

Mehmet Demir Güven

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EDUCATION

ETH Zürich

Bachelor of Science in Computer Science

Zürich, Switzerland

Sep 2026 - Expected Aug 2029

Coursework: Linear Algebra, Data Structures and Algorithms, Discrete Mathematics, Introduction to Programming

RESEARCH PROJECTS

Independent Research

Zürich, Switzerland

Parameter Symmetry in Sine-Network Implicit Neural Representations (SIREN-GAP)

Jul 2026 - Present

- Proved that neuron permutations, sign flips and π bias shifts generate the complete function-preserving symmetry group of generic sine networks with 1 and 2 hidden layers
- Showed with a Shapley-value factorial experiment that this group alone accounts for 79.1 of the 80.4 percentage points of MNIST accuracy lost when INRs start from independent rather than shared initializations
- Designed an exactly invariant weight-space classifier via a $(\cos b, \sin b)$ bias encoding that closes 91.7% of the gap at equal parameter count, against 62.8% for the best alignment method
- Released the method as phasorkit, a pip-installable PyTorch library with invariant layers and an invariance certifier; manuscript in arXiv moderation

Low-Rank Confounding and Partial Identification of Cross-Asset Price Impact (XID)

Jul 2026 - Aug 2026

- Proved that the confounding gap between estimated and true cross-impact matrices has rank at most $K + \text{rank}(B)$, verified in a preregistered simulation with 30 assets, 3 factors and 10M observations
- Derived the execution-cost error in closed form: an equal-weight index basket is mispriced by 54% of its true cost, a dollar-neutral basket by 0%

Reconstructing the Unlisted FLEX Options Market from Clearing Data (FLEX)

Aug 2026 - Sep 2026

- Built a validated pipeline turning OCC daily clearing reports into a 13-month panel of the unlisted FLEX market: 269 activity dates, 1,691 underlyings and 9.06M series-days, reaching 73.0M contracts and \$596B of mark value
- Showed strike-based FLEX detection has precision 0.67 and recall 0.34 and that leg-by-leg counting overstates a butterfly 49x; a placebo-tested fixed-effects regression finds no next-day predictability

Forecasting Run-to-Run Variance in Reinforcement Learning Post-Training of LLMs (caliper)

Aug 2026

- Derived a covariance recursion and adjoint backward pass that predicts the across-seed standard deviation of a model's pass rate from one stored training run, reaching 1.11x median error over 192 prospective settings
- Showed the reward signal drives variance contraction: replacing rewards with coin flips turned a divergence that shrank to 0.14x into one that grew 90.5x; reported where the forecast fails on Qwen2.5-0.5B and 7B

OLYMPIADS

TÜBİTAK National Informatics Olympiad - Second-round qualifier, 33rd National Science Olympiads Dec 2025

- Qualified as 1 of 511 from 18,463 students nationwide (top 3%) for the TÜBİTAK summer school and final

TÜBİTAK National Mathematics Olympiad - Second-round qualifier, 32nd National Science Olympiads Dec 2024

- Advanced to the proof-based national round: number theory, combinatorics, algebra and geometry

TECHNICAL SKILLS

Languages: Python, C++, Java, Rust, TypeScript, Swift, SQL, Bash, LaTeX

ML and Scientific: PyTorch, MLX, NumPy, SciPy, pandas, Polars, scikit-learn, Hugging Face Transformers

Quant Methods: Purged walk-forward CV, Clark-West tests, FDR control, deflated Sharpe ratio, stationary bootstrap

Algorithms: Dynamic programming, graph algorithms, advanced data structures

Mathematics: Probability, matrix analysis, group theory, convex optimization

Spoken: Turkish (native), German (C2, DSD II), English (C1)