

Alex Atanasov

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EDUCATION

Yale University

B.S. Physics (intensive), B.S./M.S. Mathematics

Graduation: May 2018

GPAs: Physics 3.97; Math 4.00; Total 3.92

- **Relevant Undergraduate Coursework:** Classical Mechanics, Modern Algebra & Combinatorics, Systems Programming
- **Relevant Graduate Coursework:** Complex Geometry, General Relativity, Statistical Physics I & II, Lie Algebra in Physics, Seminars in: Representation Theory, Algebraic Geometry, Quantum and Conformal Field Theory

Thomas Jefferson High School for Science and Technology

Concentration in Optics and Modern Physics

Graduation: June 2014

GPA: 3.92 unweighted

- **Relevant Post-AP Coursework:** Quantum Mechanics, Electrodynamics, Parallel Computing I & II, Numerical Analysis

RESEARCH EXPERIENCE

Undergraduate Researcher: 3D Conformal Bootstrap and the Ising Model

Yale Dept. of Physics – Supervised by [Prof. David Poland](#)

September 2016 – Present

New Haven, CT

- Performed investigations on 3D conformal field theories (CFTs) of similar structure to the 3D Ising model.
- Supplemented by directed reading on monopole operators in 3D CFT towards senior thesis.

Software Engineering Intern: Machine Learning and Computer Vision

Google – Supervised by Dr. Nhat Vu

May – August 2017

Mountain View, CA

- Worked to port TensorFlow models onto embedded devices for real-time face detection & recognition.
- Achieved a 6x speedup in run-through time for inference from the start of the summer without loss in accuracy.

Visiting Researcher: Sparse Grid Discretization for Relativistic Astrophysics

Perimeter Institute for Theoretical Physics – Supervised by [Dr. Erik Schnetter](#)

May 2016 – January 2017

Waterloo, ON

- One of seven students selected internationally to participate in Perimeter's [undergraduate program](#).
- Wrote a software package for solving Einstein's equations, speeding up 3D from $\mathcal{O}(N^3)$ to $\mathcal{O}(N \log^2 N)$ at resolution N .
- Organized 10 weekly *undergraduate lecture seminars*. Presented two lectures on complex & algebraic geometry.
- Selected as lecturer & guest mentor for the high schoolers in the [ISSYP program](#) (lecture video [here](#)).

Undergraduate Researcher: Machine Learning for Emulation of Neuronal Networks

Yale School of Medicine, Dept. of Psychiatry N3 Division – Supervised by [Dr. John Murray](#)

December 2015 - Present

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 tools in high-dimensional data science to generate results for publication.

Multi-scale Modelling of Carbon Nanomaterials

MITRE Corporation Student Program – Supervised by [Dr. James Ellenbogen](#)

June 2014 – January 2016

McLean, VA

- Used classical electrostatics and quantum energy models to physically explain the regularity the slope of trend lines in the capacitances of carbon nanomaterials. Learned quantum chemistry and density functional theory techniques.

SEAP Program Selected Student: Plasma Cloud Generation using Cavity Resonators

Naval Research Laboratory – Supervised by Dr. Paul Bernhardt

May – August 2013

Washington D.C.

PUBLICATIONS

Sparse Grid Discretizations based on a Discontinuous Galerkin Method

September, 2017

- Preprint to be submitted to *Journal of Classical and Quantum Gravity*, in collaboration with Dr. Erik Schnetter. ([link](#))

Analytic Formulas for Detachment Energies in Carbon Fullerenes

March, 2017

- Paper published in *Physical Review A*, in collaboration with Dr. James Ellenbogen. ([link](#))

Representations of a Physical Universe

May 2016, Ongoing

- An open textbook on the ideas of modern mathematical physics. Aim to publish through Yale during this year. ([link](#))

GalerkinSparseGrids.jl

August 2016

- Julia package implementing efficient method to solve differential equations in higher dimensional physics. ([link](#))

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

- William L. Putnam Mathematics Competition – Top 300
- Morse College Richter Fellow & Yale Dean's Research Fellow
- United States Physics Olympiad Semifinalist

2016

2016

2013

SKILLS

Programming: C, Julia, Python, Mathematica, Java, Matlab/Octave, HTML/CSS, Excel, R (by experience, most to least)

Parallel tools: OpenMP, MPI, CUDA, Tensorflow, Julia toolkit. Strong background in scientific computing and HPC.

Languages: English, Bulgarian (native speaker, can read, & write), Latin (read & write, AP and graduate coursework)

Other: Strong background in tutoring, public speaking, and academic lecturing. Last but not least, user of L^AT_EX.