

Dongwoo Chung

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EDUCATION

PhD in Physics, Stanford University 2014–2020

Thesis: Line-intensity mapping with the CO Mapping Array Pathfinder and beyond

Advisor: Prof Sarah Church

AB in Physics, Princeton University (*magna cum laude*) 2010–2014

Thesis: Characterization of a microwave SQUID multiplexer *Advisor:* Prof Lyman Page

RESEARCH

Interests: spectral line-intensity mapping; cosmic star-formation history, galaxy formation, epoch of reionisation; empirical modelling of galaxy–halo connection; radio and mm-wave astronomical instrumentation and observational techniques.

Experience (selected):

CITA–Dunlap Institute Research Fellow, University of Toronto Nov 2020–present

- COMAP: signal forecasting, analysis and interpretation of early science results
- TIME: part of site team for 2021–22 season; instrument support, analysis of calibration and commissioning observations, simulations of signal observations
- CCAT-prime: continued work on [C II] halo models and survey projections
- Advisory discussions on simulations, analysis with SPT-SLIM, EXCLAIM teams

Research assistant w/ Prof Sarah Church, Stanford University Mar 2015–Sep 2020

- Argus: commissioning of W-band focal plane array for Green Bank Telescope
- COMAP: signal forecasting, commissioning data analysis, and miscellaneous hardware/software tasks for dedicated $z \sim 3$ CO line-intensity mapping instrument
- CCAT-prime: signal and sensitivity forecasting for [C II] line-intensity survey

Student researcher in Gravity Group, Princeton University *intermittent, 2011–2014*
(w/ Prof Suzanne Staggs 2011–2012, w/ Prof Lyman Page 2013–2014)

- Demonstration of microwave SQUID multiplexer in basic cryogenic operation
- Measurement of MuSE bolometer frequency-dependent impedance
- Recording and analysis of SQUID bias noise in ACTPol lab tests

TEACHING AND MENTORING (SELECTED)

Summer undergraduates mentored:

- Natalie Faraj (U of Toronto, CITA SURF) May–Aug 2023
- Patrick Horlville (McGill, CITA SURF; co-sup. w/ Prof J R Bond) May–Aug 2022
- Ishika Bangari (U of Toronto; SURP 2021 poster hon. mention) Jun–Aug 2021
- Lisa Nasu-Yu (U of Toronto; co-supervised w/ Prof Abigail Crites) Jun–Aug 2021
- Meredie Cohen (Brown, worked at Stanford; co-sup. w/ Prof S Church) Jun–Aug 2018

Stanford teaching assistantships:

- Electricity, Magnetism, and Optics Lab (PHYSICS 24) Jan–Mar 2019
- Introduction to Modern Physics (PHYSICS 70) Sep–Dec 2016
- Electricity and Magnetism Lab (PHYSICS 44) Mar–Jun 2015

ACADEMIC PRESENTATIONS (SELECTED)

Contributed presentations and department seminars:

—Stanford/SLAC, KIPAC@20 conference	Sep 2023
—UCSB, Dept of Physics, Astro Lunch	Feb 2023
—KITP, Co-evolution of the Cosmic Web and Galaxies across Cosmic Time	Feb 2023
—University of Toronto, Pan-Canadian EoR Focus Group	Jan 2023
—Caltech, Dept of Astronomy, Astronomy Tea talk	Oct 2022
—Cornell University, Dept of Astronomy, Galaxy lunch	Sep 2022
—McGill University, CMB+EoR workshop	Jul 2022
—Stanford University, KIPAC Tea talk	Jun 2022
—AAS 240th Meeting (Pasadena, California)	Jun 2022
—CASCA 2022 Annual General Meeting (University of Waterloo, <i>virtual</i>)	May 2022
—New York University, CCPP Astrophysics Seminar	Apr 2022
—Annual CCAT-prime/FYST Collaboration Meeting (Cornell/Köln, <i>virtual</i>)	Apr 2022
—Flatiron CCA, Tri-State Cosmology × Data Science	Apr 2022
—University of Chicago, KICP Line-intensity Mapping Workshop (<i>virtual</i>)	Jun 2021
—University of Toronto, CITA seminar	Nov 2020
—CfA, Harvard & Smithsonian, Special SMA talk	Dec 2019
—Johns Hopkins University, Dept of Phys & Astro, Cosmology/HEP seminar	Oct 2019
—Cornell University, Dept of Astronomy, Astrophysics lunch	Oct 2019
—Princeton University, Dept of Astrophysical Sciences, Cosmology seminar	Oct 2019
—Aix-Marseille Université, ‘L2S2’ (Lines in the LSS) conf. (<i>two talks</i>)	Jul 2019
—U. of Virginia, Radio/mm Astrophysical Frontiers in the Next Decade (<i>poster</i>)	Jun 2019
—Aspen Ctr for Phys, Cosmological Signals from Cosmic Dawn to the Present	Feb 2018
—Johns Hopkins University, Second Annual Intensity Mapping Workshop	Jun 2017

Invited talks:

—Present and Future of Line-Intensity Mapping (MPIA, Garching)	Apr 2023
—SPT-SLIM collaboration meeting (KICP, University of Chicago)	Jul 2022
—McGill University, Cross-correlations with CHORD Workshop (<i>virtual</i>)	Oct 2021
—Annual CCAT-prime Collaboration Meeting (University of Waterloo, <i>virtual</i>)	Apr 2020
—CCAT-prime / Chile Workshop (Cerro Calán)	Apr 2019

OUTREACH AND SERVICE (SELECTED)

CITA Pan-Canadian Reionisation Workshop co-organiser	Aug 2023
UofT Astronomy Community Climate Committee	2022–present
UofT DADDAA Graduate Admissions Committee	2021–2022
CITA National Jamboree co-organiser	2021, 2022, 2023
UofT Astronomy and Space Exploration Society ‘Star Talk’ speaker	Aug 2021
Stanford Physics Equity and Inclusion Committee	2017–2019
Kavli Institute for Particle Astrophys. and Cosmology (KIPAC) Outreach	2015–2019
<i>Referee service: ApJ (2020), MNRAS (2022), Phys Rev D (2023)</i>	

AWARDS AND HONOURS

Vincent and Beatrice Tremaine Postdoctoral Fellowship , CITA, U of Toronto	2022–2023
CITA & Dunlap Postdoctoral Fellowships , University of Toronto	2020–2025
KIPAC Giddings Graduate Student Fellowship , Stanford University	2014–2015
Allen G. Shenstone Prize in Physics , Princeton University	2014
Joseph Henry Fellowship & Treiman Fellowship , Princeton University	2013
Kusaka Memorial Prize in Physics , Princeton University	2012, 2013

LIST OF PUBLICATIONS, PREPRINTS, AND PROCEEDINGS

First-author, refereed: (*in reverse order of preprint announcement*)

1. Chung, D. T., ‘Constraining the halo-ISM connection through multi-transition carbon monoxide line-intensity mapping’, 2023, submitted to JCAP [arXiv:2309.03184]
2. Chung, D. T., Bangari, I., Breysse, P. C., Ihle, H. T. et al. (COMAP Collaboration), ‘The deconvolved distribution estimator: enhancing reionisation-era CO line-intensity mapping analyses with a cross-correlation analogue for one-point statistics’, 2023, MNRAS, 520, 5305 [DOI: 10.1093/mnras/stad359]
3. Chung, D. T., ‘Leveraging cross-correlations and linear covariance-based filtering for line-intensity map reconstructions at linear scales’, 2023, Phys Rev D, 107, 023509 [DOI: 10.1103/PhysRevD.107.023509]
4. Chung, D. T., ‘Exploration of 3D wavelet scattering transform coefficients for line-intensity mapping measurements’, 2022, MNRAS, 517, 2 [DOI: 10.1093/mnras/stac2662]
5. Chung, D. T., ‘Cross-correlations between mm-wave line-intensity mapping and weak lensing surveys: preliminary consideration of long-term prospects’, 2022, MNRAS, 513, 4090 [DOI: 10.1093/mnras/stac1142]
6. Chung, D. T. et al. (COMAP Collaboration), ‘COMAP Early Science: V. Constraints and Forecasts at $z \sim 3$ ’, 2022, ApJ, 933, 186 [DOI: 10.3847/1538-4357/ac63c7]
7. Chung, D. T. et al. (COMAP Collaboration), ‘A model of spectral line broadening in signal forecasts for line-intensity mapping experiments’, 2021, ApJ, 923, 188 [DOI: 10.3847/1538-4357/ac2a35]
8. Chung, D. T., ‘A partial inventory of observational anisotropies in line-intensity mapping’, 2019, ApJ, 881, 149 [DOI: 10.3847/1538-4357/ab3040]
9. Chung, D. T., Viero, M. P., Church, S. E., & Wechsler, R. H., ‘Forecasting [C II] line-intensity mapping measurements between the end of reionization and the epoch of galaxy assembly’, 2020, ApJ, 892, 51 [DOI: 10.3847/1538-4357/ab798f]
10. Chung, D. T., Viero, M. P., Church, S. E., Wechsler, R. H. et al. (COMAP Collaboration), ‘Cross-correlating Carbon Monoxide Line-intensity Maps with Spectroscopic and Photometric Galaxy Surveys’, 2019, ApJ, 872, 186 [DOI: 10.3847/1538-4357/ab0027]
11. Chung, D. T., Li, T. Y., Viero, M. P., Church, S. E., & Wechsler, R. H., ‘On estimation of contamination from hydrogen cyanide in carbon monoxide line intensity mapping’, 2017, ApJ, 846, 60 [DOI: 10.3847/1538-4357/aa8624]

Contributing author, refereed:

1. Horlaville, P., Chung, D. T., Bond, J. R., & Liang, L., ‘The informativeness of [C II] line-intensity mapping as a probe of the H I content and metallicity of galaxies at the end of reionization’, 2023, to be submitted to MNRAS [arXiv:2309.15733]
2. Dunne, D. A., Cleary, K. A., Breysse, P. C., Chung, D. T., Ihle, H. T., et al. (COMAP Collaboration), ‘COMAP Early Science: VIII. A Joint Stacking Analysis with eBOSS Quasars’, 2023, submitted to ApJ [arXiv:2304.09832]
3. Liang, L., Feldmann, R., Murray, N., et al. (including Chung, D. T.), ‘[C II] 158 μm emission as an indicator of galaxy star formation rate’, 2023, submitted to MNRAS [arXiv:2301.04149]
4. Breysse, P. C., Chung, D. T., & Ihle, H. T., ‘Characteristic functions for cosmological cross-correlations’, 2023, MNRAS, 525, 1824 [DOI: 10.1093/mnras/stad2350]
5. Viero, M. P., Sun, G., Chung, D. T. et al., ‘The early Universe was dust-rich and extremely hot’,

- 2022, MNRAS Letters, 516, L30 [DOI: 10.1093/mnrasl/slac075]
6. Cleary, K. A., et al. (COMAP Collaboration, including Chung, D. T.), ‘COMAP Early Science: I. Overview’, 2022, ApJ, 933, 182 [DOI: 10.3847/1538-4357/ac63cc]
 7. Lamb, J. W., et al. (COMAP Collaboration, including Chung, D. T.), ‘COMAP Early Science: II. Pathfinder Instrument’, 2022, ApJ, 933, 183 [DOI: 10.3847/1538-4357/ac63c6]
 8. Foss, M. K., Ihle, H. T. et al. (COMAP Collaboration, including Chung, D. T.), ‘COMAP Early Science: III. CO Data Processing’, 2022, ApJ, 933, 184 [DOI: 10.3847/1538-4357/ac63ca]
 9. Ihle, H. T. et al. (COMAP Collaboration, including Chung, D. T.), ‘COMAP Early Science: IV. Power Spectrum Methodology and Results’, 2022, ApJ, 933, 185 [DOI: 10.3847/1538-4357/ac63c5]
 10. Rennie, T. J. et al. (COMAP Collaboration, including Chung, D. T.), ‘COMAP Early Science: VI. A First Look at the COMAP Galactic Plane Survey’, 2022, ApJ, 933, 187 [DOI: 10.3847/1538-4357/ac63c8]
 11. Breyse, P. C. et al. (COMAP Collaboration, including Chung, D. T. as second author), ‘COMAP Early Science: VII. Prospects for CO Intensity Mapping at Reionization’, 2022, ApJ, 933, 188 [DOI: 10.3847/1538-4357/ac63c9]
 12. CCAT-prime collaboration et al. (including Chung, D. T.), ‘CCAT-prime Collaboration: Science Goals and Forecasts with Prime-Cam on the Fred Young Submillimeter Telescope’, 2023, ApJS, 264, 7 [DOI: 10.3847/1538-4365/ac9838]
 13. Seo, Y. M., Majumdar, L., Goldsmith, P. F., et al. (including Chung, D.), ‘An Ammonia Spectral Map of the L1495-B218 Filaments in the Taurus Molecular Cloud: II CCS & HC₇N Chemistry and Three Modes of Star Formation in the Filaments’. 2019, ApJ, 871, 134 [DOI: 10.3847/1538-4357/aaf887]
 14. Ihle, H. T., Chung, D., Stein, G. et al. (COMAP Collaboration), ‘Joint power spectrum and voxel intensity distribution forecast on the CO luminosity function with COMAP’, 2019, ApJ, 871, 75 [DOI: 10.3847/1538-4357/aaf4bc]

Proceedings and non-refereed articles:

1. Karkare, K. S. et al. (including Chung, D. T.), ‘Snowmass 2021 Cosmic Frontier White Paper: Cosmology with Millimeter-Wave Line Intensity Mapping’, 2022, arXiv:2203.07258
2. Silva, M. B. et al. (including Chung, D. T.), ‘Synergies between the COMAP CO Line Intensity Mapping mission and a Ly α galaxy survey: How to probe the early universe with voxel based analysis of observational data’, 2021, arXiv:2111.05354; originally submitted to A&A
3. Choi, S. K. et al. (including Chung, D. T.), ‘Sensitivity of the Prime-Cam Instrument on the CCAT-prime Telescope’, 2020, JLTP, 199, 1089 [DOI: 10.1007/s10909-020-02428-z]
4. Herter, T. et al. (including Chung, D.), ‘The CCAT-Prime Submillimeter Observatory’, 2019, Bulletin of the AAS, 51, 213 [arXiv:1909.02587]
5. Vavagiakis, E. M. et al. (including Chung, D.), ‘Prime-Cam: A first-light instrument for the CCAT-prime telescope’, 2018, Proc SPIE, 10708, 107081U [DOI: 10.1117/12.2313868]
6. Stacey, G. J. et al. (including Chung, D. T.), ‘CCAT-Prime: science with an ultra-widefield submillimeter observatory on Cerro Chajnantor’, 2018, Proc SPIE, 10700, 107001M [DOI: 10.1117/12.2314031]
7. Kovetz, E. D. et al. (including Chung, D.), ‘Line-Intensity Mapping: 2017 Status Report’, 2017, arXiv:1709.09066