Tyler Tippens, PhD

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Education

PhD in Computational Space Physics – Georgia Institute of Technology *January 2020-December 2024*
Minor in Scientific Machine Learning
Advisor: Dr. Sven Simon

Bachelor of Science in Physics – Georgia Institute of Technology *August 2013-May 2017*
Graduated with High Honors

Research

Georgia Institute of Technology – School of Earth and Atmospheric Sciences
Graduate Research Assistant (Atlanta, GA) *January 2020-December 2024*

- Developed novel parallelized, high-performance particle tracing codes to quantitatively model particle and electromagnetic interactions between planets' moons and their magnetospheres using Python/Cython and Julia
- Utilized remote sensing and in-situ measurements to inform both model design and analysis of model output, enabling interpretation of complex and underutilized data products from the Cassini spacecraft
- Translated broad scientific questions within a high-uncertainty space into actionable research goals
- Improved a large C++ plasma simulation code used by the team; achieved up to 10x runtime reduction, extended portability across cluster architectures, established version control using Git, and wrote documentation
- Mentored new grad and undergrad group members and advised on operation and creation of research codes
- Presented research results and computational methods at several international conferences

Georgia Institute of Technology – School of Earth and Atmospheric Science
Undergraduate Research Assistant – Dr. Sven Simon (Atlanta, GA) *January 2016-May 2017*

- Wrote parallelized simulation software to study behavior and surface incidence of energetic ions at Callisto
- Created 3D visualization and impact mapping scripts in Python

Georgia Institute of Technology – School of Physics
Undergraduate Research Assistant – Dr. Laura Cadonati (Atlanta, GA) *January 2015-December 2015*

- Data analysis and detector characterization for the LIGO Scientific Collaboration (LSC)
- Configured and ran gravitational wave burst pipeline software on LSC computer clusters
- Identified, categorized, and cataloged glitches in LIGO data using spectrograms generated in Python
- Participated in first ever gravitational wave detection

Peer-Reviewed Journal Publications

C. Michael Haynes, Tyler Tippens, Sven Simon, Lucas Liuzzo. (2025). **Constraints on the Observability of Energetic Neutral Atoms from the the Magnetosphere-Atmosphere Interactions at Callisto and Europa**. *Journal of Geophysical Research: Space Physics*, 130. DOI:10.1029/2024JA033391

Tyler Tippens *et al*. (2024). **Modeling the Emission of Energetic Neutral Atoms in Titan's Dynamic Magnetospheric Environment**. *Journal of Geophysical Research: Space Physics*, 129. DOI:10.1029/2024JA033103

Tyler Tippens *et al*. (2024). **A Novel Backtracing Model to Study the Emission of Energetic Neutral Atoms at Titan**. *Journal of Geophysical Research: Space Physics*, 129. DOI:10.1029/2023JA032083

C. Michael Haynes, Tyler Tippens, Peter Addison, Lucas Liuzzo, Andrew R. Poppe, Sven Simon. (2023). **Emission of Energetic Neutral Atoms From the Magnetosphere- Atmosphere Interactions at Callisto and Europa**. *Journal of Geophysical Research: Space Physics*, 128. DOI:10.1029/2023JA031931

Tyler Tippens *et al*. (2022). **Influence of Titan's Variable Electromagnetic Environment on the Global Distribution of Energetic Neutral Atoms**. *Journal of Geophysical Research: Space Physics*, 127. DOI:10.1029/2022JA030722

Andre Galli, Audrey Vorbuger, Shane R. Carberry Mogan, Elias Roussos, …, Tyler Tippens, and Lucas Liuzzo. (2022). **Callisto's Atmosphere and its Space Environment: Prospects for the Particle Environment Package on Board JUICE**. *Earth and Space Science*. e2021EA002172. DOI:10.1029/2021EA002172

International Conference Presentations

Tyler Tippens, Sven Simon, Elias Roussos, Lucas Liuzzo. **Influence of Titan's Variable Electromagnetic Environment on the Distribution of Energetic Neutral Atoms: Global Morphology and Observability**. *Magnetospheres of Outer Planets Conference*, oral & poster presentations, July 2024.

Tyler Tippens, Elias Roussos, Sven Simon, Lucas Liuzzo. **A Novel Backtracing Model to Study the Emission of Energetic Neutral Atoms at Titan**. *European Geophysical Union General Assembly*, oral & poster presentations, April 2024.

Tyler Tippens, Elias Roussos, Sven Simon, Lucas Liuzzo. **Influence of Titan's Variable Electromagnetic Environment on the Global Distribution of Energetic Neutral Atoms**. *American Geophysical Union Fall Meeting*, poster presentation, December 2023.

Tyler Tippens, Elias Roussos, Sven Simon, Lucas Liuzzo. **Influence of Titan's Variable Electromagnetic Environment on the Global Distribution of Energetic Neutral Atoms**. *Division for Planetary Sciences and Europlanet Science Congress Joint Meeting*, oral presentation, October 2023.

Tyler Tippens. **Modeling Emission of Energetic Neutral Atoms at Titan**. *International HPC Summer School 2023*, virtual poster presentation, July 2023.

Tyler Tippens, Jack Peters, and Sven Simon. **Influence of Titan's Variable Electromagnetic Environment on the Emission of Energetic Neutral Atoms**. *American Geophysical Union Fall Meeting*, virtual poster presentation, December 2020.

Teaching

Teaching Assistant – Earth System Modeling, EAS 6130 (graduate course) *Fall 2022, Fall 2024*
Numerical analysis with application to Earth science; root finding, numerical integration, num. solutions to ODEs & PDEs
Held office hours and graded weekly homework, two exams, and a final project

Laboratory Teaching Assistant – Habitable Planet, EAS 1601 (undergraduate course) *Spring 2023*
Origin and evolution of Earth; topics include basics of cosmology, astrophysics, planetary formation, and geochemistry
Ran weekly lab section, produced pre-lab materials, and graded lab reports

Teaching Assistant – Computing for Engineers, CS 1371 (undergraduate course) *August 2014-July 2015*
Introductory computer science in MATLAB
Taught weekly recitation, held help desk hours, wrote and graded three exams

Honors and Awards

Research Excellence Award *April 2024*
Awarded annually by the Georgia Tech School of Earth and Atmospheric Sciences "to a student who has demonstrated a high level of creativity and independence in the pursuit of his/her research topic."

Presidential Undergraduate Research Award (PURA) May 2016
Awarded to competitive undergraduate research proposals. Includes a stipend to fund one semester of original research.

Additional Work Experience

Auxier & Associates, Inc. – Radiological Health, Safety, and Environmental Services
Health Physicist I (Knoxville, TN) *July 2017-November 2019*

- Part of a small team of consultants in risk assessment, surveying and remediation, and regulatory compliance
- Designed and developed in-house Android application for wirelessly receiving, viewing, and sharing instrument and GPS readings to improve survey speed, coverage, and data integrity and provide real-time data in the field
- Updated aging instrument fleet: installed bluetooth hardware, integrated Android tablet into the workflow, tested and authored updated field procedures for wireless operation of radiological and geospatial instruments
- Coordinated survey and remediation efforts: communicated with clients and subcontractors, organized and carried out field measurements, provided remediation oversight, and wrote technical reports
- Collaborated on writing and editing of risk assessment and licensing documents for clients and regulatory bodies such as the EPA, including performing and supporting colleagues in calculations, modeling, and research
- Repaired and streamlined production data validation database in Microsoft Access using SQL and VBA
- Developed scripts in VBA and C# to collaboratively automate tasks and streamline the team's workflow