

# Evgenii Zheltonozhskii

## Skills and expertise

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| Research interests   | Topological phases and interfaces between them; deep and self-supervised learning for physics  |
| Software development | Python, modern C++, Julia, Linux, $\LaTeX$ , git, jupyter  |
| Frameworks           | PyTorch, Qiskit, Hugging Face Transformers, PyTorch3D, TensorFlow  |
| Deep learning        | Since 2017 co-authored 18 papers and preprints in multiple fields of deep learning, including top tier venues (CVPR, JMLR). Wide knowledge of current trends in computer vision. |

## Education

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| 2022 – present | <b>PhD in Physics</b> , <i>Technion – Israel Institute of Technology</i> , Haifa. <ul style="list-style-type: none"><li>○ Advisor: Prof. <a href="#">Netanel Lindner</a>;</li><li>○ Research in theoretical condensed matter: edge modes and interfaces in topological states, e.g., fractional quantum Hall, Kitaev spin liquid, <math>p + ip</math> superconductors.</li></ul>   |
| 2020 – 2021    | <b>MSc in Computer Science</b> , <i>Technion – Israel Institute of Technology</i> , Haifa, Cum Laude. <ul style="list-style-type: none"><li>○ Thesis: “Reducing Supervision in Visual Recognition Tasks”</li><li>○ Advisors: Prof. <a href="#">Alex Bronstein</a>, Prof. Avi Mendelson, and Dr. Chaim Baskin;</li><li>○ Teaching experience: “Advanced Topics in Deep Learning”, “Deep Learning on Computational Accelerators”, “Intro to Machine Learning”, organization of seminar in Deep Learning;</li><li>○ Advising experience: advised research projects on computer vision and reduced supervision;</li><li>○ Reviewer for CVPR, ICCV, ECCV, WACV;</li><li>○ CS dean excellence scholarship recipient.</li></ul> |
| 2016 – 2020    | <b>BSc in Computer Science and BSc in Physics and Mathematics</b> , <i>Technion – Israel Institute of Technology</i> , Haifa, GPA 91.70, Cum Laude. <ul style="list-style-type: none"><li>○ Participant of Rothschild Technion Program for Excellence;</li><li>○ Research projects in condensed matter physics and deep learning;</li><li>○ ICPC semifinals: SWERC 2018 – honorable mention, SWERC 2019 – bronze medal (11<sup>th</sup> place).</li></ul>  |
| Summer 2018    | <b>DeepBayes</b> , <i>Summer school on Bayesian methods in deep learning</i> .   |

## Projects and open source contribution

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| 2022        | <b>QHack 2022 Hackathon</b> , “Barren plateau inhabitants”, 2nd place at IBM Qiskit Challenge. Simulation of anyons within the toric code model in Qiskit based on “Realizing topologically ordered states on a quantum processor” paper. |
| 2019 – 2020 | <b>TensorFlow</b> .<br>Implemented differentiable eigendecomposition of general matrices for TensorFlow.  |
| 2016 – 2018 | <b>tiny-dnn</b> .<br>Maintainer of tiny-dnn: header only, dependency-free deep learning framework in C++14.   |

## Industrial Experience

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| Fall 2020   | <b>Research Intern</b> , <i>Snap Research</i> , Los Angeles (remote), Creative vision group. <ul style="list-style-type: none"><li>○ Hosts: Sergey Tulyakov and Olly Woodford;</li><li>○ Researched novel approach to 3D shape reconstruction by training on dataset of single 2D views;</li><li>○ Implemented systems for dense and sparse 3D shape reconstruction from scratch with PyTorch3D.</li></ul> |
| 2016 – 2020 | <b>Research Assistant</b> , <i>Technion</i> , Haifa, Professor <a href="#">Alex Bronstein</a> 's group. <ul style="list-style-type: none"><li>○ Investigated compression methods and their impact on DNN performance;</li><li>○ Implemented and reproduced latest DL algorithms and papers;</li><li>○ Co-authored and wrote code for 8 papers on DNN compression, NAS, and adversarial attacks.</li></ul>  |
| Summer 2017 | <b>Google Summer of Code Participant</b> , <i>OpenCV</i> .<br><b>GPU enabled deep learning framework</b> : introducing GPU support for <b>tiny-dnn</b> , C++14 header-only deep learning library   |

## Publications

- [1] Tom Avrech, **Evgenii Zheltonozhskii**, Chaim Baskin, and Ehud Rivlin. "GoToNet: Fast Monocular Scene Exposure and Exploration". In: *arXiv pre-print* (June 2022). URL: <https://arxiv.org/abs/2206.05967>.
- [2] Aarohi Srivastava et al. "Beyond the Imitation Game: Quantifying and extrapolating the capabilities of language models". In: *arXiv pre-print* (June 2022). URL: <https://arxiv.org/abs/2206.04615>.
- [3] Maxim Fishman, Chaim Baskin, **Evgenii Zheltonozhskii**, Ron Banner, and Avi Mendelson. "On Recoverability of Graph Neural Network Representations". In: *arXiv pre-print* (Jan. 2022). URL: <https://arxiv.org/abs/2201.12843>.
- [4] Adam Botach, **Evgenii Zheltonozhskii**, and Chaim Baskin. "End-to-End Referring Video Object Segmentation with Multimodal Transformers". In: *IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*. June 2022. URL: [https://openaccess.thecvf.com/content/CVPR2022/html/Botach\\_End-to-End\\_Referring\\_Video\\_Object\\_Segmentation\\_With\\_Multimodal\\_Transformers\\_CVPR\\_2022\\_paper.html](https://openaccess.thecvf.com/content/CVPR2022/html/Botach_End-to-End_Referring_Video_Object_Segmentation_With_Multimodal_Transformers_CVPR_2022_paper.html).
- [5] **Evgenii Zheltonozhskii**, Chaim Baskin, Avi Mendelson, Alex M. Bronstein, and Or Litany. "Contrast to Divide: Self-Supervised Pre-Training for Learning with Noisy Labels". In: *IEEE/CVF Winter Conference on Applications of Computer Vision (WACV)*. Jan. 2022, pp. 1657–1667. URL: [https://openaccess.thecvf.com/content/WACV2022/html/Zheltonozhskii\\_Contrast\\_To\\_Divide\\_Self-Supervised\\_Pre-Training\\_for\\_Learning\\_With\\_Noisy\\_Labels\\_WACV\\_2022\\_paper.html](https://openaccess.thecvf.com/content/WACV2022/html/Zheltonozhskii_Contrast_To_Divide_Self-Supervised_Pre-Training_for_Learning_With_Noisy_Labels_WACV_2022_paper.html).
- [6] Ameen Ali, Tomer Galanti, **Evgenii Zheltonozhskii**, Chaim Baskin, and Lior Wolf. "Weakly Supervised Recovery of Semantic Attributes". In: *First Conference on Causal Learning and Reasoning*. Apr. 2022. URL: <https://openreview.net/forum?id=GdAzRedTV7J>.
- [7] Ben Finkelstein, Chaim Baskin, **Evgenii Zheltonozhskii**, and Uri Alon. "Single-Node Attack for Fooling Graph Neural Networks". In: *arXiv pre-print* (Nov. 2020). URL: <https://arxiv.org/abs/2011.03574>.
- [8] **Evgenii Zheltonozhskii**, Chaim Baskin, Alex M. Bronstein, and Avi Mendelson. "Self-Supervised Learning for Large-Scale Unsupervised Image Clustering". In: *NeurIPS Self-Supervised Learning Workshop* (Aug. 2020). URL: <https://arxiv.org/abs/2008.10312>.
- [9] Alex Karbachevsky, Chaim Baskin, **Evgenii Zheltonozhskii**, Yevgeny Yermolin, Freddy Gabbay, Alex M. Bronstein, and Avi Mendelson. "Early-Stage Neural Network Hardware Performance Analysis". In: *Sustainability* 13.2 (Jan. 2021): *Energy-Efficient Computing Systems for Deep Learning*. Ed. by José Cano, José L. Abellán, and David Kaeli, p. 717. ISSN: 2071-1050. DOI: 10.3390/su13020717. URL: <http://dx.doi.org/10.3390/su13020717>.
- [10] **Evgenii Zheltonozhskii**, Chaim Baskin, Yaniv Nemcovsky, Brian Chmiel, Avi Mendelson, and Alex M. Bronstein. "Colored Noise Injection for Training Adversarially Robust Neural Networks". In: *arXiv pre-print* (Mar. 2020). URL: <https://arxiv.org/abs/2003.02188>.
- [11] Yaniv Nemcovsky, **Evgenii Zheltonozhskii**, Chaim Baskin, Brian Chmiel, Alex M. Bronstein, and Avi Mendelson. "Smoothed Inference for Adversarially-Trained Models". In: *arXiv pre-print* (Nov. 2019). URL: <https://arxiv.org/abs/1911.07198>.
- [12] Yury Nahshan, Brian Chmiel, Chaim Baskin, **Evgenii Zheltonozhskii**, Ron Banner, Alex M. Bronstein, and Avi Mendelson. "Loss Aware Post-Training Quantization". In: *Machine Learning* (Oct. 2021). ISSN: 1573-0565. DOI: 10.1007/s10994-021-06053-z. URL: <https://link.springer.com/article/10.1007/s10994-021-06053-z>.
- [13] Chaim Baskin, Brian Chmiel, **Evgenii Zheltonozhskii**, Ron Banner, Alex M. Bronstein, and Avi Mendelson. "CAT: Compression-Aware Training for Bandwidth Reduction". In: *Journal of Machine Learning Research* 22:269 (Aug. 2021), pp. 1–20. URL: <http://jmlr.org/papers/v22/20-1374.html>.
- [14] Brian Chmiel, Chaim Baskin, Ron Banner, **Evgenii Zheltonozhskii**, Yevgeny Yermolin, Alex Karbachevsky, Alex M. Bronstein, and Avi Mendelson. "Feature Map Transform Coding for Energy-Efficient CNN Inference". In: *International Joint Conference on Neural Networks (IJCNN)*. July 2020, pp. 1–9. DOI: 10.1109/IJCNN48605.2020.9206968. URL: <https://arxiv.org/abs/1905.10830>.
- [15] Yochai Zur, Chaim Baskin, **Evgenii Zheltonozhskii**, Brian Chmiel, Itay Evron, Alex M. Bronstein, and Avi Mendelson. "Towards Learning of Filter-Level Heterogeneous Compression of Convolutional Neural Networks". In: *ICML AutoML Workshop* (Apr. 2019). URL: <https://arxiv.org/abs/1904.09872>.
- [16] Chaim Baskin, **Evgenii Zheltonozhskii**, Tal Rozen, Natan Liss, Yoav Chai, Eli Schwartz, Raja Giryes, Alexander M. Bronstein, and Avi Mendelson. "NICE: Noise Injection and Clamping Estimation for Neural Network Quantization". In: *Mathematics* 9.17 (Sept. 2021): *Computational Optimizations for Machine Learning*. Ed. by Freddy Gabbay. ISSN: 2227-7390. DOI: 10.3390/math9172144. URL: <https://www.mdpi.com/2227-7390/9/17/2144>.
- [17] Chaim Baskin, Natan Liss, Eli Schwartz, **Evgenii Zheltonozhskii**, Raja Giryes, Alex M. Bronstein, and Avi Mendelson. "UNIQ: Uniform Noise Injection for Non-Uniform Quantization of Neural Networks". In: *ACM Transactions on Computer Systems* 37.1–4 (Mar. 2021). ISSN: 0734-2071. DOI: 10.1145/3444943. URL: <https://arxiv.org/abs/1804.10969>.
- [18] Chaim Baskin, Natan Liss, **Evgenii Zheltonozhskii**, Alex M. Bronstein, and Avi Mendelson. "Streaming Architecture for Large-Scale Quantized Neural Networks on an FPGA-Based Dataflow Platform". In: *IEEE International Parallel and Distributed Processing Symposium Workshops*. May 2018, pp. 162–169. DOI: 10.1109/IPDPSW.2018.00032. URL: <https://arxiv.org/abs/1708.00052>.