

# Taylor E. Jacovich

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## EDUCATION

### GEORGE WASHINGTON UNIVERSITY

PHD IN PHYSICS  
 Expected May 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 Inference  
 Iterative Fitting

### PROGRAMMING

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

## 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
- 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. Jacqueline 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, 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. A Grid of Core-Collapse Supernova Remnant Models. I: The Effect of Wind-Driven Mass-Loss. *In Prep*, 2021.

**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, D. Milisavjevic, and D. Ellison. Line-of-Sight Spectral Models and Absorption in Core-Collapse Supernovae. *In Prep*, 2021.

### 2020

**Taylor Jacovich,** Paz Beniamini, and Alexander van der Horst. Modeling Synchrotron Self-Compton and Klein-Nishina Effects in Gamma-Ray Burst Afterglows. *arXiv e-prints*, page arXiv:2007.04418, July 2020.

### 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.