

# Jiayin (DJ) Dong

Flatiron Research Fellow

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## Current Position

### Flatiron Research Fellow

Center for Computational Astrophysics, Flatiron Institute – Simons Foundation

New York, NY  
July 2022–Present

## Education

### Pennsylvania State University

Ph.D. in Astronomy & Astrophysics; Ph.D. minor in Computational Science  
M.S. in Astronomy & Astrophysics

State College, PA  
August 2022  
April 2019

### University of Illinois at Urbana-Champaign

B.S. in Engineering Physics and Astronomy (dual degree) with honors

Champaign, IL  
May 2017

## Fellowships & Awards

- 2022–25 **Flatiron Research Fellowship** Postdoctoral fellowship at CCA, Flatiron Institute
- 2022 **Alumni Association Dissertation Award** The most prestigious recognition to Penn State doctorate students
- 2021 **Raynor L. Duncombe Student Research Prize** Awarded by AAS Division on Dynamical Astronomy
- 2018–20 **Zaccheus Daniel Fellowship (x3)** Penn State travel grants for graduate student research
- 2020 **CCA Pre-Doctoral Fellowship** Selected as a predoc fellow at CCA, Flatiron Institute in Spring 2020
- 2019 **Student Poster Competition Winner** at New Horizons in Planetary Systems Conference
- 2018 **Sagan Workshop Travel Award** Travel support for 2018 Sagan Exoplanet Summer Workshop
- 2017 **Homer F. Braddock Fellowship** University scholarship awarded to selected 1st-year graduate students
- 2014–17 **Edmund J. James Scholar** Undergraduate honor program at the University of Illinois

## Awarded Telescope Time

### As Principal Investigator

I led 12 observing programs as Principal Investigator, and was awarded over 45 nights.

**WIYN-3.5m / NEID** via the NASA-NSF Exoplanet Observational Research Program (NN-EXPLORE)

2024A–2025B (**Long Term Program**), #536482

2024A, Priority 3, **39 hours**

2024B, **33 hours** (scheduled)

2025A, **13 hours** (scheduled)

2025B, **10 hours** (scheduled)

2023A, #954402, Priority 0, **17.8 hours (NASA WIYN Data Award)**

2023A, #652300 (co-PI Chontos), Priority 0 and 1, **24.4 hours**

2022A, #413894, Priority 1 and 2, **16.7 hours (NASA WIYN Data Award, \$6,000)**

2021B, #0277, Priority 1 and 2, **5 hours**

**CT-1.5m / CHIRON** via NN-EXPLORE

2022A, #308148, **50 hours**

2021A, #0147, **60 hours**

2020B, #0189, **20 hours**

### **MINERVA-A / MINERVA** via NN-EXPLORE

2022A, #308148, **20 hours**

2021A, #0147, **40 hours**

### **LCOGT-1m** via NOIRLab

2021A, #0147, **50 hours**

2020B, #0189, **30 hours**

### **WIYN-3.5m / NEID** via the Penn State TAC

2022B, #836442, Priority 3 and 4, **4.4 hours**

2021B, #0448, Priority 2, **10.5 hours**

2021A, #0405, Priority 1 and 2, **9.6 hours**

2021A, #0406, Priority 2, **4 hours**

**As Co-Investigator** on VLT-8m / ESPRESSO, ESO-3.6m / HARPS, TNG-3.6m / HARPS-N, Magellan-6.5m / MIKE, Magellan-6.5m / PSF, WIYN-3.5m / NEID, WIYN-3.5m / NESSI, CHEOPS

## **Invited Colloquia, Seminars, Talks**

- Mar. 2024 **Carnegie Observatories Colloquium** "Origins and Diversity of Giant Planets" Pasadena, CA
- Feb. 2024 **University of Illinois Urbana-Champaign Astrophysics Colloquium** "Origins and Diversity of Giant Planets" Urbana, IL
- Dec. 2023 **Nanjing University Exoplanet Seminar** "Five Years into TESS: A Comprehensive View of the Origins of Close-In Giant Planets" Nanjing, China
- Nov. 2023 **Columbia Seminar** "Uncovering the Origins of Close-In Giant Planets through Stellar Obliquity" New York, NY
- May 2023 **MIT TESS Science Talks** "Five Years into TESS: A Comprehensive View of the Origins of Close-In Giant Planets" Boston, MA
- Feb. 2023 **Princeton Exoplanet Seminar** "Understanding Close-in Planet Formation From Stellar Obliquities" Princeton, NJ
- Oct. 2022 **Yale Exoplanets and Stars Seminar** "Formation of Close-in Giant Planets: Where and How?" New Haven, Connecticut
- Feb. 2022 **Tsinghua Planet Group Meeting** "Origins of Warm Jupiters" Beijing, China
- Oct. 2021 **Princeton Exoplanet Seminar** "Tracing Dynamical Evolution of Planetary Systems" Princeton, NJ
- Oct. 2021 **Caltech Planetary Science Seminar** "Tracing Dynamical Evolution of Planetary Systems" Pasadena, CA
- Oct. 2021 **Berkeley Center for Integrative Planetary Science Seminar** "Tracing Dynamical Evolution of Planetary Systems" Berkeley, CA (Virtual)
- Oct. 2021 **Carnegie EPL Astronomy Seminar** "Tracing Dynamical Evolution of Planetary Systems" Washington, D.C. (Virtual)
- Sep. 2021 **CfA Seminar** "Tracing Dynamical History of TESS Warm Jupiters" Boston, MA (Virtual)
- Jan. 2020 **Tsinghua Planet Group Meeting** "Debris Disks in Multi-Planet Systems+TESS Warm Jupiters" Beijing, China

## **Contributed Conference Talks**

- Mar. 2024 **Extreme Solar Systems V** "Deciphering Origins of Close-in Gas Giants through Stellar Obliquity Distribution" Christchurch, New Zealand
- Jan. 2024 **ExoNYC** "From Super Earths to Super Jupiters: What stellar obliquity tells us about their formation" New York, New York
- Dec. 2023 **Exoplanets & Planet Formation Workshop** "Deciphering Origins of Hot Jupiters through Stellar Obliquity Distribution" Beijing, China

- Dec. 2023 **Open Problems in the Astrophysics of Gas Giants** "Deciphering Origins of Close-in Gas Giants through Stellar Obliquity Distribution" Patagonia, Chile
- July 2023 **Other Worlds Laboratory Summer Program** "Hot Jupiters: Dynamical Imprints Meet Atmospheric Mysteries" Santa Cruz, CA
- Oct. 2022 **TESS Science Meeting 29** "Using the NEID spectrograph to confirm the planetary nature of TOI-1859b via the Rossiter-McLaughlin effect" Boston, MA
- June 2022 **The 240th AAS Meeting** "Tracing Dynamical Evolution of Planetary Systems" Pasadena, CA (**Dissertation talk**)
- April 2022 **The 53rd DDA Meeting** "Two Case Studies of Warm Jupiters Suggesting Different Origins" New York, NY
- May 2021 **The 52nd DDA Meeting** "Boundary Layer Circumplanetary Accretion: How Fast Could an Unmagnetized Planet Spin Up Through Its Disk?" (Virtual, **Duncombe Prize Winner**)
- Jan. 2021 **TESS Science Meeting 24** "Warm Jupiters in Year 1 TESS Full-Frame Images: A Catalog and Observed Eccentricity Distribution" Boston, MA (Virtual)
- Nov. 2020 **Exoplanet Demographics I** "The Eccentricity Distribution and Occurrence Rates of Warm, Large Exoplanets" Pasadena, CA (Virtual)
- Aug. 2020 **The 51st DDA Meeting** "Unraveling Warm, Large Exoplanet (WaLE) Origins From TESS Observations" Ithaca, NY (Virtual)
- July 2020 **Exoplanets III** "A Catalog of Warm, Large Exoplanet (WaLE) candidates discovered in TESS Full Frame Images" Heidelberg, Germany (Virtual)
- June 2019 **Emerging Researchers in Exoplanet Science V** "Probing Young Planetary Systems from Their Debris Disks: Are Our Inferences Compromised by Unseen Planets?" Ithaca, NY
- June 2018 **Emerging Researchers in Exoplanet Science IV** "Investigating Young Planetary Systems Through Their Debris Disks" State College, PA

## Seminars

- Feb. 2023 **CCA Thursday Lunch Talk** "Close-in Giant Planets: Where, When, and How Do They Form?" New York, NY
- June 2020 **CCA Pre-Doctoral Symposium** "Angular Momentum Transport in Circumplanetary Disks: How Much Could an Unmagnetized Planet Spin up Through Its Disk?" New York, NY (Virtual)
- Nov. 2019 **Penn State Astronomy Lunch Talk** "Detection and Characterization of Warm Jupiters in TESS Full-Frame Images" State College, PA
- Jan. 2019 **Penn State Astronomy Lunch Talk** "Probing Young Planetary Systems from Their Debris Disks: Are We Messed up by Unseen Planets?" State College, PA
- Sep. 2017 **Penn State Astronomy Lunch Talk** "An ALMA Continuum Survey of the Protoplanetary Disks in the  $\rho$ -Ophiuchus Molecular Cloud" State College, PA

## Contributed Conference Posters

- June 2023 **Gordon Research Conference** "Stellar Obliquity Distribution of Exoplanetary Systems" South Hadley, MA
- May 2022 **Exoplanets IV** "Two Case Studies of Warm Jupiters Suggesting Different Origins" Las Vegas, NV
- Aug. 2021 **TESS Science Conference II** "The Eccentricity Distribution, Occurrence Rates, and Companions of TESS Warm Jupiters" Cambridge, MA (Virtual)
- May 2021 **Emerging Researchers in Exoplanet Science VI** "In Situ versus Disk Migration Origins of Warm Jupiters: Prediction on Nearby Companions" (Virtual)
- May 2021 **The 52nd DDA Meeting** "In Situ versus Disk Migration Origins of Warm Jupiters: Prediction on Nearby Companions" (Virtual)

- Aug. 2019 **Extreme Solar Systems IV** "Probing Young Planetary Systems from Their Debris Disks: Are Our Inferences Compromised by Unseen Planets?" Reykjavik, Iceland
- July 2019 **TESS Science Conference I** "Detection and Characterization of TESS Warm Jupiters" Cambridge, MA
- May 2019 **New Horizons in Planetary Systems** "Probing Young Planetary Systems from Their Debris Disks: Are Our Inferences Compromised by Unseen Planets?" Victoria, BC (**Poster Prize Winner**)
- July 2018 **Sagan Exoplanet Summer Workshop** "Investigating Young Planetary Systems Through Their Debris Disks" Pasadena, CA
- Apr. 2016 **University of Illinois Image of Research** "Substructures of Protoplanetary Disks Revealed with ALMA Radio Observations" Champaign, IL

## Teaching Experience

**Fluid Dynamics Summer School Lecturer** New York, NY  
 Flatiron Computational Fluid Dynamics for Astrophysics Summer School 2023  
 • Gave a lecture about the application of grid-based code Athena++ in planet formation

**LSSTC DSFP Visiting Lecturer** Chicago, IL  
 LSSTC Data Science Fellowship Program 2022  
 • Gave lectures on **Bayesian inference**, **sampling methods**, and **PyMC applications** to fellow graduate students in the Large Synoptic Survey Telescope Corporation (LSSTC) Data Science Fellowship Program (DSFP). 

**Sagan Workshop Hands-on Session Helper** Virtual  
 Sagan Exoplanet Summer Workshop 2021  
 • Led the hands-on session on circumstellar disk modeling using RADMC-3D (written by Faramaz et al.) in Zoom break-out rooms  
 • Facilitated students to complete coding exercises

**Graduate Teaching Assistant** State College, PA  
 Elementary Astronomy; Fundamental of Planetary Science and Astronomy 2017, 18  
 • TA responsibilities including grading assignments, offering office hours, and proctoring exams  
 • Two guest lectures to roughly 150 students on "**The Solar System Formation**"  
 • One guest lecture to 5 students on "**Elementary Astronomy Lab**"

**Grader and Observation Assistant** Champaign, IL  
 Introduction to Astrophysics 2016, 17  
 • Graded homework and exams for sophomore undergraduate students in Astronomy major  
 • Set up telescopes, monitored telescopes for safe use by students, and discussed celestial objects being observed during the evening and solar observing sessions

## Mentoring Experience

### Graduate students

- 2024– **Brandon Radzom**, Indiana University '26, "Stellar obliquity of multi-planet systems", co-mentored with Prof. Songhu Wang
- 2023– **Allyson Bieryla**, University of Southern Queensland '25, "Stellar obliquity measurement of TOI-2005", co-mentored with Profs. George Zhou and Chelsea Huang
- 2022–23 **Kyle Hixenbaugh**, Indiana University '23, "Stellar obliquity measurement of TOI-5143", co-mentored with Prof. Songhu Wang

## Undergraduate students

- 2024– **Tyler Fairington**, University of Southern Queensland '25, "Eccentricity Distribution of TESS Planets", co-mentored with Prof. Chelsea Huang
- 2021–22 **Claire DiPerna**, Penn State '24, "Dynamics of the resonant-chain system", co-mentored with Prof. Bekki Dawson
- 2021–22 **Jonathon Hope**, Penn State '24, "Migration of multiple giant planets", co-mentored with Prof. Bekki Dawson

## DEI, Outreach & Professional Activities

### Core Organizer of the Emerging Researchers in Exoplanet Science (ERES) Symposium

- 2023 **Consultant for the 8th ERES Symposium (@Yale)** Provided expertise and guidance for the successful hosting of the ERES Symposium at Yale, drawing over 100+ in-person participants. This event contributed to the continued growth and development of emerging researchers in exoplanet science.
- 2022 **Chair of Organizing Committee for the 7th ERES Symposium (@Penn State)** Led the organization of the ERES Symposium at Penn State, securing **\$100,000** in meeting funds from the Heising-Simons Foundation. The event brought together over 80 in-person participants, creating a platform for knowledge exchange and networking among junior researchers in the field of exoplanet science.
- 2021 **Organizing Committee Member for the 6th ERES Symposium (@Princeton)** Organized discussion panels focusing on career development and public engagement in astronomy. These panels served as a valuable resource for attendees, providing insights into career paths and ways to engage with the broader public.
- 2018 **Organizing Committee Member for the 4th ERES Symposium (@Penn State)** Involved in abstract selection and conference scheduling. Chaired the Planet Formation & Evolution session. Organized excursions, enhancing the overall experience of the conference participants.

### Outreach

- 2024 **Solar Viewing Volunteer** Delivering solar viewing sessions for parkgoers at Madison Square Park before the 2024 Total Solar Eclipse
- 2022, 17–19 **Featured Speaker; Exploring Exoplanets Demonstrator; The Guardian of Kid Prizes** at AstroFest (4-night outreach, 2500+ public visitors) & Astronight (1-night outreach, 500+ students)
- 2022 **Astronomy on Tap Speaker** Live coding Solar System dynamical interactions using N-body integrators

### Service

- 2023– **Journal Referee** for AJ (x2), A&A (x1), & PASP (x1)
- 2023 **External Panelist** served on CanTAC for the CFHT proposal
- 2023 **Review Panelist** served on the TESS General Investigator (GI) program
- 2020 **Panelist** on the Graduate School Information Session for Penn State undergraduate students
- 2020 **Moderator** for Exoplanets III; 950+ online participants; Coordinated with Transits 1 & 2 sessions
- Fall 2019 **CEHW Journal Club Organizer** Organized weekly Astro-ph.EP group discussion for the Center for Exoplanets and Habitable Worlds (CEHW)
- 2019 **Executive Secretary** of NASA XRP Review Panel

## Media & Press Release

- 2023 **"New 'warm Jupiter' exoplanet has a weird orbit and another planet may be to blame"** Press release of the discovery of TOI-1859b by the **Space.com; phys.org (Dong, Wang, Rice+23, ApJL)**
- 2023 **"Hot Days and Cloudy Nights on a 'Heavy Metal' Exoplanet"** Press release of the JWST phase curve of WASP-121b by the **AAS Nova (Mikal-Evans, Sing, Dong+23, ApJL)**

- 2021 **“Worlds Away”** Featured article on circumplanetary accretion by the **Simons Foundation Annual Report (Dong, Jiang, & Armitage 21, ApJ)**
- 2021 **“Newly discovered gas giant moving closer to its star”** Press release of the discovery of TOI-3362b by the **ABC Southern Queensland; MINERVA-Australis Press; Eberly College Science News (Dong, Huang, Zhou+21, ApJL)**
- 2021 **AAS Journal Author Series** Interviewed by AAS Editor Frank Timmes about the TESS Warm Jupiter catalog and statistics (**Dong, Huang, Dawson+21, ApJS**)
- 2020 **“Detail in the Debris”** Featured article on debris disk modeling by the **Eberly College Science Journal (Dong, Dawson, Shannon+20, ApJ)**

## Refereed Publications

### 1st-Author Publications

- [1] **Dong** & Foreman-Mackey 2023, "A Hierarchical Bayesian Framework for Inferring the Stellar Obliquity Distribution", *AJ*, **166**, 112
- [2] **Dong**, Wang, Rice, et al. 2023, "TOI-1859b: A 64-Day Warm Jupiter on an Eccentric and Misaligned Orbit", *ApJ Letter*, **951**, L29
- [3] **Dong**, Huang, Zhou, Dawson, et al. 2022, "NEID Rossiter-McLaughlin Measurement of TOI-1268b: A Young Warm Saturn Aligned with Its Cool Host Star", *ApJ Letter*, **926**, L7
- [4] **Dong**, Jiang & Armitage 2021, "Boundary Layer Circumplanetary Accretion: How Fast Could an Unmagnetized Planet Spin Up Through Its Disk?", *ApJ*, **921**, 54
- [5] **Dong**, Huang, Zhou, Dawson, et al. 2021, "TOI-3362b: A Proto-Hot Jupiter Undergoing High-Eccentricity Tidal Migration", *ApJ Letter*, **920**, L16
- [6] **Dong**, Huang, Dawson, Foreman-Mackey, et al. 2021, "Warm Jupiters in TESS Full-Frame Images: A Catalog and Observed Eccentricity Distribution for Year 1", *ApJ Supplement*, **255**, 6
- [7] **Dong**, Dawson, Shannon, & Morrison 2020, "Debris Disks in Multi-Planet Systems: Are Our Inferences Compromised by Unseen Planets?", *ApJ*, **889**, 47

### 2nd/3rd-Author Publications

- [8] Mikal-Evans, King, **Dong**, Foreman-Mackey, et al. 2023, "A JWST NIRSpec Phase Curve for WASP-121b: Dayside Emission Strongest Eastward of the Substellar Point and Nightside Conditions Conducive to Cloud Formation", *ApJ Letter*, **943**, 17

### 4th+-Author Publications

- [9] Mikal-Evans et al. incl. **Dong** 2024, "Silicon monoxide in an ultrahot Jupiter atmosphere with a super-stellar C/O", *Nature*, under review
- [10] Gupta, Millholland, Im, **Dong** 2024, "A hot Jupiter progenitor on a super-eccentric, retrograde orbit", *Nature*, under review
- [11] Delamer et al. incl. **Dong**, et al. 2024, "TOI-4201: An Early M-dwarf Hosting a Massive Transiting Jupiter Stretching Theories of Core-Accretion", *ApJ Letter* under review
- [12] Mantovan et al. incl. **Dong** 2024, "TOI-5398, the youngest compact multi-planet system composed of an inner sub-Neptune and an outer warm Saturn", *A&A* in press
- [13] Bieryla et al. incl. **Dong** 2024, "TOI-4641b: An Aligned Warm Jupiter Orbiting a Bright ( $V=7.5$ ) Rapidly Rotating F-star", *MNRAS*, **527**, 10955
- [14] Lubin, Wang, Rice, **Dong**, et al. 2023, "The 40d Orbital Period Warm Jupiter Within a Compact System, TOI-1670 c, is Well-aligned", *ApJ Letter*, **959**, L5
- [15] Gupta et al. incl. **Dong** 2023, "A High-Eccentricity Warm Jupiter Orbiting TOI-4127", *AJ*, **165**, 234
- [16] Heitzmann et al. incl. **Dong** 2023, "TOI-4562b: A Highly Eccentric Temperate Jupiter Analog Orbiting a Young Field Star", *ApJ*, **165**, 121
- [17] Frazier et al. incl. **Dong** 2023, "NEID Reveals that The Young Warm Neptune TOI-2076 b Has a Low Obliquity", *ApJ Letter*, **944**, 41
- [18] Bowens, Shannon, Dawson, **Dong** 2023, "Longterm Stability of Planetary Systems Formed from a Transitional Disk", *ApJ*, **944**, 201
- [19] Jackson, Dawson, Quarles, **Dong** 2023, "Statistical Analysis of the Dearth of Super-eccentric Jupiters in the Kepler Sample", *AJ*, **165**, 82
- [20] Kanodia et al. incl. **Dong** 2022, "TOI-3757b: A Low-density Gas Giant Orbiting a Solar-metallicity M Dwarf", *AJ*, **164**, 81

- [21] Stefansson et al. incl. **Dong** 2022, "The Warm Neptune GJ 3470b has a Polar Orbit", *ApJ Letter*, **931**, L15
- [22] Foreman-Mackey et al. incl. **Dong** 2021, "exoplanet: Gradient-based Probabilistic Inference for Exoplanet Data & Other Astronomical Time Series", *JOSS*, **6**, 3285
- [23] Dawson et al. incl. **Dong** 2021, "Precise Transit and Radial-Velocity Characterization of a Resonant Pair: A Warm Jupiter TOI-216c and Eccentric Warm Neptune TOI-216b", *AJ*, **161**, 161
- [24] Kanodia et al. incl. **Dong** 2020, "TOI-1728b: The Habitable-zone Planet Finder Confirms a Warm Super Neptune Orbiting an M Dwarf Host", *ApJ*, **899**, 1
- [25] McFarquhar et al. incl. **Dong** 2017, "Processing of Cloud In-Situ Data Collected by Bulk Water, Scattering and Imaging Probes: Fundamentals, Uncertainties and Efforts towards Consistency", *Meteorological Monographs*, **11.1**