

Efi Arazi School of Computer Science
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Education

- Postdoctoral Research Fellow at the Department of Statistics 9/2017 - 06/2021
Stanford University
 - Advisor: David Donoho.
 - Research areas: multiple testing, sparse signal detection, variable selection, empirical processes, inference from compressed data.
- Ph.D., Electrical Engineering GPA: 3.9
Stanford University 9/2012 – 9/2017
 - Advisor: Andrea Goldsmith
 - Thesis: “Fundamental performance limits of analog-to-digital compression”
 - PhD exam committee: Tsachy Weissman, John Duchi, Abbas El Gamal, Emanuel Candes
- M.Sc., Mathematics (*summa cum laude*)
Ben-Gurion University 10/2010 - 8/2012
 - Advisor: Daniel Alpay
 - Thesis: “Generalized white noise space analysis and stochastic integration with respect to a class of Gaussian stationary increment processes”
- B.Sc., Mathematics (*summa cum laude*)
Ben-Gurion University 10/2007 - 8/2010
- B.Sc., Electrical and Computer Engineering (*summa cum laude*)
Ben-Gurion University 10/2006 - 8/2010

Awards and Fellowships

- **Bergman Memorial Research Award** for “best BSF application by a young scientist” (Granted 10/2023)
- **US-Israel Binational Science Foundation (BSF)**. In collaboration with David Donoho. (2023 - 2025)
- **Koret Foundation postdoctoral fellowship**, Statistics Department, Stanford University (2019 - 2021)

Employment

- **Reichman University** 3/2022 –
Senior Lecturer in the School of Computer Science
- **Stanford University** 10/2017 – 6/2021
Postdoctoral research fellow and lecturer in the Department of Statistics
- **SenseIP** (Tenafly, NJ and Natanya, Israel) 1/2021 –
Head of artificial intelligence
 - Text understanding and retrieval for analyzing intellectual property
- **Tarsier Technologies** (San Francisco, CA) 6/2017 – 3/2020
Technical adviser
 - Algorithms for tracking and identifying flying objects.
- **Huawei** (Bridgewater, NJ and Santa Clara, CA) 6/2015 – 9/2015
Summer research intern
 - Statistical properties of communication over multiple radio access technologies.
- **SanDisk** (Omer, Israel) 5/2011 – 10/2012
Algorithm development
 - High-throughput and low-latency data compression algorithms

Invited Contributions

- **August 2025.** Joint Statistical Meeting (JSM). Invited talk to that session: “New frontiers in change-point analytics: complex data structures and large-scale data streams” (invited by Piotr Fryzlewicz)
- **July 2025.**
- **September 2024.** 60th Annual Allerton Conference on Communication, Control, and Computing. Invited talk to the session: “Sequential Methods” (with Tingnan Gong and Yao Xie)
- **August 2023.** Joint statistical meeting (JSM). Invited talk to the session: “Detection and estimation of sparse and weak signals” (invited by Zheng Tracy Ke)
- **July 2023.** Joint Conference on Statistics and Data Science in China (JCSDC). Invited talk to the session: “Recent advances in statistical machine learning” (invited by Jiashun Jin)
- **June 2022.** The annual meeting of the Israeli Statistics Association, Tel-Aviv, will be held in June 2022. Invited talk to the session: “Recent advances in high-dimensional statistics” (invited by Daniel Yekutieli)
- **October 2019.** Invited book chapter to “Information-theoretic methods in data science”. Cambridge University Press, 2021 (editors: Miguel MD Rodrigues and Yonina C. Eldar)
- **October 2018.** Keynotw speaker at the workshop: “The intersection of information theory and signal processing”, Banff International Research Stations, October 2018 (chairs: Petros Boufounos, Stark Draper, and Yonina C. Eldar)

Selected Invited Seminar Talks:

- “An Information-Theoretic Approach for Detecting Edits in AI-Generated Text.” **Princeton University**, ECE seminar, 2/2025;
- “Rare and weak signal detection and authorship challenges: From the Federalist Papers to ChatGPT.” **Georgia Tech**, SYE Statistics seminar, 8/2024; **Weizmann Institute of Science**, Signal Acquisition Modeling Processing and Learning (SAMPL) lab seminar 5/2025;
- “Detecting human edits of AI-generated text: an information-theoretic approach.” **Bar-Ilan University**, Computer Science Department seminar, 05/2024;
- “The minimax risk in testing uniformity under missing ball alternatives.” **Technion**, Communication and Information Theory seminar, 3/2024; **Tel-Aviv University**, Electrical Engineering Department seminar, 5/2024;
- “Detecting rare and weak deviations of non-proportional hazard in survival analysis.” **University of Göttingen**, Medical Statistics seminar, 1/2024;
- “Mean estimation from one-bit measurements”. Tel-Aviv University, Information Theory (IT) and Signal Processing (SP) seminar, 04/2023; **The Hebrew University**, IT and Applications seminar, 03/2023; **Technion**, IT seminar, 03/2023
- “Two-sample problem for high-dimensional multinomials and testing authorship”. **Stanford University**, Department of Statistics seminar, 02/2020; **UC Berkeley**, BLISS Seminar, 02/2020; **Tel-Aviv University**, Electrical Engineering Department seminar 01/2020; **The Hebrew University**, Machine Learning Seminar, 01/2020; **Ben-Gurion University**, Electrical & Computer Engineering (ECE) department seminar 01/2020, **Stanford University**, IT Forum 12/2019.
- “Compressed sensing under optimal quantization”. **UC San Diego**, 05/2018; **Tel-Aviv University**, EE department seminar 03/2016; **University of Maryland at College Park**, IT Seminar 03/2017
- “Fundamental distortion limits of analog-to-digital compression”. **Stanford University**, Vision and Learning Lab 03/2017; **Duke University**, SP/ECE Seminar 05/2017; **Georgia Tech**, ECE Seminar 04/2016; **MIT**, Research Laboratory of Electronics seminar 02/2016
- “From Brownian motion to bits (and back)”. **Chapman University**, 10/2017; **Ben-Gurion University**, ECE department seminar, 12/2016; **Stanford University**, IT Forum, 11/2016
- “Shannon meets Nyquist: Rate-distortion of sub-Nyquist sampled processes”. Silicon Valley **IEEE SP Society Chapter** 12/2015; **Stanford University**, IT Forum 10/2015; **New York University**, ECE department seminar 08/2015; **Rutgers University**, ECE department seminar 08/2015; **Bell-Labs NJ**, 08/2015; **Princeton University**, IT seminar 07/2015; **Technion**, SP Seminar 01/2014; **Tel-Aviv University**, SP/IT Seminar 01/2014; **Ben-Gurion University**, ECE department seminar 12/2013

Professional and Volunteer Services

- Science Advisor. BSF (Round of 2024/25)
- Panel member. Prof. Rahamimoff Travel Grant Program of the BSF (2024)
- Reviewer for: International Conference on Learning Representation (2024), Empirical Methods in Natural Language Processing (EMNLP) (2024), Neural Information Processing Systems (NeurIPS) (2024, 2025), International Conference on Machine Learning

(ICML) (2024), The IEEE Transactions on Information Theory, The Proceedings of the National Academy of Sciences, The Annals of Statistics, The IEEE Transactions on Wireless Communication, The IEEE Transactions on Signal Processing, IEEE Journal of Selected Topics in Signal Processing

Patents

- Pt4 A. Kipnis, Andrea J. Goldsmith and Yonina C. Eldar, "Analog to digital converter optimized for efficiency," 2017
- Pt3 A. Kipnis and I. Dror, "Encoding data for storage in a data storage device," 2014
- Pt2 A. Kipnis and I. Dror, "Method and apparatus to process data based upon estimated compressibility of the data," 2013
- Pt1 I. Dror and A. Kipnis, "Systems and methods for performing variable flash wear leveling," 2013

Teaching Experience

- Reichman University
 - **Advanced statistical analysis and model-based learning** (Fall 2024)
 - **Information Theory** (Fall 2023)
 - **Machine learning from data** (Spring 2023, 2024)
 - **Information-theoretic analysis of neural language models** (Fall 2022, Spring 2024)
 - **Advanced statistics for data science** (Spring 2022, 2023).
- Stanford University
 - **STATS 285: Massive computational experiments, painlessly** (Spring 2021, with Masha Lofti, Andrew Donoho, and David Donoho)
 - **STATS 207: Introduction to time series analysis** (Fall 2020).

Publications

Journal publications under review

- R3 Tingnan Gong, Alon Kipnis, and Yao Xie. (2025). Higher-criticism for sparse multi-stream change-point detection. arXiv:2409.15597.
- R2 Alon Kipnis. (2023). *The Minimax Risk in Testing Poisson Data under Missing Ball Alternatives*. arXiv:2305.18111.
- R1 Ben Galili, Alon Kipnis, and Zohar Yakhini. (2023). *Detecting rare and weak deviations of non-proportional hazard in survival analysis*. arXiv:2310.00554.

Accepted journal publications

- A1 Alon Kipnis. (accepted 8/2023). *Unification of Rare and Weak Multiple Testing Models using Moderate Deviations Analysis and Log-Chisquared P-values*. Statistica Sinica. vol.35(3), July 2025 (expected).

Journal publications

- J15 Idan Kashtan and Alon Kipnis. (2024). *An Information-Theoretic Approach for Detecting Edits in AI-Generated Text*. Harvard Data Science Review. Special Issue 5.
- J14 David L. Donoho and Alon Kipnis. (2024). *The impossibility region for detecting sparse mixtures using the higher criticism*. The Annals of Applied Probability. vol.34(5)
- J13 David L. Donoho and Alon Kipnis. (2022). *Higher criticism to compare two large frequency tables, with sensitivity to possible rare and weak differences*. The Annals of Statistics. vol.50(3)
- J12 Alon Kipnis and John C. Duchi. (2022). *Mean estimation from one-bit measurements*. IEEE Transactions on Information Theory. vol.68(9)
- J11 Alon Kipnis. (2022). *Higher criticism for discriminating word-frequency tables and authorship attribution*. The Annals of Applied Statistics. vol.16(2)
- J10 Alon Kipnis and Galen Reeves. (2021). *Gaussian approximation of quantization error for estimation from compressed data*. IEEE Transactions on Information Theory. vol.67(8)
- J9 Alon Kipnis, Stefano Rini, and Andrea J. Goldsmith. (2021). *The rate-distortion risk in estimation from compressed data*. IEEE Transactions on Information Theory. vol.67(5)
- J8 Stefano Rini, Alon Kipnis, Ruiyang Song, and Andrea J. Goldsmith. (2019). *The compress-and-estimate coding scheme for Gaussian sources*. IEEE Transactions on Wireless Communications. vol.18(9)
- J7 Alon Kipnis, Andrea J. Goldsmith and Yonina C. Eldar. (2018). *The distortion rate function of sampled Wiener Processes*. IEEE Transactions on Information Theory. vol.65(1)
- J6 Alon Kipnis, Andrea J. Goldsmith, and Yonina, C. Eldar. (2018). *Fundamental distortion limits of analog to digital compression*. IEEE Transactions on Information Theory. vol.64(9)
- J5 Alon Kipnis, Yonina C. Eldar, and Andrea J. Goldsmith. (2018). *Analog-to-digital compression: a new paradigm for converting signals to bits*. IEEE Signal Processing Magazine. vol.35(3)
- J4 Alon Kipnis, Andrea J. Goldsmith and Yonina, C. Eldar. (2017). *The Distortion Rate Function of Cyclostationary Gaussian Processes*. IEEE Transactions on Information Theory. vol.64(5)
- J3 Alon Kipnis, Andrea J. Goldsmith, Yonina, C. Eldar, and Tsachy Weissman. (2016). *Distortion rate function of sub-Nyquist sampled Gaussian sources*. IEEE Transactions on Information Theory. vol.62(1)
- J2 Daniel Alpay and Alon Kipnis. (2015). *Wiener chaos approach to optimal prediction*. Numerical Functional Analysis and Optimization. vol.36(10)

- J1 Daniel Alpay and Alon Kipnis. (2013). *A generalized white noise space approach to stochastic integration for a class of Gaussian stationary increment processes*. Opuscula Mathematica. vol.33(3)

Book chapters

- BC1 Alon Kipnis, Yonina C. Eldar and Andrea J. Goldsmith. (2021). *An information theory approach for analog-to-digital compression*. Pp 44-71 in *Information-theoretic methods in data science*. Cambridge University Press

Refereed conference publications

- C27 Alexander Tsvekov and Alon Kipnis. *Information Parity: Measuring and Predicting the Multilingual Capabilities of Language Models*. Empirical Methods in Natural Language Processing (EMNLP). Miami, November 2024
- C26 Tingnan Gong, Alon Kipnis, and Yao Xie. *Higher-criticism for sparse multi-sensor change-point detection*. 60th Annual Allerton Conference on Communication, Control, and Computing. Urbana-Champaign, September 2025
- C25 Alexander Tsvekov and Alon Kipnis. *Multilingual Compression Parity: How Efficiently Large Language Models Represent Information Across Languages* International Conference on Machine Learning (ICML). Workshop on Theoretical Foundations of Foundation Models. Vienna, July 2023
- C24 Dana Levin and Alon Kipnis. *The Likelihood Gain of a Language Model as a Metric for Text Summarization*. IEEE International Symposium on Information Theory (ISIT). Athens, July 2024
- C23 Alon Kipnis. *The minimax risk in testing the histogram of discrete distributions for uniformity under missing ball alternatives*. 59th Annual Allerton Conference on Communication, Control, and Computing. Monticello, September 2023
- C22 Alexander Tsvekov and Alon Kipnis. *EntropyRank: Unsupervised Keyphrase Extraction via Side-Information Optimization for Language Model-based Text Compression*. International Conference on Machine Learning (ICML). Workshop on Neural Compression: From Information Theory to Applications. Honolulu, July 2023
- C21 Alon Kipnis. *Rare and Weak Detection Models under Moderate Deviations Analysis and Log-Chisquared P-values*. IEEE International Symposium on Information Theory (ISIT). Helsinki, July 2022
- C20 Alon Kipnis and David L. Donoho *Two-sample testing of discrete distributions under rare/weak perturbations*. IEEE International Symposium on Information Theory (ISIT). Sydney, July 2021
- C19 Alon Kipnis, *Higher criticism as an unsupervised authorship discriminator*. Working Notes of CLEF 2020.
- C18 Alon Kipnis and Galen Reeves, *Gaussian approximation of quantization error for estimation from compressed data*. IEEE International Symposium on Information Theory (ISIT). Paris, July 2019

- C17 Alon Kipnis, Galen Reeves, and Yonina C. Eldar, *Single-letter formulas for quantized compressed sensing with Gaussian codebooks*. IEEE International Symposium on Information Theory (ISIT). Vail, June 2018
- C16 Georgia Murray, Alon Kipnis, and Andrea J. Goldsmith, *Lossy compression of decimated Gaussian random walks*. 52nd Annual Conference on Information Sciences and Systems (CISS). Princeton, March 2018
- C15 Alon Kipnis and John C. Duchi, *Mean estimation from adaptive one-bit measurements*. 55th Annual Allerton Conference on Communication, Control, and Computing. Monticello, October 2017
- C14 Alon Kipnis, Galen Reeves, Yonina C. Eldar and Andrea J. Goldsmith, *Compressed sensing under optimal quantization*. IEEE International Symposium on Information Theory (ISIT). Aachen, June 2017
- C13 Alon Kipnis, Stefano Rini, and Andrea J. Goldsmith, *Coding theorems for the compress and estimate source coding problem*. IEEE International Symposium on Information Theory (ISIT). Aachen, June 2017
- C12 Ruiyang Song, Stefano Rini, Alon Kipnis, and Andrea J. Goldsmith, *Optimal rate-allocation in multiterminal compress-and-estimate source coding*. IEEE Information Theory Workshop (ITW). Cambridge, September 2016
- C11 Alon Kipnis, Andrea J. Goldsmith and Yonina C. Eldar, *Information rates of sampled Wiener processes*. IEEE International Symposium on Information Theory (ISIT), Barcelona, July 2016
- C10 Alon Kipnis, Stefano Rini, and Andrea J. Goldsmith, *Multiterminal compress-and-estimate source coding*. IEEE International Symposium on Information Theory (ISIT). Barcelona, July 2016
- C9 Milind Rao, Alon Kipnis, Tara Javidi, Yonina C. Eldar and Andrea J. Goldsmith, *System identification from partial samples: non-asymptotic analysis*. IEEE 55th Conference on Decision and Control (CDC). Las Vegas, December 2016
- C8 Alon Kipnis, Andrea J. Goldsmith and Yonina C. Eldar, *Optimal trade-off between sampling rate and quantization precision in A/D conversion*. 53rd Annual Allerton Conference on Communication, Control, and Computing. Monticello, October 2015
- C7 Alon Kipnis, Stefano Rini, and Andrea J. Goldsmith, *The indirect rate-distortion function of a binary i.i.d source*. IEEE Information Theory Workshop (ITW). Jeju, October 2015
- C6 Mainak Chowdhury, Alon Kipnis, and Andrea J. Goldsmith, *Reliable uncoded communication in the quantized SIMO MAC*. IEEE International Symposium on Information Theory (ISIT). Hong Kong, July 2015
- C5 Alon Kipnis, Andrea J. Goldsmith and Yonina C. Eldar, *Optimal trade-off between sampling rate and quantization precision in Sigma-Delta A/D conversion*. International Conference on Sampling Theory and Applications (SampTA). Washington DC, May 2015
- C4 Alon Kipnis, Andrea J. Goldsmith and Yonina C. Eldar, *Sub-Nyquist sampling achieves optimal rate-distortion*. IEEE Information Theory Workshop (ITW). Jerusalem, April 2015

- C3 Alon Kipnis, Andrea J. Goldsmith and Yonina C. Eldar, *Rate-distortion function under sub-Nyquist nonuniform sampling*. 52nd Annual Allerton Conference on Communication, Control, and Computing. Monticello, October 2014
- C2 Alon Kipnis, Andrea J. Goldsmith and Yonina C. Eldar, *Rate-distortion function of Gaussian Cyclostationary processes*. IEEE International Symposium on Information Theory (ISIT). Honolulu, July 2014
- C1 Alon Kipnis, Andrea J. Goldsmith, Tsachy Weissman and Yonina C. Eldar, *Rate-distortion function of sub-Nyquist sampled Gaussian processes corrupted by noise*. 51st Annual Allerton Conference on Communication, Control, and Computing. Monticello, October 2013