

Alexander Atanasov

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EDUCATION

Harvard University

PhD., M.S. Theoretical Physics, advised by [Prof. Cengiz Pehlevan](#) Aug 2018 - Aug 2024
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

M.S. and B.S. Mathematics, B.S. Physics—*magna cum laude*, *Phi Beta Kappa* Graduated: May 2018
GPAs: Physics 3.97; Math 4.00; 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

• Quantitative 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.
• Combined **Kalman filters and clustering methods to effectively detect and segment binding events** in a protein sequencer.

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 # elements in finite-element solver from $O(N^D)$ to $O(N \log^{D-1} N)$ in dimension D .
• **Successfully simulated 6D wave equations**. Posted result 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 .