

Taylor E. Jacovich

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EDUCATION

GEORGE WASHINGTON UNIVERSITY

PHD IN PHYSICS
Expected Fall 2021 |
Washington D.C.

M.PHIL IN PHYSICS
Fall 2018 | 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

LINKS

Gitlab:// [tjacovich](#)
LinkedIn:// [taylor-jacovich](#)
Instagram:// [@astro_adjacent](#)
Twitter:// [@astro_adjacent](#)

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

SKILLS

DATA ANALYSIS

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

PROGRAMMING

C/C++, matlab, Fortran
MPI, OpenMP, CUDA, Hadoop
python, Mathematica
Amazon Web Services, Linux

AWARDS AND FELLOWSHIPS

2018-Present	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

RESEARCH INTERESTS

- Computational Modeling
- Data Analysis and Instrument Calibration
- High-Performance and Distributed Computing solutions
- High-Energy and Broadband Astrophysics
- Space-based Science and Satellite Operations

RESEARCH

END TO END MODELING OF SUPERNOVA REMNANTS

| PREDOCTORAL RESEARCH FELLOW

September 2018 – Present | Cambridge, MA

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

August 2016 – Present | Washington D.C.

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.

- Modeled 13 *Swift* triggered GRBs with radio detections (ongoing).
- Examined the effect SSC modifications had on derived microphysical parameters.

NUMERICAL MODELING OF GRB AFTERGLOW EMISSION

| GRADUATE RESEARCH ASSISTANT

January 2017 – Present | Washington D.C.

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 – December 2016 | Washington D.C.

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 – September 2014 | Gettysburg, PA

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

January 2012 – May 2012 | Gettysburg, PA

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 EXPERIENCE

TEACHING ASSISTANT | ASTRONOMY 1001 AND 1002 SCALE-UP

January – May: 2016, 2017, 2018 | Washington, D.C.

- 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

August – December: 2015, 2016, 2017. January – May: 2016 | Washington, D.C.

- 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 – September 2017 | Washington, D.C.

- 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

August 2014 – May 2015 | Gettysburg, PA

- 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

August 2013 – May 2015 | Gettysburg, PA

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

LABORATORY TEACHING ASSISTANT | ASTRONOMY 101 AND 102

August 2013 – May 2015 | Gettysburg, PA

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

PROFESSIONAL SOCIETIES

Sept 2018-Present American Astronomical Society
May 2014-Present American Physical Society
May 2015-Present Sigma Pi Sigma

WORKSHOPS

January 2021 Harvard ComputeFest
August 2020 Eighth AtomDB Workshop
August 2019 MESA Summer School
January 2019 Adding LISA to your Astronomy Tool Box
January 2019 LSST Science Pipelines Stack Tutorial for AAS

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, D. Patnaude, C. Badenes, S. H. Lee, P. Slane, S. Nagataki, and D. Milisavjevic. Doppler Broadening and Line-of-Sight Effects in Core-Collapse Supernovae and Young Remnants. *Submitted*, 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

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.

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.