

Caltech SURF Program Experience

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About me

I am a rising third-year undergraduate student majoring in Physics with a specialization in astronomy and planetary science. My previous research experience includes work on Active Galactic Nuclei (AGN) through the TARA (Taiwan Astronomical Research Alliance) Summer Program and an asteroid research project at the Academia Sinica Institute of Astronomy and Astrophysics (ASIAA). In addition to my research, I have taken graduate-level courses such as *Data Analysis in Astronomy(DAA)* and *Computational Astrophysics(CA)*, both of which have provided me with a strong foundation for my projects.

The SURF Research Experience

My primary motivation for applying to the SURF program was to expand my research skills. My previous projects were centered on analyzing astronomical data using statistics and machine learning. However, I wanted to explore new area such as numerical simulation, using algorithms and mathematical models to investigate scientific problems from a different perspective. Joining Professor Yuk L. Yung' s group was a great opportunity, allowing me to investigate the Venus atmosphere. In this project, we developed a 2D dynamic model for Venus using the highly accurate Prather scheme and extracted an analytical stream function to describe the wind field on Venus. In the end we coupled this

dynamic core with a photochemical model to simulate the chemical evolution to investigate some specific problems e.g. D/H ratio in the mid-atmosphere.

Events

I attended many seminars in this summer. In my department, my mentor invited speakers on Wednesdays to talk about diverse topics, from Astronomy and Planetary Science to Economics. There was also the Obscos Seminar in Cahill, the astronomy and astrophysics building, where researchers, professors, and even other summer students shared their work. Best of all, both of them have free lunch. Also, our department had a happy hour every Friday. There were always lots of snacks, fruits, and drinks. It was a great way to end the week.

Another great event was the student-faculty dinner. It was a rare opportunity to share a meal with renowned professors and other students. I actually got to have dinner with Mike Brown, aka the "Pluto killer". We talked all about his research, the search for Planet 9, and upcoming asteroid missions. That conversation truly expanded my research horizons.



Life on Campus

Caltech and Pasadena are comfortable places to live. I loved the California sunshine and perfect weather, which meant I could work anywhere like under a tree or lying on the grass. Pasadena, walking distance from Caltech, is also a fun town to explore. One of my favorite party there is Astronomy on Tap, where people gather for drinks and science outreach. It was nice to talk about

astronomy with people from all walks of life, and I just loved that blend of science and community.

Also, we Taiwanese SURF students formed the “Hell's Kitchen”, often getting together to make Asian cuisine we all missed from home, and my cooking skill definitely improved in the process.





Trips

Since my research was mostly remote, I had the flexibility to travel around and explore California. The Student-Faculty Program (SFP) hosted lots of events all over LA, from trips to Santa Monica and Dodger Stadium to exploring Orange County. It was a super convenient and fun way to see the area and get to know other SURF students.

We SURF students from Taiwan also traveled together all the time, from downtown LA to other university campuses. We had a lot of fun as the photo below suggests!

Beyond these trips, I also explored San Francisco and San Diego. It was a fantastic way to experience the different vibes of each city. But the absolute highlight of my summer was personal. I went to an MLB game and got to see Taiwanese player, Kai-Wei Teng, pitch in person. Seeing him on that stage was a truly unforgettable experience and a proud moment.







Summary and Reflection

My summer in Caltech wasn't only defined by my research, but also the student life in LA and all the people I met. I learn a lot in what it means to be a scientist, and met some big names I never dreamed about meeting one day. My research on the Venus atmosphere was challenging, and I spent so much time working alone that I wanted to give up in some moments. However, I had the support of the seniors in the lab and other summer students. Together, we created those moments that made us feel like a real family. Their support gave me the confidence to face the challenges in my research and the future.

If you want to know more detail about my life in Caltech, you could go to [my youtube](#) channel and watch the Vlog. Feel free to send me an email to b12202042@ntu.edu.tw if you have any questions.

