# Evgenii Zheltonozhskii

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## Skills and expertise

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| Research interests | Topological phases, anyons, application of deep learning and self-supervised learning in physics |
| Software development | Python, modern C++, Julia, Linux, LATEX, git, jupyter |
| Frameworks | PyTorch, Qiskit, Hugging Face Transformers, PyTorch3D, TensorFlow |
| Deep learning research | Since 2017 published 16 papers and preprints in multiple fields of deep learning, including top tier venues (CVPR, JMLR). Wide knowledge of current trends in computer vision. |

## Education

**2022 – present**    **PhD in Physics**, *Technion – Israel Institute of Technology*, Haifa.
- Advisor: Prof. Netanel Lindner;
- Research in theoretical condensed matter: edge modes and interfaces in topological state, e.g., Kitaev spin liquid, fractional quantum Hall, $p + ip$ superconductors.

**2020 – 2021**    **MSc in Computer Science**, *Technion – Israel Institute of Technology*, Haifa.
- Thesis: "Reducing Supervision in Visual Recognition Tasks"
- Advisors: Prof. Alex Bronstein, Prof. Avi Mendelson, and Dr. Chaim Baskin;
- Teaching experience: "Advanced Topics in Deep Learning", "Deep Learning on Computational Accelerators", "Intro to Machine Learning", organization of seminar in Deep Learning;
- Advising experience: advised research projects on computer vision and reduced supervision;
- Reviewer for CVPR, ICCV, ECCV, WACV;
- CS dean excellence scholarship recipient.

**2016 – 2020**    **BSc in Computer Science and BSc in Physics and Mathematics**, *Technion – Israel Institute of Technology*, Haifa, GPA *91.70*, Cum Laude.
- Participant of Rothschild Technion Program for Excellence;
- Research projects in condensed matter physics and deep learning;
- ICPC semifinals: SWERC 2018 – honorable mention, SWERC 2019 – bronze medal (11th place).

**Summer 2018**    **DeepBayes**, *Summer school on Bayesian methods in deep learning*.

## Projects and open source contribution

**2022**    **QHack 2022 Hackathon**, *"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**    **TensorFlow**.
Implemented differentiable eigendecomposition of general matrices for TensorFlow.

**2016 – 2018**    **tiny-dnn**.
Maintainer of tiny-dnn: header only, dependency-free deep learning framework in C++14.

## Industrial Experience

**Fall 2020**    **Research Intern**, *Snap Research*, Los Angeles (remote), Creative vision group.
- Hosts: Sergey Tulyakov and Olly Woodford;
- Researched novel approach to 3D shape reconstruction by training on dataset of single 2D views;
- Implemented systems for dense and sparse 3D shape reconstruction from scratch with PyTorch3D.

**2016 – 2020**    **Research Assistant**, *Technion*, Haifa, Professor Alex Bronstein's group.
- Investigated compression methods and their impact on DNN performance;
- Implemented and reproduced latest DL algorithms and papers;
- Co-authored and wrote code for 8 papers on DNN compression, NAS, and adversarial attacks.

**Summer 2017**    **Google Summer of Code Participant**, *OpenCV*.
GPU enabled deep learning framework: introducing GPU support for tiny-dnn, C++14 header-only deep learning library

# Publications

[1]  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.

[2]  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://arxiv.org/abs/2111.14821.

[3]  **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.

[4]  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.

[5]  Ben Finkelshtein, 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.

[6]  **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.

[7]  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.

[8]  **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.

[9]  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.

[10] 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.

[11] 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.

[12] 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.

[13] 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.

[14] 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.

[15] 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.

[16] 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.