Huihao **Zhang**

NASA Partner Eclipse Ambassador

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Education

Penn State University — *State College, PA*

PhD In Astronomy & Astrophysics — *Aug. 2024 - Expected May. 2029*

The Ohio State University(OSU) — *Columbus, Ohio*

BS In Physics and BS In Astronomy & Astrophysics — *Jan. 2021 - May. 2024*

- GPA 3.925 (Summa Cum Laude)
- Research Distinction in Astronomy & Astrophysics

Publications

Detecting Biosignatures in Nearby Rocky Exoplanets using High-Contrast Imaging and Mid-Resolution Spectroscopy with Extremely Large Telescope — *Astronomical Journal*

Huihao Zhang, Ji Wang, Michael K. Plummer; *AJ 167 37* — *Dec, 2023*

The Development of HISPEC for Keck and MODHIS for TMT: Science Cases and Predicted Sensitivities — *Proceedings of SPIE*

Q., Konopacky, A., Baker, D., Mawet, and others (including **Huihao Zhang**); *Tech & Instru for Detection of Exoplanets XI. Vol. 12680.* — *Sep, 2023*

Specsim and it's Web Interface: a Calculator for SNR and Exposure Time Calculations of TMT-MODHIS and Keck-HISPEC — *PASP*

Huihao Zhang, Ashley Baker, Dimitri Mawet; **In Prep** — *Present*

Realizing the Full Potential of Clumped Isotopes as an Orthogonal Exoplanet Biosignature — *Astrophysical Journal*

Ji Wang and **Huihao Zhang**, Amy Hofmann, Eddie Schwieterma; **In Prep** — *Present*

Research Projects

Exposure Time Calculator (ETC) for Keck-HISPEC and TMT-MODHIS — *Pasadena, CA*

Mentor: Prof. Dimitri Mawet, Dr. Ashley Baker; California Institute of Technology. — *June. 2023 - Present*

- Provides updates on instrument throughput as well as instrument coupling for the simulation packages TMT-MODHIS and Keck-HISPEC based on official data.
- Recompile the direct imaging exoplanets functions of simulation packages of TMT-MODHIS and Keck-HISPEC.
- Provides web interface to exposure time calculator for TMT-MODHIS and Keck-HISPEC.
- Provides exemplary scientific cases for the TMT-MODHIS and Keck-HIPSPEC simulation package.
- The main language of the project is Python, and the main libraries used in this project are PICASO, PSIsim, specsim, Astropy, NumPy, Pandas, and Matplotlib.
- This project was selected by Summer Undergraduate Research Fellowships (SURF) of Caltech and was awarded a ten-week(June - Aug, 2023) research fellowship for a total of $7,000(Approx)

Quantifying the Ability of JWST and E-ELT to Detect Biosignatures in the Atmosphere of Exoplanets. — *Columbus, Ohio*

Mentor: Prof. Ji Wang; The Ohio State University — *Nov. 2021 - Present*

- Based on NASA's publicly available data, we assume that TRAPPIST-1 e has the atmosphere of Modern Earth and Archean Earth.
- We use PICASO/petitRADTRANS for simulating the transmission spectra of TRAPPIST-1 e and use PandExo for simulating JWST observation results of TRAPPIST-1 e (transiting)
- We use the BT-Settl model to simulate the flux of TRAPPIST-1, assuming that TRAPPIST-1 e has an Earth-like albedo(Modern), and use the method proposed by Dr. Ji Wang and Dr. Dimitri Mawet et al. to simulate the results of ELT direct imaging of TRAPPIST-1 e.
- Based on the method proposed by Caprice Phillips and Dr. Ji Wang el al. to quantify the ability of JWST and ELT to detect a single gas biosignature in the atmosphere of exoplanets, we proposed a method to detect the ability of JWST and ELT to detect a gas pair biosignatures.
- The main language of the project is Python, and the main libraries used in this project are PICASO, PandExo, petitRADTRANS, Astropy, NumPy, Pandas, and Matplotlib.
- This project was selected by Undergraduate Research Apprenticeship Program(URAP) of Ohio State University and was awarded a three-month(May - July, 2022) research fellowship for a total of $6,000(Approx)

Presentation & Poster

2024 SPIE Astronomical Telescopes + Instrumentation — *Yokohama, Japan*

Poster: Calculating HISPEC and MODHIS performance estimates with the Specsim package and website tool, available here — *June. 2024*

- H., Zhang, A., Baker., D., Mawet, HISPEC/MODHIS team.

2023 Great Lake Exoplanet Area Meeting — *Bloomington, IN*

Presentation: Web Platform for Calculations of SNR and Exposure Time with Specsim for TMT-MODHIS and Keck-HISPEC, available here — *Oct. 2023*

- H., Zhang, A., Baker., D., Mawet, HISPEC/MODHIS team.

2023 NASA Sagan Summer Workshop — *Pasadena, CA*

Poster: Biosignature Detectability in Rocky Exoplanet with ELT-HARMONI and ELT-METIS in Different Coronagraph Contrast Levels, available here — *Aug. 2023*

- H., Zhang, J., Wang., M., Plummer.

242 Meeting of the American Astronomical Society — *Albuquerque, NM*

Poster: Assessing the Feasibility of High-Contrast Direct Imaging in NIR and Mid-Resolution Mode with ELTs for Atmosphere of Rocky Exoplanets , available here — *June. 2023*

- H., Zhang, J., Wang., M., Plummer.

2023 Spring Undergraduate Research Festival — *Columbus, OH*

Presentation: Quantifying the Ability of E-ELT(Direct Imaging) and JWST(Transit Method) to Detect Biosignatures, available here — *Apr. 2023*

- H., Zhang, J., Wang.

2022 Great Lake Exoplanet Area Meeting — *Columbus, OH*

Presentation: Quantifying the Ability of JWST to Detect Biosignatures, available here — *Nov. 2022*

- H., Zhang, J., Wang.

Observation Experience

WASP imager on the 200-inch Telescope, Palomar Observatory — *San Diego, CA*

co-PI — *Aug. 2023*

- Target: ZTF23aatekmu, one night observation

Honors & Awards

2024	**Braddock-Roberts Fellowship**, Recognizes outstanding astronomy majors, nominated by faculty	*State College, PA*
2023	**Ann Slusher Tuttle Award**, Recognizes outstanding astronomy majors, nominated by faculty	*Columbus, OH*
2023	**Summer Undergraduate Research Fellowships**, Selected by the Student-Faculty Programs of Caltech	*Pasadena, CA*
2023	**NASA Eclipse Ambassador**, Selected by the Astronomical Society of the Pacific	*San Francisco, CA*
2022	**Ann Slusher Tuttle Award**, Recognizes outstanding astronomy majors, nominated by faculty	*Columbus, OH*
2022	**URAP Research Fellowship**, Selected by the office of undergraduate education of Ohio State University.	*Columbus, OH*
2022	**Smith Sophomore Award**, Recognizes outstanding physics majors(sophomore), nominated by faculty.	*Columbus, OH*
2021-24	**Dean's List(6 out of 6)**, The Ohio State University	*Columbus, OH*

Skills

Programming	Python, Mathematica, LaTeX, HTML, SQL, Javascript, CSS
Technology	PSIsim(developer), Specsim(developer), Flask, PyQt5, Celery, PandExo, PICASO, petitRADTRANS, Astropy, sklearn, Keras
Languages	English(Fluent), Chinese(Native)

Extracurricular Activity & Volunteering

NASA Partner Eclipse Ambassador — *San Francisco, CA*

Member — *Jan. 2023*

- A program designed to serve over 200 people in local underrepresented communities for NASA and the Astronomical Society of the Pacific
- Spread knowledge of Astronomy as well as organizing local eclipse-related events

Friends of Ohio State Astronomy and Astrophysics

Columbus, Ohio

VOLUNTEER

Oct. 2022

- Providing directions, organizing signage
- Answer questions from participants

Fan translation(Chinese) of Youtube channel Launch Pad Astronomy

Cyber Space

MEMBER&VOLUNTEER

May. 2022 - PRESENT

- I was given permission to translate four videos as a volunteer and post them on the Chinese community Bili Bili.
- Videos currently receives 12k plays on Bili Bili.