Gavin Wang

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Education

Johns Hopkins University, Baltimore, MD, USA — August 2022 – May 2026 (expected)
Bachelor of Science in Physics, GPA 3.92 / 4.00

Research Experience

Astrophysics Summer Intern, Carnegie Observatories — June 2025 – present
Mentor: Dr. Jessica Spake

- Analyzing high-resolution transmission spectra of a low-density hot Jupiter from the Magellan Inamori Kyocera Echelle spectrograph
- Searching for atmospheric escape in calcium, sodium, and Hα lines, which if found would constrain the vertical structure of the planet's atmosphere
- Primary remote controller of Magellan Clay for one full night; first-author paper in preparation

JWST GO Program Co-Investigator, Johns Hopkins University — October 2024 – present
Mentors: William Balmer, Dr. Laurent Pueyo

- Fitting the orbit of HD 222237 b, potentially the coldest planet to ever be imaged
- Simultaneous modeling of Hipparcos-Gaia proper motions, absolute astrometry, radial velocities, and new relative astrometry from JWST to resolve degeneracies in the planet's orbit

Summer Undergraduate Research Fellow, California Institute of Technology — June 2024 – present
Mentors: Dr. Jerry Xuan, Prof. Dimitri Mawet

- Analyzed high-resolution K band spectra from the Keck Planet Imager and Characterizer of the L dwarf CD-35 2722 B
- Used radiative transfer models and high-performance computing to measure atmospheric metallicity, C/O, and $^{12}C/^{13}C$ ratio for the brown dwarf and its host star
- Find chemical homogeneity between the two objects, supporting formation via gravitational instability
- First-author paper accepted to *The Astrophysical Journal*

JWST Research Intern, Space Telescope Science Institute — October 2023 – present
Mentor: Dr. Néstor Espinoza

- Using Bayesian statistics and wavelet analysis to reduce 1/f noise in JWST's near-infrared detectors, currently the largest source of excess noise
- Application on K2-141 b's NIRSpec phase curve show 15% reduction in noise compared to existing algorithms
- First-author paper describing algorithm and constraints on K2-141 b's atmosphere in preparation

NSF NOIRLab Program Principal Investigator, Johns Hopkins University — July 2023 – present
Mentors: William Balmer, Dr. Laurent Pueyo

- Analyzed archival data on 15 Myr system with two candidate gas giants during preparation of proposal
- Radial velocity and photometric follow-up currently underway; will publish data and analysis once complete
- Confirming planetary nature of candidates would make the system the youngest multi-transiting system

Research Intern, Johns Hopkins University April 2023 – May 2025

Mentors: William Balmer, Prof. David Sing

- Used WIYN/NEID radial velocity data and Transiting Exoplanet Survey Satellite (TESS) photometry to measure the density of HAT-P-67 b
- Found HAT-P-67 b to be the largest and second lowest-density hot planet known to date
- First-author paper published in *The Astronomical Journal*

Undergraduate Researcher, Space Telescope Science Institute January 2022 – December 2023

Mentor: Dr. Néstor Espinoza

- Searched for transit depth variability among a sample of 330 exoplanets using TESS data
- Performed transit photometry fitting, periodogram analysis, and used Gaussian processes and parallel processing to identify four candidates with depth variability and their likely causes
- First-author paper published in *The Astronomical Journal*

Junior Member, TESS Follow-up Observing Program July 2020 – January 2022

Mentor: Dr. Karen Collins

- Helped identify 12 extrasolar planets from 100+ datasets collected by the Las Cumbres Observatory
- 27 co-author publications (2021 – 2025)

Awards & Honors

Astronaut Scholarship, Astronaut Scholarship Foundation May 2025
Awarded annually to 70+ of the brightest and most talented college students in science, technology, engineering and mathematics

Barry M. Goldwater Scholarship, Goldwater Foundation March 2025
Supports students who show exceptional promise of becoming the Nation's next generation of research leaders

Maryland Sellinger Scholarship, JHU December 2024
Donor-funded scholarship recipient

ΣΠΣ, JHU Chapter May 2024
Inducted into honor society in recognition of outstanding scholarship in physics and astronomy

Summer Undergraduate Research Fellowship, Caltech April 2024
$7,740 award for conducting a ten-week summer research project

Dean's List, JHU Spring 2023 – present

Provost's Undergraduate Research Award, JHU October 2022
$3,000 award; one of 25 selected research proposals out of 137

Successful Proposals

Co-Investigator, "Direct Detection and Characterization of a Nearby Temperate Giant Planet" 2025
Awarded 47.3 hours for JWST Cycle 4 (GO 6915)

Principal Investigator, "Unlocking the periods and masses of two young long-period planets" 2025
Awarded 23 hours on Miniature Exoplanet Radial Velocity Array-Australis (2025A-416224)

Co-Investigator, "Synergistic Cool Star Monitoring" 2024
Awarded 14.5 hours on Apache Point Observatory ARC 3.5-meter Telescope

Posters/Talks

International Conference on Exoplanets and Planet Formation *(poster)* December 2025
"A Spectroscopic Phase Curve of K2-141 b, an Ultra-Short Period Rocky Planet"

Carnegie Summer Student Symposium *(talk)* August 2025
"Searching for Atmospheric Escape on Three Hot Jupiters with MIKE"

Astronaut Scholar Technical Conference *(talk)* August 2025
"Measuring the Mass of the Largest Known Extrasolar Planet"

Caltech SURF Seminar Day *(talk)* August 2024
"Atmospheric Retrievals of a Brown Dwarf with KPIC"

TESS Science Conference III *(poster)* August 2024
"A Blind Search for Transit Depth Variability with TESS"

TESS Science Talks @ MIT *(invited talk)* March 2024
"Searching for Transit Depth Variability with TESS"

JHU Day of Undergraduate Research *(poster)* October 2023
"A Blind Search for Transit Depth Variability with TESS"

54th Annual Meeting of the AAS Division for Planetary Sciences *(poster)* October 2022
"Constraints on Transit Depth Variations of Known Exoplanets with TESS"

53rd Annual Meeting of the AAS Division for Planetary Sciences *(poster)* October 2021
"Developing a Tool to Automate the Search for NEBs Among TOIs"

TESS Science Conference II *(poster)* August 2021
"Analyzing FFIs to Identify False Positives within TESS Candidates"

Society for Astronomical Sciences 2021 Symposium on Telescope Science *(poster)* June 2021
"Eclipsing Binaries Identified Through the TESS Follow-up Observing Program"

Refereed Publications

Total: 30 publications, **604** citations, **14** h-index

First-author publications:

1. **Wang**, Xuan, González Picos et al., "Chemical and Isotopic Homogeneity Between the L Dwarf CD-35 2722 B and its Early M Host Star," *ApJ*, accepted.
2. **Wang**, Balmer, Pueyo et al., "A Revised Density Estimate for the Largest Known Exoplanet, HAT-P-67 b," *AJ* (2025), 169, 336.
3. **Wang** & Espinoza, "A Blind Search for Transit Depth Variability with TESS," *AJ* (2024), 167, 1.

Select co-author publications: see Google Scholar for full list

1. Christian, Vanderburg, Becker et al. (including **Wang**), "Wide Binary Orbits Are Preferentially Aligned with the Orbits of Small Planets, but Probably Not Hot Jupiters," *AJ* (2025), 169, 308.
2. Armstrong, Osborn, Burn et al. (including **Wang**), "The NCORES Program: Precise planetary masses, null results, and insight into the planet mass distribution near the radius gap," *MNRAS* (2025), 537, 3175.
3. Masuda, Libby-Roberts, Livingston et al. (including **Wang**), "A Fourth Planet in the Kepler-51 System Revealed by Transit Timing Variations," *AJ* (2024), 168, 294.
4. Yahalomi, Kipping, Nesvorný et al. (including **Wang**), "Not-so-fast Kepler-1513: a perturbing planetary interloper in the exomoon corridor," *MNRAS* (2024), 527, 620.

5. Peterson, Benneke, Collins et al. (including **Wang**), "A temperate Earth-sized planet with tidal heating transiting an M6 star," *Nature* (2023), 617, 701.
6. Chontos, Murphy, MacDougall et al. (including **Wang**), "The TESS-Keck Survey: Science Goals and Target Selection," *AJ* (2022), 163, 297.
7. Christian, Vanderburg, Becker et al. (including **Wang**), "A Possible Alignment Between the Orbits of Planetary Systems and their Visual Binary Companions," *AJ* (2022), 163, 207.
8. Winters, Cloutier, Medina et al. (including **Wang**), "A Second Planet Transiting LTT 1445A and a Determination of the Masses of Both Worlds," *AJ* (2022), 163, 168.
9. Rodriguez, Quinn, Zhou et al. (including **Wang**), "TESS Delivers Five New Hot Giant Planets Orbiting Bright Stars from the Full Frame Images," *AJ* (2021), 161, 194.

Teaching & Outreach

Astronomy & Space Club, JHU — Fall 2023 – present

- Operator of campus observatory for eyepiece viewing of planets, nebulae, and galaxies
- Astrophotography and post-processing sessions with club members; images shared on personal website

Learning Den Tutor, JHU — Fall 2023

- Personalized one-on-one tutoring for General Physics I

Undergraduate Learning Assistant, JHU — Spring 2023 – Fall 2023

- Assisted for General Physics I (AS.171.101 and AS.171.107) weekly discussion sections
- Held weekly 2-hour office hours

***Hopkins Insider* Contributor**, JHU — May 2023

- Wrote blog post on my exoplanet research for prospective undergraduates

Media Features

"Solved: the mystery of the evaporating planet," Nature Research Highlights — 2025
"Rising Johns Hopkins senior Gavin Wang wins Astronaut Scholarship," JHU Hub — 2025
"Humans of Hopkins: Goldwater Scholar Gavin Wang," JHU Newsletter — 2025
"Four Johns Hopkins students awarded Goldwater Scholarships," JHU Hub — 2025

Skills

- Languages: English (native), Chinese (native)
- Computing: Python, C/C++, Linux, HPC
- Software: `AstroImageJ`, `astropy`, `corner`, `dynesty`, `emcee`, `MultiNest`, `petitRADTRANS`, `Ray`
- Astronomy: 80 hours experience operating 0.5 m Morris W. Offit Telescope, remote observing with ARC 3.5 m and Magellan Clay