

Alex Atanasov

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EDUCATION

Yale University

M.S./B.S. Mathematics, B.S. Physics

Overall GPA: 3.89/4.0

Graduation: May 2018 (expected)

- **Relevant Undergraduate Coursework:** Modern Combinatorics, Design & Analysis of Algorithms, Systems Programming and Computer Architecture (CS 323)
- **Relevant Graduate Coursework:** Complex Analysis, Einstein Gravity, Statistical Mechanics, Lie Algebras & Applications, Seminars in Representation Theory, Algebraic Geometry, Quantum and Conformal Field Theory

Thomas Jefferson High School for Science and Technology

Overall GPA: 4.41 weighted (corresponding to 3.92/4.0)

Graduation: June 2014

- **Relevant Post-AP Coursework:** Parallel Computing I & II, Numerical Analysis, Complex Analysis, Linear Algebra

WORK & RESEARCH EXPERIENCE

Visiting Researcher & Software Developer: Sparse Grid Discretization for Big Data

May 2016 – August 2016

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

Waterloo, ON

- One of seven students selected internationally to participate in Perimeter's [undergraduate student program](#).
- Built a Julia package (repository available [here](#)) for solving Einstein's equations on large datasets by using *sparse grids*. Sped up 2D solvers from $\mathcal{O}(N^2)$ to $\mathcal{O}(N \log N)$ and 3D solvers from $\mathcal{O}(N^3)$ to $\mathcal{O}(N \log^2 N)$, where N is the resolution.
- Writing up final paper to publish on the ArXiv with my supervisor in the coming months.
- Organized 10 weekly *undergraduate lecture seminars*. Presented two lectures on complex & algebraic geometry.
- Selected as lecturer & mentor for the high schoolers in the [ISSYP program](#) (lecture video [here](#)).

Undergraduate Researcher: Machine Learning for Emulation of Neuronal Networks

December 2015 - Present

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

New Haven, CT

- Developed Python package to train recurrent neural networks to emulate the outputs observed in medical data, using Theano and PyCUDA on the Yale cluster, alongside tools from high-dimensional data science. *Intend to publish results.*

Multi-scale Modelling of Carbon Nanomaterials

June 2014 – January 2016

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

McLean, VA

- Used classical electrostatics, graph theory, Excel and Mathematica to physically explain the regularity and slope of the trends in capacitance of carbon nanomaterials to within known accuracy. Learned density functional theory techniques.
- Final paper of results recently [submitted](#) to Physical Review A.

SEAP Program Selected Student: Plasma Cloud Generation using Cavity Resonators

May – August 2013

Naval Research Laboratory – Supervised by Dr. Paul Bernhardt

Washington D.C.

LARGE PROJECTS & PUBLICATIONS

Kaggle: Predicting Epileptic Seizures

September 2016, Ongoing

- Working in a group of four on using machine learning to recognize signs of epileptic seizures in human subjects.

Theoretical & Applied Neural Computing (ThinkTANC@Yale)

September 2016, Ongoing

- Founder and President of student group for hosting speakers and working to build machine learning initiatives at Yale.

Representations of a Physical Universe

May – November 2016 (expected release)

- Extracurricular collaboration with a friend to write an 'open textbook' [here](#) on the ideas of modern mathematical physics.

GalerkinSparseGrids.jl

May – August 2016

- Software for avoiding the curse of dimensionality when numerically solving differential equations in high dimensions.

Complex Analysis: In Dialogue

May – 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 (taken once so far) 2016
- **Morse College Richter Fellow & Yale Dean's Research Fellow** 2016
- **United States Physics Olympiad Semifinalist** 2013

SKILLS

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

Parallel tools: OpenMP, MPI, CUDA, PyCUDA @ Theano. Strong background in scientific computing and HPC.

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

Other: Strong background in tutoring, public speaking, and academic lecturing. Last but not least, user of $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$.