YICHEN LIU

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EDUCATION

University of Illinois at Urbana-Champaign (Illinois, U.S.) | College of Liberal Arts & Sciences **Aug 2022 - Present**
- Bachelor of Science - **Astrophysics** and **Mathematics** **4.00/4.00**
- Minor in **Physics**, **Computer Science**, and **Chemistry**
- Enrolled in the **LAS Honors program**

University of Macau (Macau SAR, China) | Faculty of Science and Technology **Aug 2019 - May 2022**
- Major in **Applied Physics and Chemistry** **3.40/4.00** (3.81 in the third year)
- Enrolled in the **Honours College**

Summer sessions
- **University of California, Berkeley** (Online) 4.000/4.000 **Jun 2022 - Aug 2022**
- **Shanghai Jiao Tong University** (Shanghai, China) 4.00/4.00 **Jun 2021 - Jul 2021**

RSEARCH EXPERIENCES

Department of Astronomy (Illinois, U.S.) - *research assistant* **Sep 2022 - Present**
- Supervisor - Professor Xin Liu
- Topic 1 - galaxy deblending using machine learning **Sep 2022 - Present**
  - Examined the source extraction pipelines of `Astrodet` and `Astro R-CNN` using `Sep` and `Scarlet`
  - Arranged test runs of different models and configurations based on PhoSim data on Hardware - Accelerated Learning (HAL) cluster using `Detectron2`
  - Wrote code to introduce Transformer models such as MViT and VitDet into the pipeline
  - Enrolled in the NCSA SPIN internship in Summer 2023
- Topic 2 - DES SED fitting Feb 2023 - Present
  - Generated SED spectra of the sources in the DES and WISE catalogs using `CIGALE`
  - Compared and labelled potential AGNs in the catalog

National Observatory of China (Beijing, China) - *summer research internship* **Jun 2022 - Aug 2022**
- Supervisor - Professor Chaojian Wu
- Topic - meteor slitless spectrum
  - Computed the spectrum of Gemini meteors captured by DSLR
  - Analyzed the intensitities of Sodium and Magnesium using Python
  - Wrote code to use machine learning to identify meteors from the meteors and do photometry automatically

Institute of Applied Physics & Materials Engineering (Macau SAR, China) - *research assistant* **Aug 2019 - May 2022**
- Supervisor - Professor Hongchao Liu
- Topic 1 - ghost imaging under complex environment Aug 2019 - Aug 2021
  - Studied the concepts of single-pixel imaging & ghost imaging
  - Managed ghost imaging experiments in MATLAB (measure image quality based on different equipment and algorithms), analyze the data, and author reports for project supervisors
  - Reviewed latest studies on ghost imaging and presented research summaries at staff meetings
- Topic 2 - anti-loss image encryption based on ghost imaging Sep 2021 - Feb 2022
  - Conducted experiments on ghost imaging using the optimized patterns
  - Designed Python algorithms based on the concept of compressive sensing
  - Conducted the computational simulations of ghost imaging and integrated the results
  - Authored research paper, becoming the first undergraduate student in the department publishing research paper
- Topic 3 - ghost imaging using recurrent neural network Mar 2022 - May 2022
  - Operated lasers and other equipments in collaboration with postgraduate students
  - Summarized and verified the existing ghost imaging methods using nerural networks
  - Designed Python algorithms based on recurrent and convolutional neural network for ghost imaging

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PUBLICATIONS

1. **Yichen Liu**, Peixia Zheng, and Hong-Chao Liu, "Anti-loss-compression image encryption based on computational ghost imaging using discrete cosine transform and orthogonal patterns," Opt. Express 30, 14073-14087 (2022)
2. Peixia Zheng, **Yichen Liu**, and Hong-Chao Liu, "Single-pixel imaging and metasurface imaging (Invited)," Infrared and Laser Engineering (红外与激光工程) 50.12, 20211058-1 (2022)

OBSERVATION EXPERIENCE

- Cerro Tololo Inter-American Observatory, Blanco 4m / DECam: 3 nights observation   Jan 2023 - Apr 2023

AWARDS

- University of Illinois Dean's Honour List   Jan 2023
- Smart Star Sponsorship for studies at University of California, Berkeley   Jun 2022
- University of Macau Dean's Honour List (2020 first semester and 2022)   Aug 2022
- Residential College Summer Programme Sponsorship for studies at Shanghai Jiao Tong university   May 2021
- Third Prize, China Undergraduate Physics Tournament   Oct 2020
- National Team Leader at the 2019 European Union Contest for Young Scientists   Sep 2019
- University of Macau Full Scholarship (tuition & accommodation, 2019-2021)   Aug 2019
- Bronze Medal, International Olympiad of Astronomy and Astrophysics   Nov 2018
- First Prize, China Adolescents' Science and Technology Innovation Contest   Aug 2018
- Second Prize, China National Astronomy Olympiad   May 2018

OUTREACH

Youtuber in physics and mathematics (Online)   Sep 2021 - Present
- Occasionally live stream or publish videos in Bilibili platform, offering public education resources in Chinese
- Topics include mathematics and physics that I self-learned
- The most popular video obtained more than 160,000 watchings

Seminar of Physics at the University of Macau (Macau SAR, China)   Feb 2022 - May 2022
- This is a series of unofficial lectures organized by me and my classmate, Jiheng Duan, willing to offer the contents that the University of Macau's curriculum does not provide, such as classical mechanics, supplementing the theoretical basis of the future research and studies in physics for the DPC students
- Conducted and arranged the class meetings twice a week
- Prepared and taught the lecture *SPUM 102 The tools of physical tools*, including complex variables, Γ functions, integral transforms, δ functions, and Green functions |Syllabus
- The recordings of the lectures are available on Youtube

ACTIVITIES

Department of Astronomy (Illinois, U.S.) - *undergraduate tutor*   **Jan 2023 - Present**
- Planned and facilitated collaborative tutoring sessions for Astronomy-program major students enrolled in targeted core major courses

Personal 25-centimeter Remote Observatory (Hebei, China) - *astrophotographer*   **Jan 2018 - Jul 2022**
- Identified a suitable site in China and built a 2×2-meter storage facility with internet access and a retractable roof
- Selected, assembled, and tested the equipment; successfully developed a remotely-operated facility
- Regularly captured emission nebulae

University of Macau Physics Society (Macau SAR, China) - *director*   **Aug 2020 - Feb 2021**
- Founded the University's physics society and promoted its activities on social media platforms
- Significantly expanded the Society's membership through effective outreach activities and university club fairs
- Organized and led a team of undergraduate students at the 2020 China Undergraduate Physics Tournament

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Department of Physics and Chemistry (Macau SAR, China) - *student helper*   **Jul 2020 - Oct 2020**
- Procured equipment for physics-related research (requested product quotes and negotiated contracts with suppliers)
- Tracked the department's procurement budget and developed budgeting recommendations
- Purchased supplies for the 2020 China Undergraduate Physics Tournament

TECHNICAL SKILLS

Skilled in:	Python, LaTeX, MATLAB, Git, and Shell Bash/Zsh
Basic Knowledge:	C/C++, Mathematica, Julia, docker, and Java
Softwares:	MaxIm DL, COMSOL, Altium Designer, KiCAD, Solidworks, Cinema 4D, and SPSS
Often-used Packages:	AstroPy, Scarlet, PyTorch, Detectron2, and CIGALE
Contributions:	Astrodet: instance segmentation of galaxies and stars
	Metspec: Auto-detection and photometry of meteor slitless spectrum
	DES-SED-Fitting: SED fitting and classification of DES sources
	DECat-pointings: working repository of DECam