Chih-Chun "Dino" Hsu

Center for Astrophysics and Space Sciences, University of California San Diego 9500 Gilman Drive, La Jolla, CA 92093, USA chh194 [at] ucsd [dot] edu https://chihchunhsu.github.io/

EDUCATION

University of California, San Diego, La Jolla, CA, USA

Doctor of Philosophy (Ph.D.) in Physics

Expected August 2022

Thesis: "Kinematics, Multiplicity, Rotational Dynamics, and Population Properties of Ultracool Dwarfs Inferred from High-Resolution Near-Infrared Spectroscopy"

Advisor: Adam J. Burgasser

National Tsing Hua University, Hsinchu, Taiwan

Bachelor of Science (B.S) in Physics

June 2014

RESEARCH INTERESTS

lowest-mass stars; brown dwarfs; exoplanets; medium-/high-resolution spectroscopy; very low-mass binaries; stellar populations; stellar kinematics; stellar rotation

RESEARCH EXPERIENCE

Graduate Research Student

2016-present

Center for Astrophysics and Space Sciences, UC San Diego, La Jolla, CA

Advisor: Adam Burgasser

Research Assistant

2015-2016

Institute of Astronomy, National Tsing Hua University, Hsinchu, Taiwan

Supervisor: Huei-Ru "Vivien" Chen

Undergraduate Research Student

2013-2014

Physics Department, National Tsing Hua University, Hsinchu, Taiwan

Advisor: Kingman Cheung

ACADEMIC HONORS & AWARDS

Cool Stars 21 Travel Grant

July 2022

Cool Stars 21st Meeting, Toulouse, France

Rodger Doxsey Travel Prize

June 2022

AAS 240th Meeting, Pasadena, CA

Awarded for providing graduate students/postdocs within one year of receiving or receipt of their PhD a monetary prize to enable the oral presentation of their dissertation research (transferred from the AAS 239 th Meeting).

Friends of the International Center fellowship

2020

UC San Diego, La Jolla, CA

Awarded for promoting international friendship, understanding, and cooperation.

Carol and George Lattimer Award for Graduate Excellence

2019-

UC San Diego, La Jolla, CA

2020

Awarded to graduate students in the Divisions of Physical Sciences who seek interdisciplinary approaches to problem-solving and have a strong commitment to education, mentorship, and service.

Physics Chair's Challenge Award * 3

2017, 2018, 2022

UC San Diego, La Jolla, CA

Awarded for supporting educational excellence and training for physics students.

Physics Excellence Award

2016

UC San Diego, La Jolla, CA

Awarded to highly qualified students admitted to the Physics PhD program.

College of Science Elite Student Award * 3

2012 - 2014

National Tsing Hua University, Hsinchu, Taiwan

Awarded to the top student of class based on academic achievements.

Academic Achievement Award * 5

2011 - 2014

National Tsing Hua University, Hsinchu, Taiwan Awarded to top 5 % of class.

College of Science Scholarship

2013

National Tsing Hua University, Hsinchu, Taiwan

Awarded to one student in College of Science based on academic achievements.

FIRST AUTHOR **PUBLICATIONS**

- [4] Hsu, C.; Burgasser, A. J.; Theissen, C. A.; Gelino, C. R.; Birky, J. L.; Diamant, S. J. M.; Bardalez Gagliuffi, D. C.; Aganze; C., Blake, C. H., Jacqueline K. Faherty, "The Brown Dwarf Kinematics Project (BDKP). VI. Radial and Rotational Velocities of late-M and L Dwarfs from Keck/NIRSPEC High-Resolution Spectroscopy", in prep.
- [3] Hsu, C.; Burgasser, A. J.; Theissen, C. A.; Birky, J. L.; Aganze; Schmidt, S. J.; C., Blake, C. H.; Covey, K. R., "Ultracool Dwarf Radial and Rotational Velocity Survey with SDSS/APOGEE High-Resolution Spectrometer", in prep.
- [2] **Hsu, C.**: Burgasser, A. J.: Bardalez Gagliuffi, D. C.: Sahlmann, Johannes: Theissen, C. A., "2MASS J21265916+7617440: A Long Period Brown Dwarf Binary System", in prep.
- [1] Hsu, C.; Burgasser, A. J.; Theissen, C. A.; Gelino, C. R.; Birky, J. L.; Diamant, S. J. M.; Bardalez Gagliuffi, D. C.; Aganze; C., Blake, C. H., Jacqueline K. Faherty, "The Brown Dwarf Kinematics Project (BDKP). V. Radial and Rotational Velocities of T Dwarfs From Keck/NIRSPEC High-Resolution Spectroscopy", ApJS 257, 45, December 2021.

AUTHOR **PUBLICATIONS**

- CONTRIBUTING [13] Kiwy, Frank; Faherty, Jacqueline K.; Meisner, Aaron; Schneider, Adam C.; Kirkpatrick, J. Davy; Kuchner, Marc J.; Burgasser, Adam J.; Casewell, Sarah; Kiman, Rocio; Calamari, Emily; Aganze, Christian; Hsu, Chih-Chun; Sainio, Arttu; Thakur, Vinod; The Backyard Worlds: Planet 9 Collaboration, "Discovery of 34 low-mass comoving systems using NOIRLab Source Catalog DR2", AJ, 164, 3, July 2022
 - [12] Aganze, Christian; Burgasser, Adam J; Malkan, Mathew; Theissen, Christopher A; Tejada Arevalo, Roberto A; Hsu, Chih-Chun; Bardalez Gagliuffi, Daniella C; E Ryan, Russell, Jr; Holwerda, Benne, "Beyond the Local Volume II: Population Scaleheights and Ages of Ultracool Dwarfs in Deep HST/WFC3 Parallel Fields", ApJ, 934, 73, July 2022
 - [11] Softich, Emma; Schneider, Adam C.; Patience, Jennifer; Burgasser, Adam J.; Shkolnik, Evgenya; Faherty, Jacqueline K.; Caselden, Dan; Meisner, Aaron M.; Kirkpatrick, J. Davy; Kuchner, Marc J.; Gagne, Jonathan; Bardalez-Gagliuffi, Daniella; Cushing, Michael C.; Casewell, Sarah L.; Aganze, Christian; Hsu,

- Chih-Chun; Andersen, Nikolaj Stevnbak; Kiwy, Frank; Thevenot, Melina; The Backyard Worlds: Planet 9 Collaboration, "CWISE J014611.20-050850.0AB: The Widest Known Brown Dwarf Binary in the Field", ApJL, 922, L12, February 2022
- [10] Faherty, Jacqueline K; Gagne, Jonathan; Popinchalk, Mark; Vos, Johanna M.; Burgasser, Adam J.; Schumann, Jorg; Schneider, Adam C.; Kirkpatrick, J. Davy; Meisner, Aaron M.; Kuchner, Marc J.; Bardalez Gagliuffi, Daniella C.; Marocco, Federico; Caselden, Dan; Gonzales, Eileen C.; Rothermich, Austin; Casewell, Sarah L.; Debes, John H.; Aganze, Christian; Ayala, Andrew; Hsu, Chih-Chun; Cooper, William J.; Smart, R. L.; Gerasimov, Roman; Theissen, Christopher A.; The Backyard Worlds: Planet 9 Collaboration, "A Wide Planetary Mass Companion Discovered Through the Citizen Science Project Backyard Worlds: Planet 9", ApJ, 923, 48, December 2021
- [9] Aganze, Christian; Burgasser, Adam J; Malkan, Mathew; Theissen, Christopher A; Tejada Arevalo, Roberto A; Hsu, Chih-Chun; Bardalez Gagliuffi, Daniella C; E Ryan, Russell, Jr; Holwerda, Benne, "Beyond the Local Volume I: Surface Densities of Ultracool Dwarfs in Deep HST/WFC3 Parallel Fields", ApJ, 924, 144, January 2022
- [8] Schneider, Adam C.; Meisner, Aaron M.; Gagne, Jonathan; Faherty, Jacqueline K.; Marocco, Federico; Burgasser, Adam J.; Kirkpatrick, J. Davy; Kuchner, Marc J.; Gramaize, Leopold; Rothermich, Austin; Brooks, Hunter; Vrba, Frederick J.; Bardalez Gagliuffi, Daniella; Caselden, Dan; Cushing, Michael C.; Gelino, Christopher R.; Line, Michael R.; Casewell, Sarah L.; Debes, John H.; Aganze, Christian Ayala, Andrew; Gerasimov, Roman; Gonzales, Eileen C.; Hsu, Chih-Chun; Kiman, Rocio; Popinchalk, Mark; Theissen, Christopher; Backyard Worlds: The Planet 9 Collaboration, "Ross 19B: An Extremely Cold Companion Discovered via the Backyard Worlds: Planet 9 Citizen Science Project", ApJ, 921, 150, November 2021
- [7] Theissen, C. A.; Konopacky , Q. M.; Lu, J. R.; Kim D.; Zhang, S. Y.; Hsu, C.; Chu, L.; Wei, L., "The 3-D Kinematics of the Orion Nebula Cluster: NIRSPEC-AO Radial Velocities of the Core Population", ApJ, 926, 141, February 2022
- [6] Meisner, Aaron M.; Schneider, Adam C.; Burgasser, Adam J.; Marocco, Federico; Line, Michael R.; Faherty, Jacqueline K.; Kirkpatrick, J. Davy; Caselden, Dan; Kuchner, Marc J.; Gelino, Christopher R.; Gagne, Jonathan; Theissen, Christopher; Gerasimov, Roman; Aganze, Christian; Hsu, Chih-Chun; Wisniewski, John P.; Casewell, Sarah L.; Bardalez Gagliuffi, Daniella C.; Logsdon, Sarah E.; Eisenhardt, Peter R. M., "New Candidate Extreme T Subdwarfs from the Backyard Worlds: Planet 9 Citizen Science Project", ApJ, 915, 120, July 2021
- [5] J. Davy Kirkpatrick; Christopher R. Gelino; Jacqueline K. Faherty; Aaron M. Meisner; Dan Caselden; Adam C. Schneider; Federico Marocco; Alfred J. Cayago; R. L. Smart; Peter R. Eisenhardt; Marc J. Kuchner; Edward L. Wright; Michael C. Cushing; Katelyn N. Allers; Daniella C. Bardalez Gagliuff; Adam J. Burgasser; Jonathan Gagne; Sarah E. Logsdon; Emily C. Martin; James G. Ingalls; Patrick J. Lowrance; Ellianna S. Abrahams; Christian Aganze; Roman Gerasimov; Eileen C. Gonzales; Chih-Chun Hsu; Nikita Kamraj; Rocio Kiman; Jon Rees; Christopher Theissen; Kareem Ammar; Nikolaj Stevnbak Andersen; Paul Beaulieu; Guillaume Colin; Charles A. Elachi; Samuel J. Goodman; Leopold Gramaize; Leslie K. Hamlet; Justin Hong; Alexander Jonkeren; Mohammed Khalil; David W. Martin; William Pendrill; Benjamin Pumphrey; Austin Rothermich; Arttu Sainio; Andres Stenner; Christopher Tanner; Melina

- Thevenot; Nikita V. Voloshin; Jim Walla; Zbigniew Wedracki; "The Field Substellar Mass Function Based on the Full-sky 20-pc Census of 525 L, T, and Y Dwarfs", ApJS, 253, 7, March 2021
- [4] Sahlmann, Johannes; Dupuy, Trent J.; Burgasser, Adam J.; Filippazzo, Joseph C.; Martín, Eduardo L.; Bardalez Gagliuffi, Daniella C.; Hsu, Chih-Chun; Lazorenko, Petro F.; Liu, Michael C., "Individual Dynamical Masses of DENIS J063001.4—184014AB Reveal A Likely Young Brown Dwarf Triple", MNRAS, 500, 5453, January 2021
- [3] Meisner, Aaron M.; Faherty, Jacqueline K.; Kirkpatrick, J. Davy; Schneider, Adam C.; Caselden, Dan; Gagné, Jonathan; Kuchner, Marc J.; Burgasser, Adam J.; Casewell, Sarah L.; Debes, John H.; Artigau, Étienne; Bardalez Gagliuffi, Daniella C.; Logsdon, Sarah E.; Kiman, Rocio; Allers, Katelyn; Hsu, Chih-Chun; Wisniewski, John P.; Allen, Michaela B.; Beaulieu, Paul; Colin, Guillaume Durantini Luca, Hugo A.; Goodman, Sam; Gramaize, Léopold; Hamlet, Leslie K.; Hinckley, Ken; Kiwy, Frank; Martin, David W.; Pendrill, William; Rothermich, Austin; Sainio, Arttu; Schümann, Jörg; Andersen, Nikolaj Stevnbak; Tanner, Christopher; Thakur, Vinod; Thévenot, Melina; Walla, Jim; Wedracki, Zbigniew; Aganze, Christian; Gerasimov, Roman; Theissen, Christopher; The Backyard Worlds: Planet 9 Collaboration, "Spitzer Follow-up of Extremely Cold Brown Dwarfs Discovered by the Backyard Worlds: Planet 9 Citizen Science Project", ApJ, 889, 123, August 2020
- [2] Schneider, Adam C.; Burgasser, Adam J.; Gerasimov, Roman; Marocco, Federico; Gagné, Jonathan; Goodman, Sam; Beaulieu, Paul; Pendrill, William; Rothermich, Austin; Sainio, Arttu; Kuchner, Marc J.; Caselden, Dan; Meisner, Aaron M.; Faherty, Jacqueline K.; Mamajek, Eric E.; Hsu, Chih-Chun; Greco, Jennifer J.; Cushing, Michael C.; Kirkpatrick, J. Davy; Bardalez-Gagliuff, Daniella Logsdon, Sarah E.; Allers, Katelyn; Debes, John H.; Backyard Worlds: Planet 9 Collaboration, "WISEA J041451.67-585456.7 and WISEA J181006.18-101000.5: The First Extreme T-type Subdwarfs?", ApJ, 989, 77, July 2020
- Paudel, R. R., Gizis, J. E., Burgasser, A. J., Hsu, C., "2MASS J10274572+0629104: the very short period young M6 dwarf binary system identified in K2 data", MNRAS, 486, 4144, July 2019

NON-REFEREED PUBLICATIONS

- [2] Theissen, Christopher A.; Burgasser, Adam J.; Martin, Emily C.; Cushing, Michael C.; Konopacky, Quinn M.; McLean, Ian S.; Hsu, Chih-Chun; Bardalez Gagliuffi, Daniella C.; Schneider, Adam C.; Kuchner, Marc J.; Faherty, Jacqueline K.; Beichman, Charles A.; Miles, Brittany; Skemer, Andy; Logsdon, Sarah E.; Meisner, Aaron M.; Kirkpatrick, J. Davy, "Keck NIRES Spectral Standards for L, T, and Y Dwarfs", RNAAS, 6, 151, July 2022
- Low, Ryan; Burgasser, Adam J.; Reylé, Céline; Gerasimov, Roman; Hsu, Chih-Chun; Theissen, Christopher A, "Spectroscopic Confirmation of an M6 Dwarf Companion to the Nearby Star BD-08 2582", RNAAS, 5, 26, February 2021

TALKS

"Kinematics, Rotation, and Multiplicity of Ultracool Dwarfs with High-Resolution Near-Infrared Spectroscopy" June 14, 2022 AAS 240 Meeting, Pasadena Convention Center, Pasadena, CA

"Forward-Modeling High-Resolution Spectroscopic Data of Ultracool Dwarfs with Large Public Archives" June 3, 2022 HDSI Internal Talk, Halicioglus Data Science Institute, UC San Diego, Virtual

- "Kinematics, Rotation, and Multiplicity of Ultracool Dwarfs with High-Resolution Near-Infrared Spectroscopy" May 25, 2022 IPAC Seminar Series, Infrared Processing and Analysis Center, Virtual
- "Radial and Rotational Velocities of T Dwarfs from Keck/NIRSPEC High-Resolution Spectroscopy" September 9, 2021 Keck Science Meeting, UC San Diego
- "Precise Radial and Rotational Velocities of Ultracool Dwarfs with the APOGEE High-Resolution Spectrometer" August 11, 2021 2021 SDSS Collaboration Meeting, Virtual
- "Radial Velocities and Kinematic Ages of Nearby T Dwarfs from Keck/NIRSPEC High-Resolution Spectroscopy" January 15, 2021 AAS 237 Meeting, Virtual
- "Ultracool Dwarf Kinematics and Ages Revealed by High-Resolution Spectroscopy" November 13, 2020 CASS Journal Club, UC San Diego, La Jolla, CA
- "Precise Radial and Rotational Velocities of Ultracool Dwarfs Using a Forward-Modeling Method with High-Resolution Spectroscopy" February 4, 2020 High-Resolution Infrared Spectroscopy for Exoplanet Characterization Hackathon, Caltech, Pasadena, CA
- "Radial and Rotational Velocities of Ultracool Dwarfs From High-Resolution Spectroscopy" March 5, 2019
 AMNH Astrophysics seminar, American Museum of Natural History, New York, NY
- "Radial and Rotational Velocities of Ultracool Dwarfs From High-Resolution Spectroscopy" February 15, 2019 CASS Journal Club, UC San Diego, La Jolla, CA

POSTERS

- "Radial Velocities and Kinematic Ages of Nearby T Dwarfs from Keck/NIRSPEC High-Resolution Spectroscopy" March 2021 The 20.5 Cambridge Workshops of Cool Stars, Stellar Systems and the Sun, Virtual
- "Precise Radial and Rotational Velocities for over 440 Ultracool Dwarfs Observed with NIRSPEC" September 2020 Keck Science Meeting 2020, Virtual
- "Precise Radial and Rotational Velocities for T Dwarfs Using NIRSPEC High-Resolution Spectrometer" September 2019 Keck Science Meeting 2019, UCLA, Los Angeles, CA
- "Precise Radial and Rotational Velocities of Ultracool Dwarfs with APOGEE High-Resolution Spectra" June 2019 SDSS-IV/V Collaboration Meeting 2019, Ensenada, Mexico
- "Radial and Rotational Velocities for 300+ Ultracool Dwarfs from NIRSPEC High-Resolution Spectroscopy" January 2019 AAS 233 Meeting, Seattle, WA

"Toward Measurements of Radial and Rotational Velocities of 300+ Ultracool Dwarfs from NIRSPEC High-Resolution Spectroscopy" September 2018 Keck Science Meeting 2018, Caltech, Pasadena, CA

"Precise Radial Velocities to Detect Exoplanets around Ultracool Dwarfs Using the NIRSPEC High-Resolution Spectrograph" September 2018 ExSoCal 2018, Caltech, Pasadena, CA

"Refined Measurements of Radial and Rotational Velocities of 300+ Ultracool Dwarfs from NIRSPEC High-Resolution Spectroscopy" July 2018 Cool Stars 20, Boston University, Cambridge, MA

PRESS COVERAGE

"Here's how cool a star can be and still achieve lasting success",

COVERAGE Science News, August 2021

WORKSHOPS

Future Keck IR Spectroscopy Workshop January 27 2021 Virtual

High-Resolution Infrared Spectroscopy for February 4–6 2020 Exoplanet Characterization Hackathon Caltech, Pasadena, CA

Telluric Line Hack Week Workshop February 25–28 2019 Flatiron Institute, New York, NY

2017 Kraft Observational Astronomy Workshop October 12–16 2017 Lick Observatory, Mount Hamilton, CA

SciCoder Workshop July 31–August 4 2017 Vanderbilt University, Nashville, TN

TELESCOPE TIME

AWARDED

Lick Observatory

PI: **2022B**: "Calibrations of Chemical Abundances of Ultracool Dwarfs in Wide Binary Systems with Optical High-Resolution Spectroscopy of G-Type Primaries"

• 1 night awarded (APF)

W. M. Keck Telescopes, Keck II 10-meter

Co-I: **2021B–2022B**: "Galactic Archaeology with Ultracool Dwarfs: Kinematic Structure Among L Dwarfs"

• 5.25 nights awarded (NIRSPEC)

Co-I: **2021B–2022B**: "The Old and the Quick: A Search for Halo Brown Dwarfs with Backyard Worlds"

• 5.5 nights awarded (NIRES)

Co-I: 2019B-2020B: "Completing the Kinematic Census of Local T Dwarfs"

• 5.75 nights awarded (NIRSPEC)

Co-I: **2018B–2021A**: "NIRES Follow-up of Young T Dwarfs from Backyard Worlds" • 9 nights awarded (NIRES)

NASA InfraRed Telescope Facility (IRTF)

Co-I: 2018A-2019B: "Training the Cannon: Calibrating APOGEE Observations of

Ultracool	Drzzenfa"
UTILIACOOI	Dwalls

• 6 nights awarded (iSHELL)

ADDITIONAL
OBSERVING
EXPERIENCE

 $Keck\ II\ 10\text{-meter/NIRSPEC}\ 7\ nights$

2017 - 2018

EXPERIENCE Keck I 10-meter/HIRES 0.5 nights

2018

Shane Telescope 3-meter

 \bullet Kast Double Spectrograph: 22 nights

2018-2021

• ShaneAO/ShARCS: 1 night

2019

NASA InfraRed Telescope Facility (IRTF)/SpeX 2 nights

2021 - 2022

UNDERGRAD MENTORSHIP

Brigette Vazquez, UC San Diego Delilah Jacobsen, UC San Diego Tianxing "Sky" Zhou, UC San Diego 2021-Present 2021-Present 2021-Present

TEACHING

Teaching assistant for PHYS 2D

Spring 2021

UC San Diego, La Jolla, CA

• lower-division modern physics lecture for engineering/physical science majors

Teaching assistant for PHYS 5 UC San Diego, La Jolla, CA Fall 2020

• lower-division introductory stellar astrophysics lecture for non-physics major

Teaching assistant for PHYS 2DL Spring & Fall 2017, 2019, Spring 2020, Fall 2021 UC San Diego, La Jolla, CA

• lower-division modern physics lab for engineering/physical science majors

Teaching assistant for PHYS 1A

Spring 2018

UC San Diego, La Jolla, CA

• lower-division mechanics lab for life-science majors

Teaching assistant for PHYS 160 UC San Diego, La Jolla, CA Winter 2018, Fall 2018

ullet upper-division introductory stellar astrophysics lecture for physics major

Teaching assistant for PHYS 2BL

Fall 2016, Winter 2017

UC San Diego, La Jolla, CA

• lower-division electricity & magnetism lab for engineering/physics major

California Professoriate for Access to Physics Careers (CPAPC)

Southern California Physics GRE Bootcamp

August 2017

• UC San Diego, La Jolla, CA

PUBLIC OUTREACH

Python Workshop for Physics Undergraduate Students

November

• UC San Diego, La Jolla, CA

2019 - 2021

2019 Institute for Scientist & Engineer Educators (ISEE)

Professional Development Program (PDP)

March–September 2019

UC Santa Cruz/UC Los Angeless, CA

• Professional development team focused on effective and inclusive teaching, including mentoring, and also includes training in professional skills such as communication, teamwork, collaboration, and leadership.

Institute of the Americas (IOA) Science Innovation Camp UC San Diego, La Jolla, CA

• Physics outreach for Latin American high school students (14–18 year old)

The Barrio Logan Science & Art Expo

March 16 2019

Mercado del Barrio, San Diego, CA

• Physics outreach for Mexican families from around southern San Diego

PROFESSIONAL American Astronomical Society (AAS) AFFILIATIONS

2018-Present

SKILLS Python, IATEX.

Python, IATEX, Github, HTML; Languages: Mandarin (native), English (fluent)

REFERENCES Dr. Adam Burgasser

Professor of Physics University of California San Diego 9500 Gilman Drive 0424, La Jolla, California 92093-0424, USA aburgasser at ucsd.edu

Dr. Quinn Konopacky

Associate Professor of Physics University of California San Diego 9500 Gilman Drive 0424, La Jolla, California 92093-0424, USA qkonopacky at ucsd.edu

Dr. Cullen Blake

Associate Professor of Physics and Astronomy University of Pennsylvania 209 South 33rd Street, Philadelphia, PA 19104, USA chblake at sas.upenn.edu

 $[CV\ compiled\ on\ 2022/08/08]$