

Thomas (Shao-Yu) Lai

Caltech/IPAC

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Education

University of Toledo, USA

Ph.D. in Physics & Astronomy, 2014–2021

Advisor: [Dr. J.D.T Smith](#)

National Central University, Taiwan

B.A. in Space Science, 2011

Professional Experience

Postdoctoral Scholar, Caltech/IPAC, CA

2021–*present*

Advisor: Dr. Lee Armus

Keck Visiting Scholar, Keck Observatory, HI

2018

Mentor: Dr. Carlos Alvarez

Project: *Updating DEIMOS Throughput Curves with 16 Years of Observations*

UT University Fellow, University of Toledo, OH

2015–2021

Advisor: [Dr. J.D.T Smith](#)

Project: *Characterizing Properties of Small Dust Grains Across Different Galaxies*

Doreen and Lyman Spitzer Graduate Fellow, University of Toledo, OH

2015

Advisor: [Dr. Adolf Witt](#)

Project: *The Extended Red Emission in IC 59 and IC 63*

The Connection between DIBs and ERE

Research Assistant, ASIAA, Taiwan

2013–2014

Advisor: [Dr. Ciska Kemper](#), [Dr. Masaaki Otsuka](#), and [Dr. Sundar Srinivasan](#)

Project: *Near-infrared Photometry of Evolved Asymptotic Giant Branch Stars in M33*

Corporal, The Republic of China Army, Taiwan

2012

Research Assistant, National Central University, Taiwan

2011

Advisor: [Dr. Chung-Ming Ko](#)

Project: *2MASS Whole Sky Star Count*

Scientific Presentations

Talks:

- “Tracing AGN Feedback on the Star-Forming ISM in NGC 7469 with JWST”
ASIAA Seminar, Taipei, Feb 23, 2023
- “Tracing AGN Feedback on the Star-Forming ISM in NGC 7469 with JWST”
STScl JWST First Result Conference, Dec 14, 2022
- “Tracing AGN Feedback on the Star-Forming ISM in NGC 7469 with JWST”
IRSTIG Webinar, virtual, Nov 7, 2022
- “Probing the Resolved Dusty Universe with JWST”
NTU seminar, virtual, Jan 4, 2022
- “How to Make Good Plots”
Python Visualization Workshop, Toledo, OH, Aug 2, 2021

- “All the PAHs: Exploring Small Dust Grains In Galaxies”
GOALS workshop, virtual, Jul 21, 2021
- “Understanding small dust grains in different interstellar environments”
AAS dissertation talk, Hawaii, Jan 6, 2020
- “Outreach talk: DEIMOS Throughput After 16 Years of Operations”
Keck Visiting Scholar Party, Keck observatory, Dec 6, 2018
- “DEIMOS Throughput After 16 Years of Operations”
Keck Visiting Scholar Presentation, Keck observatory, Dec 5, 2018
- “Exploring Small Dust Grains Across Different Interstellar Environments”
Astronomy Seminar, Keck observatory, Nov 19, 2018
- “Extended Red Emission in IC 59 and IC 63”
Astronomy Seminar, JAXA, Japan, Jun 13, 2017
- “Extended Red Emission in IC63 & IC59: How Does it Produce?”
Astronomy Seminar, National Central University, Dec 31, 2015
- “The Mass Loss from Asymptotic Giant Branch Stars in M33”
The Astronomical Society of the Republic of China Annual Meeting, May 23–25, 2014
- “Near-Infrared Photometry of Evolved Stars in the Nearby Galaxy M33”
ASIAA Summer Student Presentation, Aug 29, 2013

Posters:

- “A JWST Study of the Starburst-AGN Connection in Merging Luminous Infrared Galaxies”
AAS240, Pasadena, CA, Jun 12–16, 2022
- “All the PAHs: a Spitzer–AKARI Cross-Archival Spectroscopic Survey of Aromatic Emission in Galaxies”
Dusting the Universe, The University of Arizona, Tucson, AZ, Mar 4–8, 2019
- “Near-Infrared Photometry of Evolved Stars in The Nearby Galaxy M33”
Science Eyes and Minds towards Cosmic Horizon, Sokendai, Japan, Nov 11–15, 2013
- “The Information of Milky Way from 2MASS Whole Sky Star Counts: the Bimodal Color Distributions”
IAU 28th General Assembly, Beijing, China, Aug 20–24, 2012

Article:

- IRSIG newsletter - “[Revealing All the PAHs in Galaxies with an AKARI-Spitzer Survey](#)”

Workshops:

- “Python in Astronomy 2018”, Flatiron Institute, NY, Apr 30– May 4, 2018
- “PAHs in the ISM: Observational, Experimental and Computational Tools”, Les Houches, France, Apr 2–6, 2018
- “ALMA/VLA/VLBA workshop”, University of Michigan, Mar 7, 2017
- “SciCoder 8”, Yale University, Aug 1–5, 2016

Honors and Awards

2022	HST GO30 Grant <i>STScI</i>
2021	JWST GO1 Grant <i>STScI</i>
2019	Award for Best Graduate Student Presentation (\$125) <i>University of Toledo Astronomy Journal Seminar</i>
2019	FAMOUS travel grant (\$500) <i>American Astronomical Society</i>
2019	Graduate Research Scholar Travel Award (\$500) <i>College of Natural Science & Mathematics, University of Toledo</i>
2018	AAS Travel Grant (\$1,607) <i>American Astronomical Society</i>
2016	Award for Best Graduate Student Presentation (\$250) <i>University of Toledo Astronomy Journal Seminar</i>
2015–2019	University Fellowship (4 years - \$72,000 + tuition) <i>Highest award from Graduate School, University of Toledo</i>
2014	Doreen and Lyman Spitzer Graduate Fellowship in Astropysics (\$9,000) <i>Department of Physics and Astronomy, University of Toledo</i>
2008	Outstanding Award <i>National Central University</i>

Successful Observing Proposal

- **HST GO30-mid:** *From Galactic Cores to the Cosmic Web – A Study of Feedback and Multiphase Galactic Winds with HST and JWST*, 2022 (PI: U, V)
- **ALMA Cyc9:** *Heating and Cooling of the Interstellar Medium in Dusty Galaxies at Cosmic Noon*, 2022 (PI: McKinney, J)
- **HST GO30:** *Linking the UV Bump with PAHs in Low Metallicity Starburst II Zw 40*, 2022 (PI: Lai, T)
- **HST GO29:** *In the Belly of the Beast: Star Cluster Formation and Evolution in the Centers of local LIRGs*, 2021 (PI: Evans, A)
- **HST GO30:** *How Do the Small Survive: PAH's in Low Metallicity Starburst II Zw 40*, 2020 (PI: Lai, T)
- **JWST GO1:** *The Vanishing Act: PAHs and Heavy Element Abundance in M101*, 2020 (PI: Smith, JD)
- **JWST ERS 1288:** *Radiative Feedback from Massive Stars as Traced by Multiband Imaging and Spectroscopic Mosaics*, 2018 (PI: Berne, O)
- **Discovery Channel Telescope / DeVeny Spectrograph:** *The search of connection between Diffuse Interstellar Bands and Extend Red Emission*, 2017 (2017Q4T01), 1 full night (PI: Lai, T)

- **Keck/DEIMOS: Potential Connection Between DIBs and ERE in the Reflection/Emission Nebula IC 63,** 20170716, 1 full night (PI: Alvarez, C)
- **Discovery Channel Telescope / DeVeny Spectrograph: The search of connection between Diffuse Interstellar Bands and Extend Red Emission,** 2016 (2016Q3T02), 2 full nights (PI: Lai, T)
- **SMA (The Submillimeter Array): Using SMA to observe FU Orionis stars RNO 1C/1B,** 1 full night (PI: Lai, T)

Teaching Experience

- Graduate Teaching Assistant, Fall 2014, Summer 2016, Summer 2018, and Summer 2019

Skills

- Programming: Python, IDL, IRAF, SExtractor, HTML, \LaTeX , SQL
- Operating System: Mac OS, Linux, Windows

Publication

First/Second author:

- **GOALS-JWST: Mid-Infrared Spectroscopy of the Nucleus of NGC 7469**
Armus, L, **Lai, T.S.-Y.** et al. (submitted to ApJL)
- **GOALS-JWST: Tracing AGN Feedback on the Star-Forming ISM in NGC 7469**
Lai, T.S.-Y., Armus, L et al. (ApJL in press)
- **GOALS-JWST: Resolving the Circumnuclear Gas Dynamics in NGC 7469 in the Mid-infrared**
U, V, **Lai, T.S.-Y.** et al., 2022 ApJL 940 L5
- **All the PAHs: an AKARI-Spitzer Cross-Archival Spectroscopic Survey of Aromatic Emission in Galaxies**
Lai, T.S.-Y., Smith, J.D.T, Baba, S, Spoon, H.W.W, Imanishi, 2020ApJ, 905, 55
- **The Observational Constraints of the Extended Red Emission**
Witt, A.N, **Lai, T.S.-Y.**, Astrophysics and Space Science Journal, 2020Ap&SS.365.58W
- **Are the Carriers of Diffuse Interstellar Bands and Extended Red Emission the Same?**
Lai, T.S.-Y., Witt, A.N, Alvarez, C, Cami, J, 2020MNRAS.492.5853L
- **Extended Red Emission in IC59 and IC63**
Lai, T.S.-Y., Witt, A.N, Crawford, K, 2017MNRAS.469.4933L
- **The Information of The Milky Way from Two Micron All Sky Survey Whole Sky Star Count: The Bimodal Color Distributions**
Chang, C.K.,**Lai, S.Y.**, Ko, C.M. & Peng, T.H., 2012, Astrophysical Journal, 759, 94

Others:

- GOALS-JWST: Hidden Star Formation and Extended PAH Emission in the Luminous Infrared Galaxy VV 114
Evans, E.,..., Lai, T.S.-Y., 2022ApJ, 940L, 8E
- GOALS-JWST: Unveiling Dusty Compact Sources in the Merging Galaxy IIZw096
Inami, H.,..., Lai, T.S.-Y., 2022ApJ, 940L, 6I
- GOALS-JWST: Revealing the Buried Star Clusters in the Luminous Infrared Galaxy VV 114
Linden, S.,..., Lai, T.S.-Y. (submitted to ApJL)
- GOALS-JWST: NIRC2 and MIRI Imaging of the Circumnuclear Starburst Ring in NGC 7469
Bohn, T.,..., Lai, T.S.-Y. (submitted to ApJL)
- Characterizing Compact 15-33 GHz Radio Continuum Sources in Local U/LIRGs
Song, Y.,..., Lai, T.S.-Y., 2022ApJ, 940, 52S
- PDRs4All: A JWST Early Release Science Program on Radiative Feedback from Massive Stars
Berné, O.,..., Lai, T.S.-Y., PASP, 134, 054301

Service and Outreach

- Coordinator, *Python Visualization Workshop*, Aug 2, 2021
- Referee, *The Astrophysical Journal*, 2020-present
- Builder, AKARI-Spitzer Extragalactic Spectral Survey (ASESS), 2020-present
- Deputy Science Coordinator, the ALESS team, 2017-present
- Conference for Undergraduate Women in Physics (CUWiP), Jun 2018
- 50th anniversary of the Ritter Observatory, Oct 2017
- Cedar Point Physics, Science and Math Week, May 2016
- Total Lunar Eclipse Outreach Program, Sep 2015