

# XINZE (SUNNY) GUO

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## RESEARCH INTERESTS

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I am most passionate about applying programming and data analysis skills to study astrophysics topics. I have a strong interests in exoplanets and habitable zones, radio astronomy, black holes, and the early universe. I am still exploring different fields in astrophysics.

## EDUCATION

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**Beijing National Day School, Beijing, China** *July 2021*  
*High School Diploma*

**University of California, Berkeley, CA** *Expected Spring 2025*  
*Bachelor of Arts in Astrophysics and Computer Science*

GPA: 4.0/4.0

Related Coursework:

Astrophysics: Physics 5 Series, Astronomy 7 Series, Physics 112 *Introduction to Statistical and Thermal Physics*

Computer Science: CS 61A, CS 61B, CS 70, CS 170 *Efficient Algorithms and Intractable Problems*

## TECHNICAL SKILLS

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<b>Professional:</b>	Operate Leuschner 30" Optical Telescope; filter out potential exoplanet candidates from TESS data; Data Fitting; Interpolation of data.
<b>Programming:</b>	Python, Java
<b>IDE:</b>	Jupyter, Colaboratory, Wing101, VSCode, IntelliJ, Spyder, Anaconda
<b>Technologies:</b>	Latex, Microsoft Suite, Adobe Photoshop, Autodesk 123D Design
<b>Libraries:</b>	NumPy, matplotlib, SciPy, pandas, healpy, pocoMC, UltraNest
<b>Language:</b>	English (fluent), Chinese (native speaker)

## RESEARCH EXPERIENCE

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**Beijing University of Aeronautics and Astronautics** *Jan 2018 - Dec 2019*  
*Researcher of TAFE Project*

- Proposed the idea of Twin-body Asymmetric Flying-Wing Aircraft (TAFE) to carry out the air-monitoring task. TAFE increases the flight performance, lift, and endurance of the twin-body aircraft
- Designed, modeled, and simulated it using the vortex lattice method and Computational Fluid Dynamics
- Fabricated the TAFE plane model and did a successful flight test
- Won S. -T. Yau High School Science Award (Physics) Division final first prize
- Attended the 4th International Conference on Modeling, Simulation, and Applied Mathematics
- Publication: GUO, Xin-ze, Bo-zhao FAN, Jun HUANG, and Jing-feng XIE. "CFD and VLM Simulation of the Novel Twin-Body Asymmetric Flying-Wing Aircraft." DEStech Transactions on Computer Science and Engineering, no. msam (2020). doi: 10.12783/dtse/msam2020/34237

**Undergraduate Laboratory at Berkeley(ULAB)** *Sep 2021 - May 2022*  
*Mentee of the Exoplanets Project*

- The goal is to discover and confirm an unknown exoplanet by looking and filtering data from TESS and taking pictures of potential candidates
- Looked through the light curves, periods, secondary eclipse, Even Odd Test, SNR and other data to evaluate and filter out potential candidates
- Found three potential candidates with shorter transit period and suitable coordinate after filtering through 5000 data
- Used Leuschner 30" Optical Telescope to observe two transits. Used AstroImageJ to deal with the observed pictures and plot the luminosity plot

### **Undergraduate Research Apprentice Program (URAP)**

*Feb 2022 - Present*

*Researcher of MIST Project*

- Learned about radio antenna behavior, sky temperature, beam cube, and convolution
- Used NumPy, matplotlib, healpy, and provided code to create, interpolate, and analyze theoretical sky models and beam cubes.
- Created theoretical 2D Gaussian Beam cubes with Gaussian noise to test data fitting ability of pocoMC
- Used pocoMC, and UltraNest to fit parameters that characterized a frequency-determined beam model
- Decompose the Beam using two-dimensional Hermite functions (TDH) functions
- Attend weekly telecom to present my work and listen to colleagues' updates
- Wrote memos to communicate work. They are posted under "Memos" section on MIST official website

## **TEACHING EXPERIENCE**

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### **CS 70 Discrete Mathematics and Probability Theory**

*Sep 2022 - Present*

*Discussion Academic Intern (AI)*

- Answer conceptual and discussion questions. Give hints to direct the students to come up with the answers
- Lead some problem in front of the discussion section

### **CS 61B Data Structures**

*Jan 2023 - Present*

*Computer Science Junior Mentor*

- Lead a weekly one hour section to help students understand the concepts better
- Give a mini-lecture to review the topics and guide students to discuss and work out the practice problems
- Hold review sessions to prepare students for the exams

## **ACTIVITY**

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### **Berkeley Physics Directed Reading Program (PDRP)**

*Sep 2021 - Dec 2021*

*Mentee*

- Read papers about simulations methods and using the exoplanets data to derive earlier universe formation
- Delivered a speech about exoplanets and application of data

### **Undergraduate Astronomical Society (UAS)**

*Sep 2021 - May 2022*

*Member*

- Learned to use ground-based telescope to observe Jupiter, Saturn, Moon, M31, and ring nebula

### **Cal Science Fiction Club**

*Sep 2022 - Present*

*Member*

- Read and discuss Science Fiction bi-weekly
- *Dune, Three-body Problem, The Overstory*