Dr. Chris R. Gilly 0000-0003-0021-9056 Curriculum Vitae

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Scientific Interests

- **Science:** The Middle Corona. Solar wind acceleration and heating. Space Weather Prediction. Non-equilibrium ionization in the Corona. Polar plumes.
- **Techniques**: Imaging and spectroscopy in optically thin media. Understanding systemic measurement errors. Working on mission teams to analyze new data. Radial Graded Filters. Fourier Analysis.

Research Experience

- **Postdoctoral Research Assistant** with *Dr. Chris Lowder and Dr. Craig Deforest, SwRI* (2023+)
  - Utilized the Fluxon model framework to simulate coronal magnetic fields.
- **PUNCH Mission Associate Investigator** with *Dr. Sarah Gibson, HAO* (2021-2022)
  - Wrote forward model in IDL to simulate and process image data. Employed by LASP.
- **Graduate Research Assistant** for *Dr. Steven Cranmer, LASP, CU Boulder* (2016-Present)
  - Wrote forward model in python to examine Line-of-Sight Effects in the Corona.
- **Undergraduate Research Assistant** for *Dr. Rick Trebino, Georgia Tech* (2013-2015)
  - Generated, measured, and characterized femtosecond ultrafast laser pulses.
- **Undergraduate Researcher, Heliophysics REU** at *University of Alabama in Huntsville* (2014)
  - Learned "C" while examining Lyman-Alpha Backscatter in Voyager UV Spectrometer Data.

Publications

- Chen, B., …, **C. Gilly** et al. (2023). *"Radio Studies of the Middle Corona: Current State and New Prospects in the Next Decade."* ArXiv Preprint (Paper in Review), *https://doi.org/10.48550/arXiv.2301.12183*
- Rivera, Y., …, **C. Gilly** et al. *(2022). "Deciphering the Birth Region, Formation, and Evolution of Ambient and Transient Solar Wind Using Heavy Ion Observations."* Front. Astron. Space Sci., *https://doi.org/10.3389/fspas.2022.1056347*
- West, M., …, **C. Gilly** et al. (2022). "*Defining the Middle Corona*." ArXiv Preprint (Paper in Review). https://doi.org/10.48550/arXiv.2208.04485
- **Gilly,C.**, & Cranmer, S. R. (2020). "*The Effect of Solar Wind Expansion and Nonequilibrium Ionization on the Broadening of Coronal Emission Lines*." The Astrophysical Journal, 901(2), 150. https://doi.org/10.3847/1538-4357/abb1ad
- Fayock, B., Zank, G., Heerikhuisen, J., **Gilbert, C. R.**, & Scherer, K. (2015). "*Lyman-alpha Radiation Pressure in the Heliosphere: Results from a 3D Monte Carlo Radiative Transfer Simulation*." Journal of Physics: Conference Series, 642(1), 012007. https://doi.org/10.1088/1742-6596/642/1/012007

EDUCATION

- **2022 PhD** in **Astrophysical and Planetary Sciences:** University of Colorado, Boulder.
  - *"Spectroscopic Analysis and Image Processing of the Optically-Thin Solar Corona"*
- **2018 MS** in **Astrophysical and Planetary Sciences** : University of Colorado, Boulder.
- **2015 BS** in **Physics (Astrophysics Concentration):** Georgia Institute of Technology, ΣΠΣ.

PROPOSAL SUBMISSIONS

- **Co-I** for **DKIST 2nd Round (Selected)** – Off-limb spectral width measurements (NSO, 2022)
- **George Ellery Hale Graduate Fellowship** (CU Boulder, 2017)
- PI of mock proposal for **Space Mission Design** Class Project (CU Boulder, 2015)
- PI of mock proposal for **Physics of Planets** Class Project (GA Tech, 2014)

LEADERSHIP AND SERVICE

- **Webmaster** for AGU Space Physics and Aeronomy Section (2020-2023+)
- **Member of Early Career Committee** for the *AGU SPA Executive Committee* (2023+)
- **Student Representative/Committee Member** to the *AGU SPA Exec. Committee* (2020-2023)
- **Student Representative** to the *SHINE Conference Steering Committee* (2020-2022)
- **Graduate Event Planner + Coordinator** for the *SHINE Conference* (2017-2022)
- **Graduate Admissions Committee Member** at *CU Boulder* (2018-2019)
- **Comprehensive Exam Committee Member** at *CU Boulder* (2017-2018)
- **Observatory Committee Chair** at *CU Boulder* (2016-2017)
- **Secretary + Event Planner** of the *Society of Physics Students* at *GA Tech* (2014-2015)
- **FIRST® Robotics Team Captain** at *Lumpkin County High* (2006-2009)

OUTREACH AND VOLUNTEER WORK

- **Production Manager and Public Talk Facilitator** at *Fiske Planetarium* (2018-2022)
- **Public Speaker** (2018-2022)
  - *Fiske Planetarium*; Boulder, CO (2018-2022)
  - *WesterCon / Myths and Legends Convention*; Denver, CO (2018-2019)
- **Public Observatory Host** (2013-2022)
  - *Sommers-Bausch Observatory*; Univ. of Colorado (2015-2022)
  - *GT Observatory;* Georgia Tech (2013-2015)
- **Public Outreach Author, Host, Trainer** (2013-2022)
  - *Elementary/ Middle School Invited Lectures* (2021)
  - *Boulder Jr Astronauts* (2018-2019)
  - *Spark, Spin, and Freeze*; Georgia Tech (2013-2015)

TEACHING EXPERIENCE

- **Instructor of Record** - *ASTR 1000 The Solar System*, CU Boulder (Summer 2018)
- **Instructor & Facilitator** - *ISEE Professional Develop. Program* (2017, 2018)
- **Instructor** - *CU Boulder Junior Astronauts*: Elementary Afterschool Program (2018)
- **Teaching Assistant** - *ASTR 2000 Ancient Astronomies*, CU Boulder (Spring 2018)
- **Teaching Assistant** - *Accel. Intro Astronomy I + II w/ Lab*, CU Boulder (Fall 2015, Spring 2016)
- **Teaching Assistant** - *Modern Optics*, GA Tech (Fall 2014)
- **Lead Camp Counselor** - *Roller Coaster Physics Summer Camp*, GT Physics (Summer 2015)
- **Tutor** - *Physics + Matlab,* Center for Academic Success, GA Tech (2013, 2015)

CERTIFICATIONS AND AWARDS

- **Nominated for Graduate Student Leader of the Year Award** – U. Colorado (2021)
- **Certificate in College Teaching** – University of Colorado (In Progress)
- **Completion of Professional Development Program** – ISEE (2017,2018)
- **Completion of Heliophysics Summer School** – UCAR (2017)
- **TA of the Year Award** – Astrophysics Department, University of Colorado (2016)
- **Letter of Commendation for SSF Outreach** – Physics Department, Georgia Tech (2015)

PROFESSIONAL MEMBERSHIPS

- 2017-23, AAS: American Astronomical Society
- 2014-23, AGU: American Geophysical Union
- 2014-16, SPS: Society of Physics Students
- 2014-15, APS: American Physical Society
- 2015 , OSA: The Optical Society
- Lifetime, ΣΠΣ: Sigma Pi Sigma Honor Society

CONFERENCE ATTENDANCE

** Planned Future Attendance*

- **2023**
  - *AGU (San Francisco)
  - *SHINE (Vermont)
  - *SunDC Meeting (GSFC)
- **2022**
  - AGU Fall Meeting (Chicago, IL)
  - PUNCH Meeting 3 (Bellevue, WA)
  - SHINE (Honolulu, HI)
  - DKIST Proposal Webinar (Virtual)
  - PDP Sunset Conference (Maui, HI)
  - Solar and Space Physics Decadal Survey White Papers Workshop 2 (Virtual)
  - DKIST Training Workshop 5 (Virtual)
- **2021**
  - AGU Fall Meeting (Virtual)
  - PUNCH Meeting 2 (Virtual)
  - SHINE (Virtual)
  - AAS SPD (Virtual)
  - Heliophysics 2050 (Virtual)
  - Space Weather Workshop (Virtual)
  - SDO Science Workshop (Virtual)
- **2020**
  - AGU Fall Meeting (Virtual)
  - AAS SPD (Virtual)
  - NSRC Suborbital (Broomfield, CO)
  - Michael Knoelker Symp. (Boulder, CO)
  - DKIST Workshop (Los Angeles, CA)
- **2019**
  - AGU Fall Meeting (San Francisco, CA)
  - SHINE (Boulder, CO)
  - AAS + SPD (St. Louis, MO)
- **2018**
  - AGU Fall Meeting (Washington, DC)
  - Polar Perspectives (Boulder, CO)
  - SHINE (Cocoa Beach, FL)
  - AAS (Denver, CO)
  - ISEE PDP (Monterey, CA/ Houston, TX)
- **2017**
  - UCAR Helio. Sum. School (Boulder, CO)
  - SHINE (Saint-Sauveur, Quebec)
  - ISEE PDP (Monterey, CA/ Maui, HI)
- **2016**
  - Solarnet 5 (Belfast, N. Ireland)
  - SHINE (Santa Fe, NM)
  - AAS SPD (Boulder, CO)
- **2014**
  - AGU Fall Meeting (San Francisco, CA)
  - Solar REU, NSSTC (Huntsville, AL)
  - APS April Meeting (Savannah, GA)

CONFERENCE ACTIVITIES

- **Invited Talks**
  - "Forward Modelling as a Tool for Analyzing PUNCH Data."
    PUNCH 2 Meeting. **2021** Aug 9-11th. Virtual. (C. Gilly, S. Cranmer, S. Gibson)

- **Invited Panels**
  - "Community in Heliophysics."
    Helio2050 Conference. **2021** May 7th. Virtual.
  - "Diversity, Equity, and Inclusion in NASA Helio Early Career Scientists."
    NASA EC Roundtable w/ Nicky Fox. **2021**, May 20th & June 1st. Virtual.

- **Sessions Convened**
  - "SH025. Solar and Heliospheric Physics: General Contributions"
    AGU Fall Meeting. 2022, Chicago, IL, (C. Gilly & C. Lee)
  - "SPA General Submissions II."
    AGU Fall Meeting. 2021, Virtual. (C. Gilly & C. Lee)
  - "Student Day" and the "Student Hospitality Suite."
    SHINE Conference. 2021 + 2022, Virtual & Honolulu, HI.

- **Submitted Talks**

  - "Space Weather Education at the University of Colorado Boulder"
    NSRC Conference. **2020** March 2-4; Broomfield, CO. (**Gilly**, Cranmer, Berger, Knipp, Thayer)

  - "Line of Sight Effects of Non-Equilibrium Ionization on Coronal Spectral Lines"
    SHINE Conference. **2019** August 11; Boulder, CO. (**C. Gilbert**, S. Cranmer)

  - "Quantifying Line-of-sight Effects … for Spectroscopy … in the Solar Corona"
    SOLARNET 5. **2016** Aug 23-31; Belfast, Northern Ireland. (**C. Gilbert**, S. Cranmer)

CONFERENCE ACTIVITIES (CONTINUED)

- **Poster Presentations**
  - "The Middle Corona: Perpetually Under-observed."
    SHINE Conference. **2022** Aug 8-11; Honolulu, HI. (**C. Gilly**)
  - "The Middle Corona."
    Helio2050. **2021** May 3-7; Virtual. (D.B. Seaton **et. al.**)
  - *"The PUNCH Associate Investigator (AI) Program.*"
    Helio2050. **2021** May 3-7; Virtual. (R. Attie **et. al.**)
  - *"Solar Wind and Line of Sight Effects Broaden Coronal Spectral Lines."*
    AAS SPD 51. **2020** Aug 20; Virtual. (**C. Gilly**, S. Cranmer)
  - *"The Effect of Non-Equilibrium Ionization, Resonant Scattering, and the Solar Wind on the Broadening of Coronal Emission Lines."*
    AGU Fall Meeting. **2019** Dec 8-13; Washington, D.C. (**C. Gilbert**, S. Cranmer)
  - *"Interpreting Off-Limb Emission Lines from Polar Coronal Holes."*
    SHINE Conference. **2019** Aug 8-11; Boulder, CO. (**C. Gilbert**, S. Cranmer)
  - *"Forward Models of Off-Limb Emission Lines in Solar Coronal Holes."*
    AAS Conference. **2019** Jun 9-13; St. Louis, MO. (**C. Gilbert**, S. Cranmer)
  - *"Refinement of a … Model to Understand Spectroscopic … Alfven Waves in the … Corona."*
    AGU Fall Meeting. **2018** Dec 10-14; Washington, D.C. (**C. Gilbert**, S. Cranmer)
  - *"Modeling Spectroscopy to Understand Alfvén Waves and Turbulence in the Solar Corona."*
    SHINE Conference. **2018** Jul 29- Aug 3; Cocoa Beach, FL. (**C. Gilbert**, S. Cranmer)
  - *"Relating Spectroscopic Measurements of the Solar Corona to Alfvén Waves & Turbulence."*
    SHINE Conference. **2017** Jul 24-28; Saint-Sauveur, Quebec. (**C. Gilbert**, S. Cranmer)
  - "*The reduction of Lyman alpha data from Voyager."* (REU Project)
    AGU Fall Meeting. **2014** Dec 15-19; San Francisco, CA. (Fayock, Heerikhuisen, **Gilbert**)

WHITE PAPERS

SUBMITTED TO THE DECADAL SURVEY FOR SOLAR AND SPACE PHYSICS (HELIOPHYSICS) 2024-2033.

Significant Contributions

- D. Seaton, …, **C. Gilly** et al. (2022). "*A Strategy to Close Key Questions about the Nature of the Middle Solar Corona During this Decade*."
- Y.J. Rivera, …, **C. Gilly** et al. (2022). "*Deciphering the Birth Region, Formation, and Evolution of Ambient and Transient Solar Wind Using Heavy Ion Observations.*"

Minor Contributions

- K. Reardon **et al.** (2022). "*Spectroscopic inversions: Our key to unlocking the solar atmosphere*."
- B. Chen **et al.** (2022) "*Radio Studies of the Middle Corona.*"
- J. Mason **et al.** (2022) "*Uninterrupted Tracking of Coronal Mass Ejections.*"
- J. Mason **et al.** (2022) "*Small Platforms, High Return: The Need to Enhance Investment in Small Satellites for Focused Science, Career Development, and Improved Equity.*"
- J. Mason **et al.** (2022) "*Leveraging Artificial Intelligence to Enhance the Science Return of 4π Solar Constellations.*"
- E. Mason **et al.** (2022) "*Enabling Critical Solar Wind Research via Consistent, Comprehensive Inner Heliosphere Data Coverage.*"
- E. Lichko **et al.** (2022) *"Enabling Discoveries in Heliospheric Science through Laboratory Plasma Experiments."*
- S. Dorfman **et al.** (2022) "*Next Generation Machine to Study Heliophysics in the Laboratory*"
- D. Seaton **et al.** (2022) "*Improving Multi-Dimensional Data Formats, Access, and Assimilation Tools for the Twenty-First Century.*"

Endorsements

- M.F. Bashir et al. (2022) "*Recognition for All: A Way Forward to Enhance Diversity, Equity and Inclusion in Space Physics.*"
- P. Saint-Hilaire et al. (2022) "*Diagnostics of Space Weather Drivers Enabled by Radio Observations.*"
- D. Gary et al. (2022) "*The Frequency Agile Solar Radiotelescope.*"
- S. Mondal et al. (2022) "*Weak transients and the heating of the quiescent solar corona.*"
- G. Fleishman et al. (2022) "*Constraining coronal abundances with a combination of high resolution EUV and microwave data.*"

OTHER SKILLS

- **Computer Experience:**
  - Languages: python, LaTeX, perl/PDL, IDL, MATLAB, C
  - Solar Data: imaging, spectroscopy, polarimetry
  - Research: spectral forward models, inversions, data reduction pipelines
  - Software: SolarSoft, Sunpy, Zemax, IGOR, EAGLECAD, Mathematica
  - Productivity: Google Docs/Calendar/Keep, TMetric, Trello, MS Office
  - Social Media Management:
    - Facebook Business, Instagram, Twitter, Buffer
  - Website & Community Management:
    - Gather.Town, Mailchimp, Wordpress, Higher Logic

- **Extracurricular Skills and Experience:**
  - **Theatrical Experience** (15+ years)
    - Performed in 27 plays, half of them musicals.
    - Designed and ran stage sound and lights.
  - **Music Production Experience** (10+ years)
    - Fluent in Ableton, FL Studio, and Audacity.
    - Piano, Alto Sax, Harmonica, Guitar, Bass, and Ukulele, plus Vocals.
  - **Event Planning and Coordinating**
    - Organized SHINE Student Day and midweek excursions multiple times.
    - Facilitated several multi-day out-of-state excursions for the SPS at GA Tech.
    - Served on executive committees of AGU and SHINE for two years as student rep.
  - **Languages**
    - English (First)
    - Spanish (Conversational)
    - German (New Student)