

Alexander Atanasov

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EDUCATION

Harvard University

PhD. Theoretical Physics, advised by [Prof. Cengiz Pehlevan](#) (Applied Math)
• Work on deep neural networks, kernel machines, and Bayesian methods.
• Extensive prior work (4+ papers) in string theory.

Aug 2018 - May 2024 (Expected)

GPA: 4.00

Yale University

M.S. and B.S. Mathematics, B.S. Physics—*magna cum laude*, *Phi Beta Kappa*

Graduated: May 2018

GPA: Physics 3.97; Math 4.00; Total 3.92

- **Undergrad Coursework in:** Systems Programming and Organization, Algorithm Design, Modern Combinatorics, Game Theory
- **Graduate Coursework in:** Algebraic Geometry, the Langlands Program, Quantum & Conformal Field Theory, Statistical Physics

EXPERIENCE

Protein Evolution – Research Scientist, AI

Deep Learning Models of Protein Function from Sequence

- Applying deep learning (transformers, AlphaFold, etc.) to discover more optimal protein structures for industrial applications.

Dec 2021 - Pres.

Remote

Google – Software Engineering Intern

Machine Learning and Computer Vision – Supervised by Dr. Nhat Vu

- Ported TensorFlow models to run on embedded devices for real-time face detection and recognition on video streams.
- Achieved a **6x speedup** in run-through time for inference vs. the start of the summer, **without loss in accuracy**.

May – Aug 2017

Mountain View, CA

Perimeter Institute for Theoretical Physics – Visiting Researcher

Sparse Grid Discretization for Relativistic Astrophysics – Supervised by Dr. Erik Schnetter

- One of seven students selected internationally to participate in Perimeter's [undergraduate program](#).
- Wrote [Julia package](#) for solving partial differential equations in higher dimensions. Published results to arXiv.
- Obtained speedup **from $O(N^2)$ to $O(N \log N)$** in 2D and **$O(N^3)$ to $O(N \log^2 N)$** in 3D at resolution N along each axis.

May 2016 – Jul 2018

Waterloo, ON

Yale School of Medicine, N3 Division – Undergraduate Researcher

Working Memory in Recurrent Neural Networks – Supervised by Dr. John Murray

- Built TensorFlow [package](#) for modeling neural behavior in cognitive tasks. Published results.

Dec 2015 – May 2018

New Haven, CT

MITRE Corporation – Student Researcher

Multi-scale Modeling of Carbon Nanomaterials – Supervised by Dr. James Ellenbogen

- Developed and published electrostatics-based model for quantum capacitance of carbon nanomaterials.

Jun 2014 – Jan 2016

McLean, VA

Naval Research Laboratory – SEAP Program Student Researcher

Plasma Cloud Generation using Cavity Resonators – Supervised by Dr. Paul Bernhardt

May – Aug 2013

Washington D.C.

SELECT PUBLICATIONS

For a full up-to-date list of 8+ papers, see my [Google Scholar](#)

Neural Networks as Kernel Learners: The Silent Alignment Effect

- In collaboration with B. Bordelon and C. Pehlevan. [arXiv:2111.00034](#). In submission.

Nov 2021

Conformal Block Expansion in Celestial CFT

- In collaboration with W. Melton, A. Raclariu, and A. Strominger. [Physical Review D](#)

Apr 2021

Bootstrapping the Minimal 3D Superconformal Field Theory

- In collaboration with D. Poland and A. Hillman. [Journal of High Energy Physics](#)

Jul 2018

Complex Analysis: In Dialogue

- In high school, independently published a 500-page textbook on complex analysis. Made for-sale on [Amazon](#).

Oct 2013

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
- **James Mills Pierce Fellowship** – Full support for first-year graduate study in physics at Harvard 2018
- **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
- **United States Physics Olympiad Semifinalist** 2013

SKILLS

Programming: Python, Julia, Mathematica, C, C++, Java, MATLAB, Excel, R (*by experience most to least*)

Tools: JAX, TensorFlow, PyTorch, NumPy, SkLearn, Pandas, SQL, OpenMP, CUDA. Strong background in data science & HPC.

Teaching: TA for Grad. Deep Learning & Databases (2x), Rep. Theory, Abstract Algebra, Complex Analysis, & Vector Analysis (2x). Mentor and Lecturer for Perimeter Institute's [ISSYP \(lecture video\)](#), [SRS Bulgaria](#), and MIT's [RSI Program](#).

Languages: English (native), Bulgarian (native), Latin (read and write, graduate coursework)

Other: Strong background in tutoring, public speaking, and lecturing. Last but not least, \LaTeX .