Alexander Atanasov

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EDUCATION

Harvard University — Aug 2018 - Aug 2024
PhD., M.S. Theoretical Physics, advised by Prof. Cengiz Pehlevan — GPA: 4.00
- Studied deep learning and neural scaling laws, leveraging high dimensional statistics, random matrix theory, and extensive empirics.
- Published in top machine learning venues (NeurIPS, ICML, ICLR).
- Extensive prior work in string theory and quantum field theory (4+ papers).

Yale University — Graduated: May 2018
M.S. and B.S. Mathematics, B.S. Physics—*magna cum laude, Phi Beta Kappa* — GPAs: Math 4.00; Physics 3.97; Total 3.92
- **Undergrad Coursework in:** Systems Programming, Algorithm Design, Modern Combinatorics, Game Theory
- **Graduate Coursework in:** Statistical Physics, Algebraic Geometry, Representation Theory, Quantum & Conformal Field Theory

EXPERIENCE

Jane Street – Quantitative Research Intern, PhD — May – Aug 2023
Machine Learning in Financial Markets — *New York, NY*
- Research in financial markets leveraging modern machine learning and statistical methodologies. Given return offer.

Protein Evolution – Senior Scientist, AI — Dec 2021 – May 2023.
Deep Learning for Protein Discovery - Consultant while in PhD — *Remote*
- Applied **transformer language models to discover novel structure** in protein sequences for industrial application.

Quantum Si – Consultant, Machine Learning — Mar – Dec 2022
Time Series for Proteomic Data - Consultant while in PhD — *Remote*
- Achieved **high accuracy in extracting sparse signal** from noisy time series using random kernel methods and Kalman filters.

Google – Software Engineering Intern — May – Aug 2017
Machine Learning and Computer Vision – Supervised by Dr. Nhat Vu — *Mountain View, CA*
- Achieved a **6x speedup** in face detection and recognition for TensorFlow model on embedded devices **without drop in accuracy**.

Perimeter Institute for Theoretical Physics – Visiting Researcher — May 2016 – Jul 2018
Sparse Grid Finite Element Methods for Relativistic Astrophysics – Supervised by Dr. Erik Schnetter — *Waterloo, ON*
- Wrote Julia package reducing finite-element solver runtime from $O(N^D)$ **to** $O(N \log^{D-1} N)$ in dimension D. Posted to arXiv.

Yale School of Medicine, N3 Division – Undergraduate Researcher — Dec 2015 – May 2018
Working Memory in Recurrent Neural Networks – Supervised by Dr. John Murray — *New Haven, CT*
- **Built popular TensorFlow package** for modeling neural behavior in cognitive tasks via RNNs. **Published results.**

SELECTED PUBLICATIONS

For a full up-to-date list of all 15+ papers, see my Google Scholar.

A Dynamical Model of Neural Scaling Laws — Jan 2024
B. Bordelon, **A. Atanasov**, and C. Pehlevan. ICML 2024.

Neural Networks as Kernel Learners: The Silent Alignment Effect — Nov 2021
A. Atanasov, B. Bordelon and C. Pehlevan. ICLR 2022. Won 3rd place at Citadel Securities' inaugural PhD Summit.

Conformal Block Expansion in Celestial Conformal Field Theory — Apr 2021
A. Atanasov, W. Melton, A. Raclariu, and A. Strominger. Physical Review D.

Complex Analysis: In Dialogue — Oct 2013
In high school, independently published a 500-page textbook on complex analysis. Made for-sale on Amazon.

HONORS AND AWARDS

- **Fannie & John Hertz Fellowship** – One of 11 students chosen from 850 to receive full graduate support ($250k) over 5 years — 2019
- **DoD Graduate Fellowship (NDSEG)** – One of 200 students chosen from 3,000 to receive full graduate support for 3 years — 2019
- **NSF Graduate Fellowship** (declined) – One of 2k students chosen from 12k to receive full graduate support for 3 years — 2019
- **Howard L. Schultz Prize in Physics** – To an outstanding senior in physics at Yale — 2018
- **Mellon Grant Recipient** – To attend international conference on the Langlands program as part of senior thesis — 2018
- **William L. Putnam Mathematics Competition** – Taken twice. Top 300 nationally both times. — 2016, 2018

SKILLS

Programming:	*(most to least experience)* Python, Julia, Mathematica, Java, C, C++, MATLAB, Excel
Tools:	JAX, PyTorch, TensorFlow, NumPy, Pandas, SkLearn, LightGBM. Strong background in data science & HPC.
Teaching:	Grad School: "Inference, Info Theory, Stat Mech, and Learning" (for S Ramanathan), Deep Learning & Databases
	Undergrad: Representation Theory, Abstract Algebra, Complex Analysis, Vector Analysis, Deep Learning
	Mentor and Lecturer for Perimeter Institute's ISSYP (lecture video), SRS Bulgaria, and MIT's RSI Program (twice).
Languages:	English (native), Bulgarian (native), Latin (read and write, graduate coursework)
Other:	Frequent public speaker and lecturer. Classically trained guitarist with a passion for Bach. Last but not least, LaTeX.