

Andrew Tuma

GRADUATE STUDENT · APPLIED MATH

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Summary

Current Master's student interested in numerical relativity and gravitational wave detection, actively researching deep learning for understanding and predicting the behavior of chaotic systems. I have experience in machine learning, numerical optimization, computational ODEs/PDEs, data science, and computational physics. I am passionate about public outreach and STEM education.

Education

San Diego State University

M.S. IN APPLIED MATH

San Diego, CA

Aug. 2020 - May. 2022

- Thesis: Deep Learning Assisted Hankel Dynamic Mode Decomposition

University of Virginia

B.S. IN PHYSICS

Charlottesville, VA

Aug. 2017 - May. 2020

- Distinguished Major

Westmont College

B.S. IN PHYSICS (TRANSFERRED)

Montecito, CA

Aug. 2016 - May. 2017

- Presidential Scholar

Work Experience

Medarcus

DATA SCIENTIST

Los Angeles, CA

Apr. 2021 - July 2021

- Implemented a new probabilistic patient match algorithm, enabling parallelized computations for record linkage and deduplication.
- Delivered critical changes to previous codebase on short notice by leveraging POSTMAN, Docker, and Flask.
- Helped design a natural language processing machine to identify patient data more effectively using convolutional neural networks and word embedding techniques.

University of Virginia

OBSERVATORY COORDINATOR

Charlottesville, VA

Aug. 2018 - Mar. 2020

- Integrated the latest astrophysical news along with Q&A into our biweekly program for public viewings at the historic Leander McCormick Observatory.
- Operated and maintained the modernized 26-inch astrometric refractor telescope originally built in the 1880s.
- Taught guests how to properly use the 14-inch Celestron CGEM DX Schmidt-Cassegrain telescope along with the 6-inch brass Alvin Clark refractor.

Westmont College

OBSERVATORY COORDINATOR

Montecito, CA

Sep. 2016 - May 2017

- Operated the 16-inch and 24-inch research grade reflecting telescopes along with their component software MIRA AL to study and introduce different objects of the night sky to the public.
- Prepared lectures and interactive activities to engage the public and used social media to advertise the events, frequently resulting in record attendance.
- Worked in conjunction with the Santa Barbara Astronomical Unit (SBAU) to spark scientific curiosity through educational gatherings and presentations.

Research

Machine Learning for Nonlinear Dynamics

ANDREW TUMA, CHRIS CURTIS

San Diego State University

May. 2021 - Present

- Leverage deep autoencoder networks and times series embedding techniques to predict nonlinear and chaotic dynamics.

Techniques in Spacetime Visualization

ANDREW TUMA, DAVID NICHOLS

University of Virginia

Aug. 2019 - June 2020

- Utilized Python and Matplotlib visualization tools to design a new method for plotting tensor fields which intuitively represent eigenvector/eigenvalue information to fully describe gravitational wave emitting spacetimes.

Pulsed Nuclear Magnetic Resonance

ANDREW TUMA, BELLAVE SHIVARAM

University of Virginia

Jan. 2019 - April 2019

- Examined the physical properties of several different hydrogen and fluorine nuclei by recording spin-lattice relaxation time, spin echoes, and free induction decay.

Pulsating Variable Stars

ANDREW TUMA, TOM WHITTEMORE

[Westmont College](#)

Feb. 2017 - June 2017

- Used MIRA AL software and the Westmont Observatory 24-inch reflector telescope to capture data on several different Delta-Scuti pulsating variable stars and then plotted the light curves to obtain information about the properties of the star IP Virginis.

Skills

Programming Python, C/C++, MATLAB, ROOT, LaTeX, Github, POSTMAN, Docker
Languages English, Conversational Spanish and German

Presentation

UVA Gravity Group

[Charlottesville, VA](#)

NEW METHODS IN SPACETIME VISUALIZATION

2019

- Introduced new methods of visualizing complex tensor fields representing gravitational wave emitting spacetimes using Python and Matplotlib.

Extracurricular Activity

Gravity Group

[Charlottesville, VA](#)

MEMBER

Aug. 2019 - Aug 2020

- Presented and engaged in current research projects in gravitational physics.
- Attended weekly journal club readings to stay up-to-date on recently published research papers.

Society of Physics Students

[University of Virginia](#)

MEMBER

Aug. 2019 - May. 2020

- Mentored and tutored younger students within the community in math and science.
- Participated in group GRE help sessions and undergraduate research meetings.

Teaching

- 2021 **Lead Graduate Teaching Assistant**, Math 141 - Pre-calculus
- 2017 **Lab Assistant**, Introduction to Physics Lab I & II
- 2017 **Teaching Assistant**, Introduction to Physics II
- 2016 **Teaching Assistant**, Introduction to Physics I

[San Diego State](#)

[Westmont College](#)

[Westmont College](#)

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Honors & Awards

- 2020 **Dean's List**, University of Virginia
- 2017 **Dean's List**, Westmont College
- 2016 **Presidential Scholarship**, Westmont College
- 2016 **CoServ Electric Scholarship**, LEF Scholarship Ceremony
- 2016 **TCHS Track Booster Club Scholarship**, LEF Scholarship Ceremony

[Charlottesville, VA](#)

[Montecito, CA](#)

[Montecito, CA](#)

[The Colony, TX](#)

[The Colony, TX](#)

Coursework

- Computational Physics
- General Relativity
- Computational Fluid Dynamics
- Theoretical Astrophysics
- Computational PDEs
- Numerical Optimization
- Mathematical Physics
- Dynamical Systems and Chaos
- Partial Differential Equations