Taylor E. Jacovich

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EDUCATION

GEORGE WASHINGTON UNIVERSITY

PhD in Physics
Jan 2022 | Washington D.C.

M.Phil in Physics
Jan 2019 | Washington D.C.

Graduate Cert. in High Performance Computing
Reqs. Completed May 2018 | Washington D.C.

GETTYSBURG COLLEGE

BS in Physics cum laude
Minor in Mathematics
May 2015 | Gettysburg, PA

SKILLS

DATA ANALYSIS

Statistical and Bayesian Inference
Machine Learning
Deep Learning
Fourier/Wavelet Analysis

DEVELOPMENT

C/C++, FORTRAN
MPI, OpenMP, CUDA, Hadoop
python, Flask, celery
Mathematica, matlab
Linux, git
PostgreSQL
Prompt Engineering

OPERATIONS

Graylog, Grafana/Prometheus, Jaeger
NGINX, traefik
Docker, Containerd
Kubernetes, kOPs, k3s, helm
AWS, GCP

COURSEWORK

GRADUATE

Radiative Processes
Computational Physics I-III
Intro to High Performance Computing
Cloud Computing and Big Data
Advanced Microarchitecture

UNDERGRADUATE

Discrete Wavelet Transforms
Optics and Laser Physics

LINKS

GitHub:// **tjacovich**
Gitlab:// **tjacovich**
LinkedIn:// **taylor-jacovich**
Medium:// **@astro_adjacent**

DEVELOPMENT

SAO/NASA ASTROPHYSICS DATA SYSTEM

| Back-Office Lead Developer
Mar 2024 – Present | Center for Astrophysics | Harvard & Smithsonian
Supervised back-office development team, and worked to implement new back-office infrastructure. Acted as DevOps engineer for ADS systems.

- Lead team of back-office developers by helping identify sprint tasks, determine developer priorities, and provide support and guidance to junior developers.
- Designed and implemented new back-office infrastructure in conjunction with technical lead.
- Handled and oversaw day-to-day Developer Operations tasks including deployments, infrastructure troubleshooting, and monitoring.
- Maintained and supported all AWS cloud hosted systems including the ADS kubernetes cluster.
- Provided support for ADS back-office servers and docker instances. Worked with the office of Information Technology Support to coordinate hardware and low-level software support.
- Created additional monitoring by building out Grafana and Graylog dashboards and alerts.

| IT Specialist: Back-Office Developer/Data Analyst
Oct 2021 – Mar 2024 | Center for Astrophysics | Harvard & Smithsonian
Worked on back-office infrastructure and microservices for **SAO/NASA Astrophysics Data System**. Contributed code used to supply citation data to the **Asclepias Project**.

- Modified pipelines to interface with external brokers via webhooks.
- Updated data pipelines to provide additional functionality such as associated works and metric calculations for software records.
- Built tools to manually curate metadata of software records.
- Expanded user-accessible features for microservices.
- Maintain back-office docker and AWS kubernetes infrastructure.
- Provided User support for issues related to backend services.

AWARDS AND FELLOWSHIPS

2018-2021	Chandra X-ray Center Predoctoral Fellowship
2015-2018	Graduate Teaching Fellowship
2015	Sigma Pi Sigma: Physics Honor Society
2014	Schweizer Summer Research Grant
2011-2015	Presidential Scholarship
2011-2015	Alexion Life Sciences Scholarship
2011	Eagle Scout

PROFESSIONAL SOCIETIES

American Astronomical Society
Sigma Pi Sigma
American Physical Society

PROFESSIONAL DEVELOPMENT

May 2023	APISec University: API Security Fundamentals
Jan 2021, 2022	Harvard ComputeFest
Aug 2020	Eighth AtomDB Workshop
Aug 2019	MESA Summer School
Jan 2019	Adding LISA to your Astronomy Tool Box
Jan 2019	LSST Science Pipelines Stack Tutorial for AAS

RESEARCH

SUPERNOVA REMNANT MODELING

| Predoctoral Research Fellow

Sept 2018 – Oct 2021 | Center for Astrophysics | Harvard & Smithsonian

Worked with **Dr. Daniel Patnaude** as part of a larger collaboration to generate a dense grid of young supernova remnant models based `MESA` progenitors.

- Calibrated model SNe to align yields with literature.
- Modeled CSM based on stellar mass-loss rates.
- Examined variation of broadband X-ray emission due to progenitor evolution.
- Examined absorption due to line-of-sight effects in the early remnant.

BROADBAND MODELING OF GRB AFTERGLOWS

| Graduate Research Assistant

Aug 2016 – Jan 2022 | The George Washington University

Worked with **Dr. Alexander van der Horst** and **Dr. Paz Beniamini** to model a large and diverse sample of GRB afterglows using our modified version of `boxfit`, a tool that generates lightcurves and spectra from numerical radiation calculations performed on a two-dimensional astrophysical jet model. Publication in prep.

- Examined the effect SSC modifcations had on derived microphysical parameters.

NUMERICAL MODELING OF GRB AFTERGLOW EMISSION

| Graduate Research Assistant

Jan 2017 – Jan 2022 | The George Washington University

Worked with **Dr. Alexander van der Horst** and **Dr. Paz Beniamini** to understand the theoretical basis for introducing Synchrotron Self-Compton scattering to `boxfit` in a computationally efficient manner. Publication in review.

- Performed mathematical derivation of Inverse-Compton parameter beyond what currently appears in the literature.
- Developed smoothed approximation to SSC parameter, Y for implementation in `boxfit`.
- Expanded SSC implementation to include effects due to Klein-Nishina suppression of the SSC cooling.

SIMULATING SCALAR FIELD THEORIES ON THE LATTICE | Research Assistant

May 2016 – Dec 2016 | The George Washington University

Worked under **Dr. Andrei Alexandru** to simulate a scalar field with a quartic interaction on a D+1-dimensional lattice.

- Implemented Metropolis based Monte Carlo methods to walk through the configuration space of the particle as a precursor to a more robust study of symmetry breaking with respect to the Path Integral sign problem.
- Performed Lattice regulated perturbation calculations to verify numerical results from the theory.

ACTIVITY-CYCLE VIABILITY STUDY OF NGC 6811 | Senior Research Assistant

May 2014 – Sept 2014 | Gettysburg College

Worked under **Dr. Jacquelynne Milingo** to perform V Band differential Photometry on cool dwarf stars in NGC 6811.

- Utilized Lomb-Scargle period finding routines to extract magnitude and rotational period data for these stars as part of an activity-cycle viability study.
- Collected data utilizing The National Undergraduate Research Observatory 0.8m telescope in Flagstaff AZ.
- Presented results as a poster at Gettysburg College Fall Honors day.
- Precursor work for my Senior **Thesis**.

OBSERVING AND ASTROMETRY WITH NURO | Research Assistant

Jan 2012 – May 2012 | Gettysburg College

Worked under **Dr. Laurence Marschall** to conduct observations utilizing the National Undergraduate Research Observatory 0.8m telescope.

- Collected data of cool dwarfs in M45 for use in an ongoing activity-cycle study.
- Performed differential photometry on these frames, and on images of two asteroids: Weismann and UETA.
- Fit sinusoids to the asteroid lightcurves to determine rotational periods.

TEACHING

TEACHING ASSISTANT | Astronomy 1001 and 1002 Scale-Up

Jan – May: 2016, 2017, 2018 | The George Washington University

- Helped conduct class sessions by preparing activity and workbook materials.
- Led discussions during class and queried students about their understanding during group activities.
- Circulated among the students to answer questions as needed.
- Assisted in proctoring exams, and graded all workbooks, lab reports and midterms.

LABORATORY INSTRUCTOR | Astronomy 1001 and 1002

Aug – Dec: 2015, 2016, 2017. Jan – May: 2016 | The George Washington University

- Prepared quizzes and instructed astronomical laboratory sections in conjunction with the lecture component of the course.
- Actively answered questions that arose during the laboratory sessions and attempted to connect material to main course wherever possible.
- Graded lab reports and proctored and graded all examinations.

LABORATORY INSTRUCTOR | Physics 1021 and 1012

May 2017 – Sept 2017 | The George Washington University

- Prepared quizzes and instructed laboratory and recitation sections in conjunction with the lecture component of the course.
- Actively answered questions that arose during the laboratory sessions and attempted to connect material to main course wherever possible.
- Graded labwork, homework, quizzes and exams.
- Held regular office hours to further facilitate student comprehension.

PEER LEARNING ASSOCIATE | Differential Equations

Aug 2014 – May 2015 | Gettysburg College

- Organized and held drop-in hours for students seeking help on Matlab based differential equations projects and LaTeX based reports.

PEER SCIENCE MENTOR | Astronomy 101 and 102

Aug 2013 – May 2015 | Gettysburg College

- Organized and led homework and exam review sessions for students in both sections of Introductory Solar System and Stellar astronomy classes.

UNDERGRADUATE LABORATORY TEACHING ASSISTANT | Astronomy 101 and 102

Aug 2013 – May 2015 | Gettysburg College

- Assisted Laboratory instructor in preparing and leading CLEA experiments in astronomy.
- Setup and operated telescopes and CCD cameras for observing laboratory sessions.

PUBLICATIONS

2023

Sergi Blanco-Cuaresma, Ioana Ciuca, Alberto Accomazzi, Michael J. Kurtz, Edwin A. Henneken, Kelly E. Lockhart, Felix Grezes, Thomas Allen, Golnaz Shapurian, Carolyn S. Grant, Donna M. Thompson, Timothy W. Hostetler, Matthew R. Templeton, Shinyi Chen, Jennifer Koch, **Taylor Jacovich**, Daniel Chivvis, Fernanda de Macedo Alves, Jean-Claude Paquin, Jennifer Bartlett, Mugdha Polimera, and Stephanie Jarmak. Experimenting with Large Language Models and vector embeddings in NASA SciX. *arXiv*, page arXiv:2312.14211, December 2023.

Taylor Jacovich, Daniel Patnaude, Patrick Slane, Carles Badenes, Shiu-Hang Lee, Shigehiro Nagataki, and Dan Milisavljevic. Doppler Broadening and Line-of-sight Effects in Core-collapse Supernovae and Young Remnants. *ApJ*, 951(1):57, July 2023.

2022

Felix Grezes, Thomas Allen, Sergi Blanco-Cuaresma, Alberto Accomazzi, Michael J. Kurtz, Golnaz Shapurian, Edwin Henneken, Carolyn S. Grant, Donna M. Thompson, Timothy W. Hostetler, Matthew R. Templeton, Kelly E. Lockhart, Shinyi Chen, Jennifer Koch, **Taylor Jacovich**, and Pavlos Protopapas. Improving astroBERT using Semantic Textual Similarity. *arXiv*, page arXiv:2212.00744, November 2022.

Tea Temim, Patrick Slane, John C. Raymond, Daniel Patnaude, Emily Murray, Parviz Ghavamian, Mathieu Renzo, and **Taylor Jacovich**. SNR G292.0+1.8: A Remnant of a Low-mass Progenitor Stripped-envelope Supernova. *ApJ*, 932(1):26, June 2022.

PUBLICATIONS

2021

Taylor E. Jacovich, Paz Beniamini, and Alexander J. van der Horst. Modeling Synchrotron Self-Compton and Klein-Nishina effects in Gamma-Ray Burst afterglows. *Monthly Notices of the Royal Astronomical Society*, April 2021.

Taylor Jacovich, Daniel Patnaude, Patrick Slane, Carles Badenes, Shiu-Hang Lee, Shigehiro Nagataki, and Dan Milisavljevic. A Grid of Core-collapse Supernova Remnant Models. I. The Effect of Wind-driven Mass Loss. *The Astrophysical Journal*, 914(1):41, June 2021.

PRESENTATIONS AND PROCEEDINGS

2023

Thomas Allen, Felix Grezes, Golnaz Shapurian, Sergi Blanco-Cuaresma, Carolyn Grant, Edwin Henneken, Kelly Lockhart, Donna Thompson, Tim Hostetler, Matthew Templeton, Shinyi Chen, Jennifer Koch, **Taylor Jacovich**, Michael Kurtz, Pavlos Protopapas, and Alberto Accomazzi. ADS Machine Learning and Deep Learning Efforts. In *American Astronomical Society Meeting Abstracts*, volume 55 of *American Astronomical Society Meeting Abstracts*, page 177.37, January 2023.

Taylor Jacovich, Sergi Blanco-Cuaresma, Edwin Henneken, Alberto Accomazzi, Michael Kurtz, Carolyn Grant, Kelly Lockhart, Donna Thompson, Timothy Hostetler, Golnaz Shapurian, Matthew Templeton, Shinyi Chen, Felix Grezes, Jennifer Koch, and Thomas Allen. Software Citation and Discoverability in ADS with the Citation Capture Pipeline. In *American Astronomical Society Meeting Abstracts*, volume 55 of *American Astronomical Society Meeting Abstracts*, page 177.43, January 2023.

Brendan O'Connor, Eleonora Troja, Simone Dichiara, Brad Cenko, Paz Beniamini, Alexander Van Der Horst, Michael Moss, James Gillanders, Gokul Srinivasaragavan, Chryssa Kouveliotou, and **Taylor Jacovich**. The early afterglow of the brightest gamma-ray burst of all time. In *AAS/High Energy Astrophysics Division*, volume 55 of *AAS/High Energy Astrophysics Division*, page 118.03, September 2023.

Daniel Patnaude, **Taylor Jacovich**, Herman Shiu-Hang Lee, and Carles Badenes. Using Machine Learning to Infer the Progenitor Properties of Core Collapse Supernova Remnants. In *AAS/High Energy Astrophysics Division*, volume 55 of *AAS/High Energy Astrophysics Division*, page 102.27, September 2023.

Daniel Patnaude, Salvatore Orlando, Herman Shiu-Hang Lee, Marco Miceli, Carles Badenes, **Taylor Jacovich**, John Raymond, Frederick Scott Porter, Paul Plucinsky, Manami Sasaki, and et al. Dissecting the Energetics of Supernovae at High Spectral Resolution: LEM Studies of Supernovae and Supernova Remnants. In *AAS/High Energy Astrophysics Division*, volume 55 of *AAS/High Energy Astrophysics Division*, page 110.14, September 2023.

2022

Kelly Lockhart, Alberto Accomazzi, Michael Kurtz, Carolyn Grant, Edwin Henneken, Donna Thompson, Roman Chyla, Timothy Hostetler, Golnaz Shapurian, Sergi Blanco-Cuaresma, Matthew Templeton, Nemanja Martinovic, Shinyi Chen, Felix Grezes, Jennifer Koch, Thomas Allen, and **Taylor Jacovich**. Introducing the New ADS OpenAPI Exploration Tool: Making API Access More User-Friendly. In *American Astronomical Society Meeting Abstracts*, volume 54 of *American Astronomical Society Meeting Abstracts*, page 302.17, June 2022.

2021

Taylor Jacovich. Examining The Outflows of High Energy Stellar Explosions. In *American Astronomical Society Meeting Abstracts*, volume 53 of *American Astronomical Society Meeting Abstracts*, page 509.02D, January 2021. Dissertation Talk.

Taylor Jacovich, D. Patnaude, C. Badenes, S. H. Lee, P. Slane, S. Nagataki, and D. Milisavjevic. Emission and Absorption in Core-Collapse Supernova Remnant Models: The Effect of Wind-Driven Mass-Loss. In *43rd COSPAR Scientific Assembly*, volume 43, January 2021. Poster Presentation.

Taylor Jacovich, D. Patnaude, C. Badenes, S. H. Lee, P. Slane, S. Nagataki, and D. Milisavjevic. Exploring The Parameter Space of High Energy Stellar Explosions. In *CHASC Seminar*, March 2021. Invited Talk.

PRESENTATIONS AND PROCEEDINGS

2019

Taylor Jacovich, D. Patnaude, C. Badenes, S. H. Lee, P. Slane, S. Nagataki, D. Milisavjevic, and D. Ellison. A Grid of Core Collapse Supernova Remnant Models Evolved from Massive Progenitors. In *Supernova Remnants: An Odyssey in Space after Stellar Death II*, page 81, Jun 2019. Poster Presentation.

Taylor Jacovich, D. Patnaude, C. Badenes, S. H. Lee, P. Slane, S. Nagataki, D. Milisavjevic, and D. Ellison. A Grid of Core Collapse Supernova Remnant Models Evolved from Massive Progenitors. In *Collaborative Meeting on Supernova Remnants between Japan and USA*, Nov 2019. Invited Talk.

Taylor E. Jacovich, Alexander J. van der Horst, and Paz Beniamini. Beyond Synchrotron Effects in Gamma-Ray Burst Afterglows. In *American Astronomical Society Meeting Abstracts #233*, volume 233 of *American Astronomical Society Meeting Abstracts*, page 248.01, Jan 2019. Poster Presentation.

Taylor E. Jacovich, Alexander J. van der Horst, and Paz Beniamini. Synchrotron self-Compton Effects on Afterglow Modeling. In *Yamada Conference LXXI: Gamma-ray Bursts in the Gravitational Wave Era 2019*, Oct 2019. Contributed Talk.

2014

Taylor Jacovich, M. Hill, A. Krehbiel, and J. Milingo. Search for Starspots in NGC 6811. In *Gettysburg College Fall Honors Poster Session*, Oct 2014. Poster Presentation.

Taylor Jacovich, J. Milingo, M. Hill, and A. Krehbiel. Activity Cycle Viability of KIC Stars in NGC 6811. In *Gettysburg College Senior Capstone Presentation*, Dec 2014. Capstone Presentation.

2012

Taylor Jacovich, L. Marschall, and A. Palmisano. Photometry of Rotating Asteroids at NURO. In *Central Pennsylvania 32nd Annual Astronomers' Meeting*, March 2012. Poster Presentation.