Ziv Aharoni

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Research Appointments

- Postdoctoral Associate, Duke University, Jan. 2025–Present
  Advisor: Prof. Henry D. Pfister

Education

- Ph.D. in Electrical and Computer Engineering, Ben-Gurion University of the Negev, Oct. 2020 – June. 2024
  Advisor: Prof. Haim H. Permuter
- M.Sc. in Electrical and Computer Engineering, Ben-Gurion University of the Negev, Oct. 2018 – Sep. 2020
  Advisor: Prof. Haim H. Permuter
- B.Sc. in Electrical and Computer Engineering, Ben-Gurion University of the Negev, Oct. 2013 – Sep. 2017

Honors and Awards

- The Advanced Communication Center (ACC) Feder Family Award for outstanding research work in the field of communication technologies (national student contest **first prize**)
- Dean award for academic excellence 2021
- Darom-Lachish Fellowship for Ph.D. students, 2018-2023
- Jack Keil Wolf best paper award finalist in ISIT 2019

Publications

Preprints

[P1] Ziv Aharoni and Henry D. Pfister (2026). *Conservation Laws for Diffusion Models.* DOI: 10.48550/arXiv.2607.10067.

Journal papers

[J1] Z. Aharoni, O. Sabag, and H. H. Permuter (2022). "Feedback Capacity of Ising Channels With Large Alphabet via Reinforcement Learning". In: *IEEE Trans. Inf. Theory* 68.9, pp. 5637–5656.

[J2] Dor Tsur, Ziv Aharoni, Ziv Goldfeld, and Haim Permuter (2023). "Neural Estimation and Optimization of Directed Information Over Continuous Spaces". In: *IEEE Transactions on Information Theory* 69.8, pp. 4777–4798. DOI: 10.1109/TIT.2023.3264674.

[J3] Dor Tsur, Ziv Aharoni, Ziv Goldfeld, and Haim Permuter (2024). "Data-Driven Optimization of Directed Information over Discrete Alphabets". In: *IEEE Transactions on Information Theory* 70.3, pp. 1652–1670. DOI: 10.1109/TIT.2023.3335863.

[J4] Ziv Aharoni, Bashar Huleihel, Henry D Pfister, and Haim H Permuter (2024a). "Data-Driven Neural Polar Decoders for Unknown Channels with and without Memory". In: *IEEE Transactions on Information Theory* 70.12, pp. 8495–8510. DOI: 10.1109/TIT.2024.3476681.

[J5] Bashar Huleihel, Oron Sabag, Ziv Aharoni, and Haim H. Permuter (2025). "The Duality Upper Bound for Finite-State Channels With Feedback". In: *IEEE Transactions on Information Theory* 71.5, pp. 3255–3270. DOI: 10.1109/TIT.2025.3545688

[J6] Ziv Aharoni and Henry D. Pfister (2025b). "Neural Polar Decoders for DNA Data Storage". In: *IEEE Journal on Selected Areas in Information Theory* 6, pp. 403–416. DOI: 10.1109/JSAIT.2025.3610751.

[J7] Ziv Aharoni, Bashar Huleihel, Henry D. Pfister, and Haim H. Permuter (2026). "Optimized Polar Codes via Mutual Information Maximization with Neural Polar Decoders". In: *IEEE Transactions on Communications* 74, pp. 5820–5832. DOI: 10.1109/TCOMM.2026.3668168.

[J8] Rom Hirsch, Ziv Aharoni, Henry D. Pfister, and Haim H. Permuter (2026). "Neural Polar Decoders for Receivers in Wireless Communication". In: *IEEE Transactions on Communications* 74, pp. 6889–6903. DOI: 10.1109/TCOMM.2026.3679226

Book chapters

[B1] Z. Aharoni, D. Tsur, Z. Goldfeld, and H. Permuter (2022). "Capacity Estimation Using Machine Learning". In: *Machine Learning and Wireless Communications*. Ed. by A. Goldsmith, D. Gunduz, H. V. Poor, and Y. C. Eldar. Cambridge University Press, pp. 317–350. DOI: 10.1017/9781108966559.013.

Conference and Workshop Papers

[C1] Ziv Aharoni, Gal Rattner, and Haim H. Permuter (2018). "Brief Announcement: Gradual Learning of Deep Recurrent Neural Network". In: *Cyber Security Cryptography and Machine Learning (CSCML)*. vol. 10879. Lecture Notes in Computer Science. Springer, pp. 274–277. DOI: 10.1007/978-3-319-94147-9_21.

[C2] Z. Aharoni, O. Sabag, and H. H. Permuter (2019). "Computing the Feedback Capacity of Finite State Channels Using Reinforcement Learning". In: *2019 IEEE Int. Symp. Inf. Theory (ISIT)*. IEEE, pp. 837–841. DOI: 10.1109/ISIT.2019.8849364 **Jack Keil Wolf best paper award finalist**.

[C3] Ziv Aharoni, Oron Sabag, and Haim H. Permuter (2020). "Reinforcement Learning Technique for Finding the Feedback Capacity". In: *2020 International Zurich Seminar on Information and Communication (IZS)*. Invited. ETH Zurich, p. 95. DOI: 10.3929/ethz-b-000402972.

[C4] Z. Aharoni, D. Tsur, Z. Goldfeld, and H. H. Permuter (2020). "Capacity of Continuous Channels with Memory via Directed Information Neural Estimator". In: *2020 IEEE Int. Symp. Inf. Theory (ISIT)*, pp. 2014–2019. DOI: 10.1109/ISIT44484.2020.9174109.

[C5] Z. Aharoni, D. Tsur, and H. H. Permuter (2022). "Density Estimation of Processes with Memory via Donsker Vardhan". In: *2022 IEEE Int. Symp. Inf. Theory (ISIT)*. IEEE, pp. 330–335. DOI: 10.1109/ISIT50566.2022.9834775.

[C6] Dor Tsur, Ziv Aharoni, Ziv Goldfeld, and Haim H. Permuter (2022). "Optimizing Estimated Directed Information over Discrete Alphabets". In: *2022 IEEE International Symposium on Information Theory (ISIT)*, pp. 2898–2903. DOI: 10.1109/ISIT50566.2022.9834898.

[C7] Z. Aharoni, B. Huleihel, H. D. Pfister, and H. H. Permuter (2023). "Data-Driven Polar Codes for Unknown Channels with and Without Memory". In: *2023 IEEE International Symposium on Information Theory (ISIT)*, pp. 1890–1895. DOI: 10.1109/ISIT54713.2023.10206663.

[C8] B. Huleihel, D. Tsur, Z. Aharoni, O. Sabag, and H. H. Permuter (2023). "Neural Estimation of Multi-User Capacity Regions". In: *2023 IEEE International Symposium on Information Theory (ISIT)*, pp. 2380–2385. DOI: 10.1109/ISIT54713.2023.10206828.

[C9] Ziv Aharoni, Bashar Huleihel, Henry D. Pfister, and Haim H. Permuter (2024c). "Data-Driven List Polar Decoder for Symmetric and Asymmetric Input Distributions". In: *International Zurich Seminar on Information and Communication (IZS 2024). Proceedings*. ETH Zurich, pp. 77–81. DOI: 10.3929/ethz-b-000664586.

[C10] Ziv Aharoni, Bashar Huleihel, Henry D. Pfister, and Haim H. Permuter (2024b). "Code Rate Optimization via Neural Polar Decoders". In: *2024 IEEE Int. Symp. Inf. Theory (ISIT)*, pp. 2424–2429. DOI: 10.1109/ISIT57864.2024.10619429.

[C11] Bashar Huleihel, Dor Tsur, Ziv Aharoni, Oron Sabag, and Haim H. Permuter (2024). "Neural Estimation of Multi-User Capacity Regions Over Discrete Channels". In: *2024 IEEE International Symposium on Information Theory (ISIT)*, pp. 1191–1196. DOI: 10.1109/ISIT57864.2024.10619290.

[C12] Ziv Aharoni and Henry D. Pfister (2025a). "Neural Polar Decoders for Deletion Channels". In: *2025 IEEE International Symposium on Information Theory (ISIT)*, pp. 1–6. DOI: 10.1109/ISIT63088.2025.11195357.

[C13] Rom Hirsch, Ziv Aharoni, Henry D. Pfister, and Haim H. Permuter (2025). *A Study of Neural Polar Decoders for Communication*. Presented at the NeurIPS 2025 Workshop on AI4NextG (NextGen AI). DOI: 10.48550/arXiv.2510.03069.

Professional Service

Reviewer: IEEE Transactions on Information Theory, IEEE Transactions on Communications, IEEE Journal on Selected Areas on Information Theory, Conference on Neural Information Processing Systems (NeurIPS), IEEE International Symposium on Information Theory (ISIT), IEEE GLOBECOM.

Project Leadership and Mentoring

- Project Manager, Visual Language Models for Visual Assistance, Duke Data+, Summer 2026. Leading a student team benchmarking visual language models and prototyping real-time smart-glasses assistance for people with visual impairment.

Teaching Experience

- Teaching Assistant, Introduction to Stochastic Processes, Ben-Gurion University, 2017-2023
- Teaching Assistant, Introduction to Stochastic Processes, Tel-Aviv University, 2021-2023
- Teaching Assistant, Factor Graphs and Machine Learning: From Belief-Propagation to Transformers, Duke University, Spring 2026