

# Jakob Paul Zimmermann

## Curriculum Vitae

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## Education

### Technische Universität Berlin

Berlin

○ M.Sc. in **Computer Science**

Starting Fall 2024

### Karlsruher Institute für Technologie (KIT)

Karlsruhe

○ B.Sc. in **Computer Science**

October 2020 – March 2024

○ B.Sc. in **Mathematics**

April 2021 – March 2024

- Relevant Coursework: Graph Theory, Convex Geometry, Statistical Learning, Combinatorics, Elementare Geometrie, Planar Graphs, Random Graphs and Networks.

○ Bachelor Thesis: “*Induced Turán problems*” under supervision of *Maria Axenovich* and *Thorsten Ueckerdt* resulting in the published paper: “*Induced Turán problem in bipartite graphs*”. with *Maria Axenovich* (*Elsevier Discrete Applied Mathematics*, 15 January 2025).

### Haus Lindenhof Foundation

Schwäbisch Gmünd

Voluntary social year in a residential group for people with disabilities

March 2020 – August 2020

## Working & Teaching Experience

### Working Student, Fraunhofer HHI

Berlin, 2025 – present

○ With professor *Wojciech Samek*, working on new backpropagation-based Explainable AI (XAI) methods for the Transformer Architecture.

### HiWi Researcher, Discrete Geometry Group (Freie Universität Berlin)

Starting Juli 2025

○ With professor *Georg Loho*, investigating the geometry of the Newton Polytopes of Neural Networks and developing new XAI methods using the Difference-of-Convex decomposition of Neural Networks. Paper “*Hidden Monotonicity*” to appear in *CVPR 2026*.

### HiWi Researcher / Intern, ML4Safety (Fraunhofer IOSB)

Karlsruhe, Fall 2024

○ Research on runtime monitoring of image recognition models and representation learning. Developed a knowledge-guided monitoring approach working on internal representations of image recognition models and embedding models such as *DINO*.

**Tutor & Grader, Graph Theory (KIT Karlsruhe)**

Fall 2023

**Tutor & Grader, Stochastics (KIT Karlsruhe)**

Spring 2023

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## Publications & Preprints

- Jakob Paul Zimmermann and Georg Loho. “*Hidden Monotonicity: Explaining Deep Neural Networks via their DC Decomposition.*” To appear in **CVPR 2026**. arXiv:2601.07700, January 2026.
- Jakob Paul Zimmermann, Gerrit Holzbach, and David Lerch. “*Knowledge-Guided Failure Prediction: Detecting When Object Detectors Miss Safety-Critical Objects.*” Accepted at **SAIAD Workshop at CVPR 2026**. arXiv:2603.25499, March 2026.
- Maria Axenovich and Jakob Zimmermann. “*Induced Turán problem in bipartite graphs.*” *Elsevier Discrete Applied Mathematics*, Volume 360, Pages 497–505, January 2025.
- Jakob Zimmermann. “*Bipartite Turán problem on cographs.*” arXiv:2601.07406, January 2026. Preprint.

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## Talks & Conferences

- Talk: “*Bipartite Turán problem on cographs*” at Szabó’s Research Seminar, FU Berlin January 2026
- Poster: “*Hidden Monotonicity*” at Workshop on Polyhedral Geometry for Neural Networks, Nürnberg March 2026
- “*Hidden Monotonicity*” at CVPR 2026, Denver June 2026
- “*Knowledge-Guided Failure Prediction*” at SAIAD Workshop at CVPR 2026, Denver June 2026

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## Skills

- **Programming:** Python (ML: NumPy, pandas, scikit-learn, PyTorch), C++, Java,  $\LaTeX$ , SQL, Lean 4 (formal verification). **Familiar with:** Kotlin, R, MATLAB, Haskell, Lisp.
- **Other:** Version Control (Git), Linux Command Line, parallel computing.

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## Activities & Honors

- *Scheffelpreis* (Literarische Gesellschaft Karlsruhe) 2019
- Art exhibition on the subject of mass merchandise, *Haus der Begegnung Ulm* 2018
- First prize, *Jugend musiziert* (singing duet) 2013
- boys choir, *Collegium Iuvenum Stuttgart* 2011 – 2014