Alex Atanasov

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EDUCATION

Yale University Graduation: May 2018
B.S. Physics, M.S./B.S. Mathematics
Overall GPA: 3.93/4.0

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

Thomas Jefferson High School for Science and Technology Graduation: June 2014
Overall GPA: 4.41 weighted (corresponding to 3.92/4.0)

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

WORK & RESEARCH 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 a software package for solving Einstein's equations, speeding up 2D models from $\boldsymbol{O(N^2)}$ to $\boldsymbol{O(N \log N)}$ and 3D models from $\boldsymbol{O(N^3)}$ to $\boldsymbol{O(N \log^2 N)}$ on large datasets, where N is the resolution. Published results.
- 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 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 tools in high-dimensional data science to generate results for publication.

Multi-scale Modelling of Carbon Nanomaterials June 2014 – January 2016
MITRE Corporation Student Program – Supervised by Dr. James Ellenbogen *McLean, VA*

- Developed and published electrostatics-based model of trends in the quantum capacitance of carbon nanomaterials.

SEAP Program Selected Student: Plasma Cloud Generation using Cavity Resonators May – August 2013
Naval Research Laboratory – Supervised by Dr. Paul Bernhardt *Washington D.C.*

PUBLICATIONS

Sparse Grid Discretizations based on a Discontinuous Galerkin Method October, 2017

- Submitted to *Journal of Classical and Quantum Gravity*, in collaboration with Dr. Erik Schnetter. [arXiv link]

Analytic Formulas for Detachment Energies in Carbon Fullerenes March, 2017

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

Representations of a Physical Universe May 2016, Ongoing

- An open textbook on the ideas of modern mathematical physics, intend to publish through Yale in the fall. [link]

GalerkinSparseGrids.jl August 2016

- Julia package implementing efficient method to solve differential equations in higher dimensions. [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 2016
- **Morse College Richter Fellow** & **Yale Dean's Research Fellow** 2016
- **United States Physics Olympiad Semifinalist** 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 $L^{A}T_{E}X$.