Astronomy Summer Camps

Directed by Dr. Jian Ge
Professor of Astronomy, University of Florida
1/15/2018

Two astronomy summer camps will be offered during the summer of 2018. Both camps involve students in taking observatory activities in Arizona. The first camp will be held in a hotel at Tucson in Arizona from June 20th to 30th, and the second one from July 17th to July 27th. These camps aim to expose high school students (freshman to senior, middle school students can participate, but require parent's or counselor's company) to astronomical observations at working

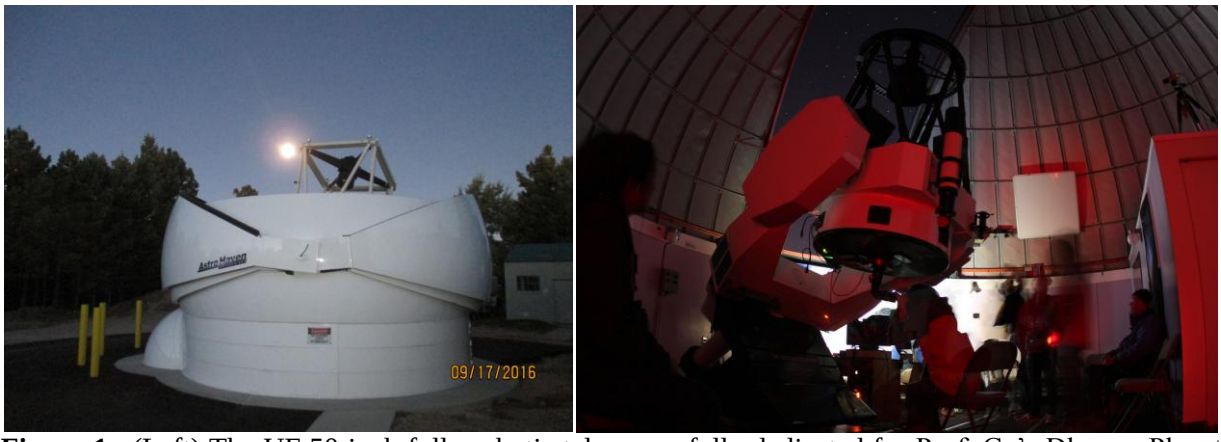

Figure 1. (Left) The UF 50-inch fully robotic telescope, fully dedicated for Prof. Ge's Dharma Planet Survey. (Right) Steward Observatory 32-inch telescope, fully dedicated for teaching and outreach.

telescopes, cutting-edge exoplanet hunting process, and processing and analysis of observational data taking with the telescopes, to inspire interests in science, and to prepare students to participate in research training in the Science Talent Training Program (STTP, https://www.astro.ufl.edu/~jge/outreach.htm) at the University of Florida later this summer or during the next summer. High school students from all grades are encouraged to participate in

Figure 2. Student's tour to Kitt Peak National Astronomical Observatory during the summer camp in 2017.

one of these camps. Middle school students with strong interest in Astronomy who wish to participate in the camp need parent's or counselor's company.

Observatories around Tucson in Arizona, including Mt. Lemmon, are the best sites for astronomical observations on the US continent. They have one of the largest collections of astronomical telescopes in the world. It is called the capital of astronomy. Mt. Lemmon has a

Figure 3. A tour to the University of Arizona's Mirror Lab, where the world's largest telescope mirrors of 8.4 meter diameter are being fabricated.

height of 9157 feet (or 2,791 meter) above the sea level. The sky is very clear and transparent. Seeing is excellent. The website at http://skycenter.arizona.edu/ has more information about public SkyNights year round at Mt. Lemmon.

Figure 4. (Left) Camp students and teachers were gathered together before the UF 50inch telescope on Mt. Lemmon during the summer camp in 2017. (Right). Some of the camp students and Prof. Jian Ge climbed up a mountain on Mt. Lemmon during the summer camp in 2017.

Observation Trainings at Mt. Lemmon Observatory

We plan to teach campers to learn some astronomy basic knowledge, to observe with UF's 50-inch automatic telescope, as well as Steward Observatory's 32-inch telescope, learn Python program basics and conduct processing and analysis with the observed data using Python program. The main observation topics will include imaging and photometry at 32-inch and spectroscopy at 50-inch, which constitute the basic techniques for astronomical observations. We will offer basic courses on how to use Mt. Lemmon telescopes for astronomical observations,

process and analyze observed data, guide the students to use these telescopes for direct imaging,

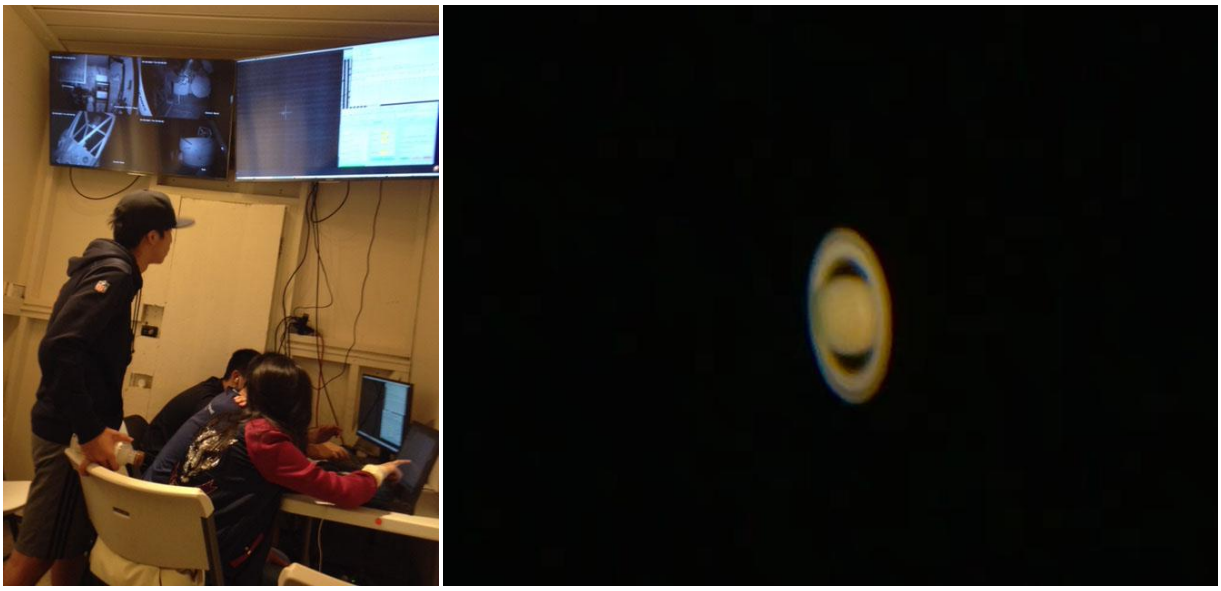

Figure 5. (Left), Students were observing at the UF 50 inch telescope for spectroscopy. (Right). A Saturn image taken by one of the camp students, Mr. Brian Wu, a 2017 Siemens semifinalist using the 32-inch telescope.

photometry, and spectroscopy practice during the nighttime observing sessions, and direct students to conduct processing and analysis of observed data. Students will also witness how stellar spectral measurements with the 50-inch telescope and the cutting-edge TOU Doppler spectrograph are turned into precision radial velocity data, leading to possible planet detections. Detection of low-mass exoplanets, especially habitable planets, around nearby stars is one of the most frontier research areas in science to address one of mankind's fundamental questions, "Are we alone?" At the conclusion of the summer camp, students will present their observations and their projects at a symposium held at the hosting hotel in Arizona and get awarded with certificates.

For the STTP students, Access to UF's 50-inch telescope will enable them to link their lab experiments at UF to astronomical observations using the cutting-edge TOU Doppler spectrograph at the 50-in telescope, understand the physics and engineering associated with exoplanet research, and will enable students to undertake authentic research projects with the potential for scientific publication.

After students from both camps have been properly trained at the observatory, they will be given the opportunity within one year of the camp to submit regular requests for observing nearby bright targets using the 50-inch telescope during the remainder of the summer camp and also throughout the year for their scientific research after they graduate from the camp. Prof. Jian Ge will guide and help them develop doable observing projects. After the requests are reviewed and accepted by Prof. Ge, the proposed targets will be placed in the twilight observation queue and get observed. Students can use the data for their scientific research projects, including possible exciting discoveries of new exoplanets, brown dwarfs, and stellar companions around nearby stars, study of stellar compositions, star spot activities, and stellar pulsations after they complete

their summer training. High school students can be expected to utilize data they obtain post-Camp in competitive national science competitions (such as state science fair, Siemens Competition, Intel International Science and Engineering Fair, and Regeneron Science Talent Search). Nine of the high students in the summer camp in 2017 won the semifinal awards in Siemens Competition in Math, Science and Technology and one camp senior student won a Regeneron Science Talent Search scholar award in 2018. Four camp seniors got early acceptance to Cambridge, Oxford Universities, and George Tech, respectively, in 2018.

In order to make this camp sustainable for years to come and improve its quality, we are accepting donations from interested parties. The donation funds will be used to renovate three

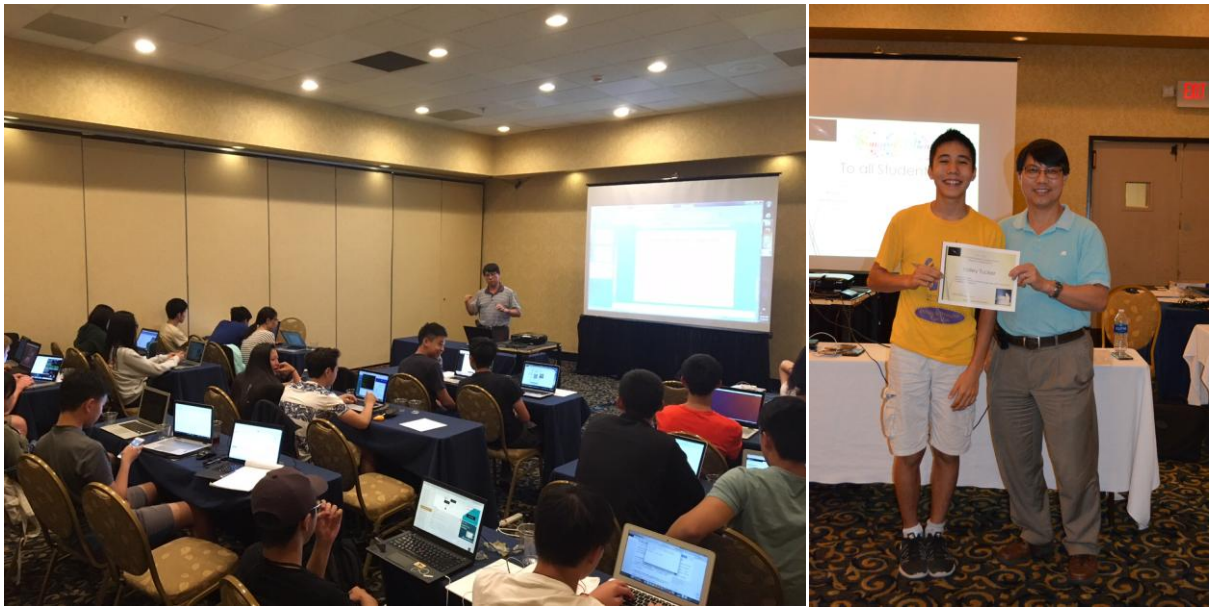

Figure 6. (Left). An astronomical lecture taught by Prof. Jian Ge. (Right). The award ceremony for student's camp certificates.

rooms eastside of the 50-inch telescope control room fully dedicated for camp students to observe, process and analyze data, upgrade the telescope control system, and establish an automatic program to allow summer camp students to access the 50-inch telescope during the academic year for monitoring their science targets and processing data on line for possible new discoveries for their science projects. Please contact Prof. Ge at astrojge@gmail.com directly for possible donations.

Dr. Jian Ge's Biography

Dr. Jian Ge is a professor of Astronomy at the University of Florida since 2004 He was University of Florida Research Foundation (UFRF) professor from 2010 to 2013, assistant professor at Pennsylvania State University from 2000 to 2004, postdoc research staff fellow at Lawrence Livermore National Lab from 1998 to 2000. He obtained his Ph.D in Astronomy from the University of Arizona in 1998 and his BSc in theoretical physics from University of Science and Technology of China in 1989.

Dr. Ge is the founder and principal investigator of the on-going Dharma Planet Survey of Habitable Planets Around Nearby Stars since 2010. He was the founder and principal investigator of the Multi-object APO Radial Velocity Exoplanet Large-area Survey (MARVELS) of the Sloan Digital Sky Survey III program ($47M, http://sdss3.org), and a management committee member from 2006 to 2015. In 2016, Dr. Ge became the first Chinese Astronomer to discover an exoplanet. He is a ground-based radial velocity follow-up team member of the NASA *TESS* Space Mission ($350M, 2011-present). He has been an advisory committee member of Chinese Thirty-Meter-Telescope Project since 2010, an oversea review panel member of Chinese Academy of Sciences since 2015, an associate editor of Chinese Science since 2012, an international editorial board member of Chinese Journal of Polar Research since 2014, and a guest professor of University of Science and Technology of China since 2007. He was a member of the international collaboration team on galaxy formation and active galaxy nuclei, Chinese Academy of Sciences and National Bureau of Foreign Experts from 2009 to 2014.

Dr. Ge's primary research interests include exoplanet, brown dwarf and binary detection and characterization, astronomical instrumentation and technology development, and quasar absorption line system study. He has published over 300 papers and abstracts. His team discovered three new planets, 16 new brown dwarfs, and over 400 new binaries in the MARVELS early processed data (SDSS DR12). His team also discovered over 700 of rare quasar 2175 Å dust absorbers at z = 0.7-2.5 in the SDSS data, found molecular hydrogen in four high-redshift damped Lyman alpha quasar absorbers, and measured Cosmic Microwave Background Radiation temperatures in the early universe. His team also discovered a planetesimal infall on to a very hot and young star. He and his collaborators discovered a rare event of a star torn apart by a black hole. The 8^{th} order image mask concept proposed by him and his collaborators is one of the leading concepts for the NASATPF-C mission in 2006.

Dr. Ge has trained 11 PhDs and 13 postdocs in Astronomy, and also trained 42 graduate students, 54 undergraduate students and 47 high school students since 2000. 11 of former group members are assistant or associate professors at universities such as Penn State, Notre Dame, Nanjing University, Air Force Academy, San Francisco State University, Polar Research Institute of China, and Indian Institute of Astrophysics. Three of his former group members are scientists at NASA centers. Two former high school students are attending Yale. Two are attending Caltech. One is attending MIT. One is attending Cornell, and one attended Duke. Four of the senior students from the STTP program got early acceptance to Harvard, Oxford, Cambridge, and George Tech, respectively, in 2018. He also helped guide her daughter in her high school research. Her research paper won Siemens regional finalist (top 30 in the country), Intel Science Talent Search finalist (top 40 in the country), and Intel international science and technology fair finalist. She is attending Harvard University as a sophomore.