (Brasil).
- *What is Lattice-Based Cryptography?*, PhD Seminar, German Aerospace Center, September 2022, Munich (Germany).
- *The Marginal Distribution of the Lee Channel and its Applications*, Coding theory and cryptography - A conference in honor of Joachim Rosenthal's 60th birthday, July 2022, Zurich (Switzerland).
- *Information Set Decoding in the Lee Metric*, Institute Colloquium, German Aerospace Center, July 2022, Munich (Germany).
- *Information Set Decoding for Lee-Metric Codes using Restricted Spheres*, CBCrypto (affiliated event of EuroCrypt 2022), May 2022, Trondheim (Norway).
- *On the Scalar Multiplication Problem in the Lee Metric*, PhD Seminar, German Aerospace Center, June 2021, Munich (Germany).
- *Decoding Performance of LDPC Codes over the Lee Channel*, Institute Colloquium, German Aerospace Center, June 2021, Munich (Germany).
- *Analysis of Low-Density Parity-Check Codes over Finite Integer Rings for the Lee Channel*, Algebraic Coding Theory e-Summer School (ACT21), June 2021 (virtual).
- *A Finite Geometry Construction for MDPC-Codes*, Swiss Seminar, University of Zurich, March 2020, Zurich (Switzerland).