

YUN-TING CHENG

CONTACT INFORMATION

California Institute of Technology
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Taiwan Citizenship, US Permanent Resident (Green Card holder)

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PROFESSIONAL EXPERIENCE

California Institute of Technology October 2021 - present
Postdoctoral Researcher (Advisor: Dr. Olivier Doré)

EDUCATION

California Institute of Technology September 2015 - June 2021
Ph.D. in Physics (Advisor: Prof. Jamie Bock)
Thesis: [Cosmology and Astrophysics with Intensity Mapping](#)

California Institute of Technology September 2015 - June 2019
M.S. in Physics

National Taiwan University September 2010 - June 2014
B.S. in Physics

RESEARCH INTERESTS

observational cosmology, intensity mapping, large-scale structure, extragalactic background light, intra-halo light, data analysis techniques for cosmological surveys

RESEARCH EXPERIENCE

California Institute of Technology Pasadena, CA
Postdoctoral Researcher (Advisor: Dr. Olivier Doré) October 2021 - Present

- **Galactic Extinction Modeling**
(collaborators: Brandon Hensley, Olivier Doré, Tzu-Ching Chang)
 - Building Galactic dust extinction map

- **Data-driven Cosmology from 3D Light Cones**
(collaborators: Benjamin Wandelt, Olivier Doré, Tzu-Ching Chang)
 - Developing a data-driven method to constrain cosmology with spectral imaging data

- **Intra-halo Light Signal in the Extragalactic Background**
(collaborators: Jamie Bock)
 - Modeling the non-linear clustering and the intra-halo light in the near-infrared background

Graduate Research Assistant (Advisor: Prof. Jamie Bock) September 2015 - June 2021

- **Intensity Mapping**
 - Developing analysis algorithms to solve the line blending problem in line intensity mapping
 - Establishing the formalism of optimal mapping strategy for large-scale structure survey
 - Modeling galaxy-intensity mapping cross correlation for SPHEREx

- **CIBER** (Cosmic Infrared Background Experiment)
 - Studying intra-halo light with stacking analysis on CIBER images
 - Building CIBER analysis pipeline and characterizing noise and systematic effects

- **TIME** (Tomographic Ionized Carbon Intensity Mapping Experiment)
 - Simulating the signal and foregrounds for TIME analysis pipeline
 - Developing foreground mitigation techniques
 - Analyzing TIME instrument data
 - Helping with instrument deployment at the ARO 12m telescope

Academia Sinica of Astronomy and Astrophysics (ASIAA) Taipei, Taiwan
Research Assistant (Advisor: Dr. Tzu-Ching Chang) May 2014 - July 2015

- Developing foreground mitigation technique for line intensity mapping

Summer Student (Advisor: Dr. Sheng-Yuan Liu, Dr. Yu-Nung Su, Mr. I-Ta Hsieh) July 2013 - August 2013

- Modeling the starless core with radiative transfer

PRESENTATIONS

Conference/Seminar Presentations:

- Caltech ObsCos Seminar Caltech, CA, Oct, 2022
- Columbia Cosmology Group Seminar Columbia, NY, Aug, 2022
- NYU CCPP Seminar NYU, NY, Aug, 2022
- ICAP seminar (virtual) IAP, Paris, Jun, 2022
- Cosmology from Home (virtual), Jun, 2022
- ASIAA Seminar ASIAA, Taiwan, May, 2022
- Cross Correlations with CHORD Workshop (virtual), Oct, 2021
- SUBLIME Workshop (virtual), Oct, 2021
- IRSIG Webminar (virtual), Oct, 2021
- KICP Line Intensity Mapping Workshop (virtual) Chicago, IL, Jul, 2021
- ASIAA Seminar (virtual) ASIAA, Taiwan, Mar, 2021
- Caltech ObsCos Seminar (virtual) Caltech, CA, Feb, 2021
- UChicago KICP Seminar (virtual) Chicago, IL, Jan, 2021
- 237th AAS Meeting (virtual), Jan, 2021
- Berkeley BCCP Seminar (virtual) Berkeley, CA, Dec, 2020
- CCA Flatiron Institute Cosmology Group Meeting (virtual) CCA, NY, Oct, 2020
- OSU CCAPP Seminar (virtual) OSU, OH, Oct, 2020
- Johns Hopkins U Cosmology/GW Journal Club (virtual) JHU, MD, Oct, 2020
- UPenn Astronomy Seminar (virtual) UPenn, PA, Sep, 2020
- Caltech ObsCos Seminar (virtual) Caltech, CA, Sep, 2020
- CCAT-prime Science Working Group Meeting (virtual) Cornell, NY, Sep, 2020
- CCA Flatiron Institute Lunch Talk (virtual) CCA, NY, Sep, 2020
- Caltech ObsCos Seminar Caltech, CA, Feb, 2020
- L2S2 : Lines in the Large Scale Structure Conference Marseille, France, Jul, 2019
- Caltech ObsCos Seminar Caltech, CA, Jun, 2019
- Caltech ObsCos Seminar Caltech, CA, May, 2019
- 233rd AAS Meeting Seattle, WA, Jan, 2019
- Taiwanese Theoretical Astrophysics Workshop ASIAA, Taiwan, Sep, 2018
- ASIAA Seminar ASIAA, Taiwan, Sep, 2018
- Caltech ObsCos Seminar Caltech, CA, Jun, 2018
- Cosmological Signals from Cosmic Dawn to the Present Aspen, CO, Feb, 2018
- Caltech ObsCos Seminar Caltech, CA, Dec, 2017
- Caltech ObsCos Seminar Caltech, CA, Nov, 2016
- Caltech ObsCos Seminar Caltech, CA, Jun, 2016
- Opportunities and Challenges in Intensity Mapping Workshop KIPAC, CA, Mar, 2016
- ASROC Annual Meeting (Taiwanese Astronomical Society) Ilan, Taiwan, May, 2015

Posters:

- Summer School on Large-Scale Structure Berlin, Germany, Jul, 2018

TECHNICAL SKILLS

- Statistical Tools: Bayesian statistics, Markov Chain Monte Carlo, Fisher analysis, Sparse Reconstruction, Machine Learning (with experience in CNN and Machine Learning Explainability)
- Programming Languages: Python (Astropy, emcee, Pandas, scikit-learn, TensorFlow, Keras, seaborn), SQL, IDL, Matlab, C++, Fortran, Latex
- Instrumentation: SOLIDWORKS, machine shop trained

AWARDS AND HONORS

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| Taiwan-Caltech Ministry of Education Fellowship | Sep 2015 - Aug 2019 |
| Dean's Award of College of Science, National Taiwan University | Jun 2014 |

SERVICE AND OUTREACH

Referee for the Astrophysical Journal and the Astrophysical Journal Letters	Sep 2021 - present
237th AAS meeting oral session chair	Jan 2021
Leading physics in-class activities at Gabrielino High School, CA	Jan 2020 - Present
233rd AAS meeting poster judge	Jan 2019

REFERENCES

- **James J. (Jamie) Bock**
Professor, California Institute of Technology/Jet Propulsion Laboratory
`jjb@astro.caltech.edu`
- **Tzu-Ching Chang**
Research Scientist, Jet Propulsion Laboratory/California Institute of Technology
`tzu-ching.chang@jpl.nasa.gov/tzu@caltech.edu`
- **Olivier P. Doré**
Research Scientist, Jet Propulsion Laboratory/California Institute of Technology
`olivier.p.dore@jpl.nasa.gov/odore@caltech.edu`
- **Abigail T. Crites**
Assistant Professor, Cornell University
`atc72@cornell.edu`
- **Benjamin D. Wandelt**
Professor, Institut d'Astrophysique de Paris/Center for Computational Astrophysics, Flatiron Institute
`bwandelt@iap.fr`

PUBLICATIONS

See [ADS](#), [Google Scholar](#), and [INSPIRE](#) for the complete publication list

First-author papers

- “*Near-infrared Extragalactic Background Light Fluctuations on Nonlinear Scales*”
Y.-T. Cheng, and J. J. Bock
2022; ApJ accepted; arXiv:2207.13712
- “*Cosmic Near-Infrared Background Tomography with SPHEREx Using Galaxy Cross-Correlations*”
Y.-T. Cheng, and T.-C. Chang
2022, [ApJ](#) 925, 136; arXiv:2109.10914
- “*Probing Intra-Halo Light with Galaxy Stacking in CIBER Images*”
Y.-T. Cheng, et al. (CIBER Collaboration)
2021, [ApJ](#), 919, 69; arXiv:2103.03882
- “*Phase-Space Spectral Line De-confusion in Intensity Mapping*”
Y.-T. Cheng, T.-C. Chang, and J. J. Bock
2020, [ApJ](#), 901, 142; arXiv:2005.05341
- “*Optimally Mapping Large-Scale Structures with Luminous Sources*”
Y.-T. Cheng, R. de Putter, T.-C. Chang, and O. Doré
2019, [ApJ](#), 877, 86; arXiv:1809.06384
- “*Spectral Line De-Confusion in an Intensity Mapping Survey*”
Y.-T. Cheng, T.-C. Chang, J. J. Bock, C. M. Bradford, and A. R. Cooray
2016, [ApJ](#), 832, 165; arXiv:1604.07833

Co-author papers

- “*Inferred Measurements of the Zodiacal Light Absolute Intensity through Fraunhofer Absorption Line Spectroscopy with CIBER*”
P. M. Korngut, et al., 2022, [ApJ](#), 926, 133; arXiv:2104.07104
- “*Probing Cosmic Reionization and Molecular Gas Growth with TIME*”
G. Sun, T.-C. Chang, et al., 2021, [ApJ](#), 915, 33; arXiv:2012.09160
- “*Superresolution Reconstruction of Severely Undersampled Point-spread Functions Using Point-source Stacking and Deconvolution*”
T. Symons, M. Zemcov, et al., 2021, [ApJS](#), 252, 24; arXiv:2102.01094
- “*Hafnium Films and Magnetic Shielding for TIME, A mm-Wavelength Spectrometer Array*”
J. Hunacek, et al., 2018, [JLTP](#), 193, 893
- “*A Foreground Masking Strategy for [C II] Intensity Mapping Experiments Using Galaxies Selected by Stellar Mass and Redshift*”
G. Sun, L. Monceli, M. P. Viero, et al., 2018, [ApJ](#), 856, 107; arXiv:1601.10095
- “*Design and fabrication of tes detector modules for the time-pilot [cii] intensity mapping experiment*”
J. Hunacek, et al., 2016, [JLTP](#), 184, 733

Non-refereed review papers / white papers

- “*Tomography of the Cosmic Dawn and Reionization Eras with Multiple Tracers*”
T.-C. Chang, et al., 2019, Astro2020 White Paper, [arXiv: 1903.11744](#)
- “*Line-Intensity Mapping: 2017 Status Report*”
E. D. Kovetz, M. P. Viero, et al., 2017, [arXiv:1709.09066](#)

Conference proceedings

- “*A status update on TIME: a mm-wavelength spectrometer designed to probe the Epoch of Reionization*”
A. Crites, et al., 2020, [SPIE](#), 114530G
- “*Detector modules and spectrometers for the TIME-Pilot [CII] intensity mapping experiment*”
J. Hunacek, et al., 2016, [SPIE](#), 99140L