

# Alex Atanasov

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## EDUCATION

**Harvard University**  
PhD. Theoretical Physics

August 2018 - Present

**Yale University**

M.S. and B.S. Mathematics, B.S. Physics—*magna cum laude*, *PBK*

Graduated: May 2018

GPA: Physics 3.97; Math 4.00; Total 3.92

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

## EXPERIENCE

**Software Engineering Intern: Machine Learning and Computer Vision**

May – August 2017

Google – Supervised by Dr. Nhat Vu

Mountain View, CA

- 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**.

**Visiting Researcher: Sparse Grid Discretization for Relativistic Astrophysics**

May 2016 – January 2017

Perimeter Institute for Theoretical Physics – Supervised by Dr. Erik Schnetter

Waterloo, ON

- One of seven students selected internationally to participate in Perimeter's [undergraduate program](#).
- Wrote software package for solving partial differential equations in higher dimensions.
- 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.
- Organized 10 weekly undergraduate lecture seminars. Presented two lectures on complex and algebraic geometry.

**Undergraduate Researcher: Working Memory in Recurrent Neural Networks**

December 2015 – Present

Yale School of Medicine, Dept. of Psychiatry N3 Division – Supervised by Dr. John Murray

New Haven, CT

- Built TensorFlow-based [package](#) for modeling neural behavior in various cognition tasks, based off medical data.
- Used CUDA, the Yale computing cluster, and high-dimensional data science tools to generate results for upcoming publication.

**Multi-scale Modeling of Carbon Nanomaterials**

June 2014 – January 2016

MITRE Corporation Student Program – Supervised by Dr. James Ellenbogen

McLean, VA

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

**SEAP Program Student Researcher: Plasma Cloud Generation using Cavity Resonators**

May – August 2013

Naval Research Laboratory – Supervised by Dr. Paul Bernhardt

Washington D.C.

## PUBLICATIONS AND PROJECTS

**Representations of the Physical Universe**

June 2017, Ongoing

- An [open textbook](#) on the concepts of modern physics. Intend to publish through Harvard in the spring.

**Bootstrapping the Minimal 3D Superconformal Field Theory**

July 2018

- In collaboration with Prof. David Poland and Aaron Hillman. [arXiv:1807.05702](https://arxiv.org/abs/1807.05702)

**Magnetic Monopoles, 't Hooft Lines, and the Geometric Langlands Correspondence**

May 2018

- [Senior Thesis](#) under Prof. Philsang Yoo.

**Sparse Grid Discretizations based on a Discontinuous Galerkin Method**

October 2017

- In collaboration with Dr. Erik Schnetter. [arXiv:1710.09356](https://arxiv.org/abs/1710.09356)

**Analytic Formulas for Detachment Energies in Carbon Fullerenes**

March 2017

- In collaboration with Dr. James Ellenbogen. [Physical Review A](#)

**GalerkinSparseGrids.jl**

August 2016

- [Julia package](#) for efficiently solving partial differential equations in high dimensional settings.

**Complex Analysis: In Dialogue**

October 2013

- Independently published a 500-page pedagogical work on complex analysis in high school. Made for-sale on [Amazon](#).

## HONORS AND AWARDS

- **Howard L. Schultz Prize in Physics** – To an outstanding senior in physics at Yale 2018
- **Mellon Grant Recipient** – To attend conference on the Langlands program as part of senior thesis research 2018
- **William L. Putnam Mathematics Competition** – Top 300 nationally 2016, 2018
- **Morse College Richter Fellow and Yale Dean's Research Fellow** – For summer research at Perimeter Institute 2016
- **United States Physics Olympiad Semifinalist** 2013

## SKILLS

- Programming:** Python, C/C++, Julia, Mathematica, Java, MATLAB, HTML/CSS, Excel, R (*by experience most to least*)
- Parallel tools:** OpenMP, MPI, CUDA, TensorFlow, Julia toolkit. Strong background in high-performance computing.
- Teaching:** TA for Graduate Deep Learning, Representation Theory, Abstract Algebra, Complex and Vector Analysis at Yale. Mentor and Lecturer for Perimeter Institute's [ISSYP \(lecture video\)](#) and [SRS Bulgaria](#).
- Languages:** English, Bulgarian (native speaker, can read and write), Latin (read and write, graduate coursework)
- Other:** Strong background in tutoring, public speaking, and academic lecturing. Last but not least,  $\LaTeX$ .