YUN-TING CHENG

CONTACT INFORMATION

California Institute of Technology
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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 intro-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:

- 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

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.caltch.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 dAstrophysique 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

- *"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. Moncelsi, 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