

# Will Barnes

GRADUATE RESEARCH ASSISTANT

6100 Main Street MS-61, Houston, TX 77005, USA

+1(405)308-0473 | [will.t.barnes@rice.edu](mailto:will.t.barnes@rice.edu) | <https://wtbarnes.github.io> | [wtbarnes](#)

## Education

### Rice University

PH.D. PHYSICS

- Thesis: Modeling Impulsive Heating in the Solar Corona (working title)
- Advisor: Stephen Bradshaw, Ph.D.

Houston, TX USA

2016-present (expected May 2019)

### Rice University

M.S. PHYSICS

Houston, TX USA

2013-2016

### Baylor University

B.S. ASTROPHYSICS

- Thesis: Astrophysical Applications of Dusty Plasma Physics, Advisor: Lorin Matthews, Ph.D.
- University Honors Program, Magna Cum Laude, Phi Beta Kappa, Dean's List
- Minors: Mathematics, Great Texts of the Western Tradition

Waco, TX USA

2009-2013

## Papers

A current publication list is also available from Orcid (ID: 0000-0001-9642-6089).

### REFEREED PUBLICATIONS

#### W.T. Barnes, S.J. Bradshaw, N.M. Viall

UNDERSTANDING HEATING FREQUENCY IN ACTIVE REGION CORES THROUGH SYNTHETIC OBSERVABLES I. MODELING

in prep, 2018

#### W.T. Barnes, S.J. Bradshaw, N.M. Viall

UNDERSTANDING HEATING FREQUENCY IN ACTIVE REGION CORES THROUGH SYNTHETIC OBSERVABLES II. CLASSIFYING OBSERVATIONS

in prep, 2018

#### W.T. Barnes, P.J. Cargill, S.J. Bradshaw

INFERENCE OF HEATING PROPERTIES FROM HOT NON-FLARING PLASMAS IN ACTIVE REGION CORES II. NANOFLARE TRAINS

ApJ, 2016

doi: 10.3847/1538-4357/833/2/217

#### W.T. Barnes, P.J. Cargill, S.J. Bradshaw

INFERENCE OF HEATING PROPERTIES FROM HOT NON-FLARING PLASMAS IN ACTIVE REGION CORES I. SINGLE NANOFLARES

ApJ, 2016

doi: 10.3847/0004-637X/829/1/31

### CONFERENCE PROCEEDINGS

#### W.T. Barnes, K.P. Dere

CHIANTI-PY: A PYTHON PACKAGE FOR ASTROPHYSICAL SPECTROSCOPY

16th SciPy Conference, 2017

doi: 10.25080/shinma-7f4c6e7-011

#### W.T. Barnes, L.S. Matthews, T.W. Hyde

DUST GRAIN GROWTH IN A PROTOPLANETARY DISK: EFFECTS OF LOCATION ON CHARGE AND SIZE

44th LPSC, 2013

bibcode: 2013LPI....44.1897B

## Professional Service

### SHINE Workshop

DISCUSSION SESSION CO-ORGANIZER AND CO-CHAIR (WITH S. BRADSHAW AND N. VIALL)

30 July-3 August 2018

Topic: Signatures of Time-dependent Heating in Active Regions and the Slow Solar Wind

### SPD/AAS Congressional Visit Day

STUDENT REPRESENTATIVE

25 May 2018

Visited senators and representatives to lobby for increase in NASA heliophysics budget

## Presentations

### CONFERENCE TALKS

## Heliophysics Community Python Working Group Meeting

LABORATORY FOR ATMOSPHERIC AND SPACE PHYSICS

fiasco: a Python Interface to the CHIANTI Atomic Database

Boulder, CO

13-15 November 2018

## 2018 SDO Science Workshop

ROYAL OBSERVATORY BELGIUM, SOLAR-TERRESTRIAL CENTRE OF EXCELLENCE

Understanding Heating Properties of Active Region Loops through Forward Modeling and Machine Learning

Ghent, Belgium

29 October-2 November

## Triennial Earth-Sun Summit

AMERICAN GEOPHYSICAL UNION

Timelag Analysis of Simulated Active Region Cores Heated by Nanoflares

Leesburg, VA

21-24 May 2018

## Python in Astronomy 2018

CENTER FOR COMPUTATIONAL ASTROPHYSICS, THE FLATIRON INSTITUTE

A Complete fiasco - The Difficulties of Dealing with Atomic Data and a Possible Pythonic Solution

New York City, NY

30 April-4 May 2018

## 16th Python in Science Conference

SciPy, ENTHOUGHT

ChiantiPy: a Python package for Astrophysical Spectroscopy

Austin, TX

10-16 July 2017

## Coronal Loops Workshop VIII

INAF IASF PALERMO

Constraining Nanoflare Heating Frequency with a Global Active Region Model

Palermo, Italy

27-30 June 2017

## 47th Annual Solar Physics Division Meeting

AMERICAN ASTRONOMICAL SOCIETY

Hot Non-flaring Plasmas in Active Region Cores Heated by Single Nanoflares

Boulder, CO

31 May-3 June 2016

## Texas Undergraduate Astronomy Research Symposium

TEXAS A&M UNIVERSITY

Dust Grain Charging in a Protoplanetary Disk

College Station, TX

14 September 2012

## SEMINARS

### Space Physics Seminar Series

RICE UNIVERSITY

Understanding Heating Frequency in Active Region Loops through Forward Modeling and Machine Learning

Houston, TX

19 November 2018

### NRL Solar and Heliospheric Physics Branch Seminar (Invited)

NAVAL RESEARCH LABORATORY

Investigating Heating Frequency in Active Region Cores through Timelag Analysis of Forward Modeled Emission

Washington, D.C.

11 July 2018

### Space Physics Seminar Series

RICE UNIVERSITY

A Framework for Forward Modeling Solar Active Regions

Houston, TX

27 February 2017

### Space Physics Seminar Series

RICE UNIVERSITY

Impacts of Two-fluid Effects on Emission from Impulsively Heated Coronal Loops

Houston, TX

9 November 2015

## OUTREACH

### North Houston Astronomy Club Late Summer Gathering

LONE STAR COLLEGE-MONTGOMERY CAMPUS

Why is the Sun So Hot? A Current Perspective on Coronal Heating

Conroe, TX

24 August 2018

## POSTERS

### Solar Heliospheric and Interplanetary Environment (SHINE) Workshop

NATIONAL SCIENCE FOUNDATION

Using Synthetic and Observed Timelags to Constrain Nanoflare Heating Frequency in Active Region Cores

Cocoa Beach, FL

30 July-3 August 2018

### Rice Data Science Conference

RICE UNIVERSITY

Timelag Analysis of Global Hydrodynamic Simulations of Active Regions in the Solar Corona

Houston, TX

9-10 October 2017

### Solar Heliospheric and Interplanetary Environment (SHINE) Workshop

NATIONAL SCIENCE FOUNDATION

Modeling Observable Signatures of Nanoflare Heating Frequency in Active Region Cores

Saint-Sauveur, Quebec, CA

24-28 July 2017

### Solar Heliospheric and Interplanetary Environment (SHINE) Workshop

NATIONAL SCIENCE FOUNDATION

Understanding the Impact of Nanoflare Heating Frequency on the Observed Emission Measure Distribution

Santa Fe, NM

11-15 July 2016

## Coronal Loops Workshop VII

UNIVERSITY OF CAMBRIDGE

Effects of Ion Heating on Emission Measure of Coronal Loops in Active Region Cores

Cambridge, UK

21-23 July 2015

## Triennial Earth-Sun Summit

AMERICAN ASTRONOMICAL SOCIETY

Nonnegative Matrix Factorization as a Method for Studying Coronal Heating

Indianapolis, IN

26-30 April 2015

## 44th Annual Lunar and Planetary Science Conference

LUNAR AND PLANETARY SCIENCE INSTITUTE

Dust Grain Growth in a Protoplanetary Disk: Effects of Location on Charge and Size

The Woodlands, TX

18-22 March 2013

## Software and Computing

---

### SKILLS

<b>Languages</b>	Bash, C, C++, Python
<b>Scientific Computing</b>	IDL, Mathematica, MATLAB, NumPy, SciPy, SLURM, TORQUE
<b>Markup</b>	CSS, HTML, LaTeX, markdown, reStructuredText
<b>Other</b>	high performance computing, continuous integration, documentation, testing, version control

### OPEN SOURCE CONTRIBUTIONS

A more complete record of my contributions is available on GitHub.

#### fiasco

MAINTAINER

fiasco provides a modern Python interface to the CHIANTI atomic database in addition to implementing many atomic physics calculations commonly used in solar physics. I am the creator and primary maintainer of fiasco.

2017-present

[github.com/wtbarnes/fiasco](https://github.com/wtbarnes/fiasco)

#### SunPy

CONTRIBUTOR

SunPy is a library for solar data analysis in Python. I am an active member of the SunPy community and have made several contributions to the package. Specifically, I have worked to implement the widely-used AIA temperature response functions in SunPy.

2016-present

[github.com/sunpy/sunpy](https://github.com/sunpy/sunpy)

#### ChiantiPy

CONTRIBUTOR

ChiantiPy is a Python interface to CHIANTI atomic database. My main contributions to ChiantiPy have been improving the documentation and packaging infrastructure and adding a test suite.

2016-2017

[github.com/chianti-atomic/ChiantiPy](https://github.com/chianti-atomic/ChiantiPy)

## Research Fellowships

---

### NSF REU Research Fellowship

BAYLOR UNIVERSITY, CASPER

Received NSF REU fellowship to study dust grain charging and growth in protoplanetary disks.

Waco, TX USA

June 2012–August 2012

### Summer Undergraduate Research Fellowship

BAYLOR UNIVERSITY, DEPT. OF PHYSICS

Awarded summer research funding to investigate plasma physics of charged dust grains in Saturn's F Ring.

Waco, TX USA

June 2011–August 2011

## Honors and Awards

---

- Nov. 2018 **Metcalf Travel Award to the SDO Workshop**, Solar physics Division of the AAS
- Nov. 2017 **Scientific Image Contest (Second Place)**, Wiess School of Natural Sciences, Rice University
- July 2017 **Outstanding Student Poster Award**, SHINE Workshop
- May 2016 **William and Elva Gordon Fellowship**, Department of Physics and Astronomy, Rice University
- May 2016 **Chuoque Graduate Student Award**, Department of Physics and Astronomy, Rice University
- 2015, 2016, 2018 **Studentship Travel Award for SPD Annual Meetings**, Solar Physics Division of the AAS
- April 2013 **URSA Scholars Week Outstanding Research Poster in Physics**, Baylor University
- 2009-2013 **President's Gold Scholarship**, Baylor University
- 2011, 2012 **Gordon K. Teal Scholarship**, Department of Physics, Baylor University
- 2010, 2011 **Herbert D. Schwetman Scholarship**, Department of Physics, Baylor University

## Teaching and Mentoring

---

## STUDENTS MENTORED

### Lily Han

UNDERGRADUATE

Assisted in advising undergraduate thesis work on force-free field extrapolations and forward modeling

*Rice University*

*Oct. 2017-Apr. 2018*

### Brandon Wang

HIGH SCHOOL INTERN

Advisor for STEM research course.

*Clements High School*

*Apr. 2017-May 2018*

### Tessa Wilkinson

UNDERGRADUATE

Mentor for project to implement AIA response functions in SunPy

*Google Summer of Code*

*May-Aug. 2016*

## TEACHING EXPERIENCE

### PHYS 480/580: Introduction to Plasma Physics

GUEST LECTURER

Gave guest lecture for introductory plasma course for senior undergraduate and graduate students. Topics covered included electrostatic waves, binary collisions, and motion in a uniform magnetic field.

*Rice University*

*Fall 2018*

### ASTR 201: Stars, Galaxies, and the Universe

GUEST LECTURER

Gave two guest lectures for non-majors astronomy course of approximately 70 undergraduate students. Topics covered included eclipses, phases of the moon, and the celestial sphere.

*Rice University*

*Spring 2017*

### PHYS 102: Electricity and Magnetism

LAB TEACHING ASSISTANT

Instructed lab sections of 40+ undergraduate students on topics including electrostatic interactions, magnetic induction, and basic circuits.

*Rice University*

*Spring 2014, Spring 2015*

### PHYS 101: Mechanics

LAB TEACHING ASSISTANT

Instructed lab sections of 40+ undergraduate students on topics including kinematics, collisions, and simple harmonic motion.

*Rice University*

*Fall 2014, Fall 2015*

## Memberships

---

- American Astronomical Society, Solar Physics Division (Junior Membership)
- Phi Beta Kappa
- Sigma Pi Sigma