

Ashley D. Baker

INSTRUMENT SCIENTIST
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Education

University of Pennsylvania

PHD IN PHYSICS & ASTRONOMY

Philadelphia, PA

May 2020

- Thesis Advisor: Cullen Blake
- Dissertation Title: "Pushing the Limits of Ground-Based Exoplanet Characterization Surveys"

University of North Carolina at Chapel Hill

B.S. IN PHYSICS, HIGHEST HONORS, GPA 3.7

Chapel Hill, NC

Aug. 2010 - May 2014

- Research Advisor: Sheila Kannappan
- Honors Thesis Title: "Exploring the Dependence of Galaxy Properties on Group Halo Environment in the ECO Catalog"
- Minors in Math and Arabic

Fellowships & Awards

Troesh Prize Postdoctoral Fellowship	2020
51 Peg b Fellowship in Planetary Astronomy	2020
The Zaccheus Daniel Graduate Fellowship	2019
The Arnold M. Denenstien Prize - <i>for most promising experimental physics graduate student</i>	2018
National Science Foundation Graduate Research Fellowship	2016
Sigma Xi Grant-in-Aid of Research	2014
University Merit Scholarship	2010

Select Publications

Mitigating differential limb coupling as an RV error term in diffraction-limited spectrographs on large telescopes	DOI 10.1117/12.3017288
ASHLEY D. BAKER, GARRETH RUANE, NEMANJA JOVANOVIC, ET AL.	2024
Differential high-precision photometry with narrowband filters using HIRAX: instrument overview	DOI 10.1117/12.3017296
ASHLEY D. BAKER, UZAIR TAHAMID SIAM, NEMANJA JOVANOVIC, ET AL.	2024
Overview and status of the front-end instrument (FEI) Keck/HISPEC, the diffraction-limited y-K band spectrograph for exoplanet characterization	DOI 10.1117/12.3020536
NEMANJA JOVANOVIC, ASHLEY D. BAKER, MITSUKO ROBERTS, ET AL.	2024
A UV double pass spectrograph for monitoring stellar activity for the Keck Planet Finder	DOI: 10.1117/12.2628149
ASHLEY D. BAKER, STEVE GIBSON, ET AL.	2022
The IAG Solar Flux Atlas: Telluric Correction with a Semi-Empirical Model	ApJS, 247, 1
ASHLEY D. BAKER, CULLEN H. BLAKE, ANSGAR REINERS	2020
The Oxyometer: A Novel Instrument for Exoplanetary Atmospheric Characterization	PASP, 131, 1000
ASHLEY D. BAKER, CULLEN H. BLAKE, SAM HALVERSON	2019
Monitoring Telluric Absorption with CAMAL	PASP, 129, 978
ASHLEY D. BAKER, CULLEN H. BLAKE, DAVID SLISKI	2017

Research Positions

Instrument Scientist

Pasadena, CA

CALTECH OPTICAL OBSERVATORIES

July 2022 - Present

- Instrument scientist for HISPEC, a single-mode fiber fed spectrograph for Keck II. Includes defining and managing instrument requirements, test planning, optical design work, and developing and maintaining the instrument simulator.

51 Peg b Postdoctoral Fellow

Pasadena, CA

POSTDOC ADVISORS: DIMITRI MAWET & ANDREW HOWARD

July 2020 - July 2022

- Keck Planet Finder (KPF) science and instrument team member: building KPF's Ca H&K spectrometer, leading the KPF detector characterization data analyses, and developing data reduction pipeline modules
- Team member of PALomar Radial Velocity Instrument (PARVI) and KPIC: assisting in the data analysis with a focus on telluric correction
- HIRAX lead: Developing a multi-band photometer for characterization of exoplanet atmospheres to deploy and test at Palomar

Graduate Research Assistant

Philadelphia, PA

ADVISOR: CULLEN BLAKE

Dec. 2014 - May 2020

- Developed a unique telluric removal process for solar spectra in application to making a telluric-free optical solar atlas
- Designed and tested a simultaneous multi narrowband photometer in lab and on-sky tests
- Built, programmed, installed, and coded the data reduction pipeline for an automated precipitable water vapor monitoring instrument called CAMAL
- Aided in the maintenance of MINERVA telescopes and electronics at Whipple Observatory

Kavli Summer Program in Astrophysics: Exoplanetary Atmospheres

Santa Cruz, CA

MENTOR: JASMINA BLECIC

Summer 2016

- Implemented a self-consistent parameterized cloud model into the exoplanet atmospheric retrieval code, PyRAT Bay

UNC Chapel Hill Undergraduate Research Assistant

Chapel Hill, NC

ADVISOR: SHEILA KANNAPPAN

Nov. 2011 - May, 2014

- RESOLVE team member; assisted in conducting an astronomical survey of 1500 nearby galaxies; determined masses of galaxy groups and studied cluster environmental effects on galaxy properties

Condensed Matter Undergraduate Research

Chapel Hill, NC

ADVISOR: RENE LOPEZ

Jan. 2014 - May, 2014

- Designed photolithography masks to fabricate FETs in order to measure the electrical properties of PbS nanocrystals to improve quantum dot solar cell efficiencies

Select Presentations

Chesapeake Bay Area Exoplanet Conference (CHEXO)

Washington, D.C.

ORAL PRESENTATION

January 24th, 2020

- The IAG Solar Flux Atlas: Telluric Correction with a Semi-Empirical Model

Caltech Seminar

Pasadena, CA

INVITED SPEAKER

November 26th, 2019

- Pushing the Limits of Ground-Based Exoplanet Characterization Surveys

University of the Sciences Colloquium

Philadelphia, PA

INVITED SPEAKER

January 31st, 2019

- The Oxyometer: A Novel Instrument Concept for Exoplanetary Atmospheric Characterization

American Astronomical Society 233rd Meeting

Seattle, WA

ORAL PRESENTATION

January 9th, 2019

- The Oxyometer: A Novel Instrument Concept for Characterizing Exoplanet Atmospheres

Exoplanet Science with Small Telescopes: Precise Radial Velocities

Philadelphia, PA

ORAL PRESENTATION

April 25th, 2017

- The Camera for the Automatic Monitoring of Atmospheric Lines

Kavli Summer Program in Astrophysics: Exoplanetary Atmospheres

Santa Cruz, CA

ORAL PRESENTATION FOR SUMMER PROJECT

Summer 2016

- Assessing Cloud Structure Using Parametrized and Self-Consistent Models in Retrieval

Teaching and Outreach

Undergraduate Research Mentor

Pasadena, CA

MENTOR FOR SUMMER UNDERGRADUATE RESEARCH FELLOWSHIP (SURF) PROGRAM

Summer 2021

- Mentored Uzair Tahamid Siam who worked on a project optimizing the bandpass choices for an exoplanet characterization instrument.

Astronomy on Tap

PUBLIC TALK TITLED "SEARCHING FOR THE SIGNATURES OF LIFE"

Philadelphia, PA

August 19th, 2019

UPenn Physics & Astronomy Outreach Coordinator

LED AND ORGANIZED DEPARTMENT OUTREACH ACTIVITIES

- Organized monthly outreach meetings where we planned our involvement in upcoming community events
- Applied for and acquired \$5,000 of funding from the University of Pennsylvania over two years for the purchase of outreach expenses
- Led the involvement in the Philadelphia Science Festival, a Total Eclipse 2017 event at the Franklin Institute, and multiple career days and high school visits
- Led the development of multiple new science demonstrations, activities, and handouts
- Organized the outreach group's online presence and recruited new participants

Philadelphia, PA

May 2015 - Dec 2018

Upward Bound Tutor

WEEKLY MATH TUTORING FOR VETERANS RETURNING TO SCHOOL

- Helped veterans from a variety of backgrounds relearn math so they can pass entrance exams to attend local colleges.

Philadelphia, PA

May 2015 - May 2019

Physics Lab TA

TEACHING ASSISTANT

- Worked with lab coordinators to develop and test-run a new research-style format for calculus-based physics lab sections.
- Helped with the first edition of a computational physics course for majors. (1 semester)

UPenn

Aug. 2014 - May 2019

Observing Experience

Tillinghast 1.5m Reflector Telescope

TRES

- Two nights observing with the TRES instrument at Whipple Observatory.

Whipple Observatory

Fall 2017

Camera for the Automatic Monitoring of Atmospheric Lines

CAMAL

- Over 15 nights of observing to test filters, CCD capabilities, and optimize the instrument setup
- Wrote code to automate telescope slewing, CCD operation, target selection, and data reduction

Philadelphia, PA

Jun 2015 - Present

SOAR Telescope (Goodman Spectrograph)

FOR THE RESOLVE SURVEY

- Over 15 full nights of remote observing requiring real-time analysis and target selection

UNC Chapel Hill

March 2012 - May 2014

Green Bank Telescope

FOR THE RESOLVE SURVEY

- On site and remote observing and data reduction of GBT galaxy spectra

UNC Chapel Hill

2013

For Fun

- Riding one of my three bikes.
- Crocheting the latest trends.
- Keeping my plants alive.
- Improving my ability to speak Arabic.