

Pin Chen
Jet Propulsion Laboratory, California Institute of Technology
M/S 183-301, 4800 Oak Grove Drive
Pasadena, CA 91109
USA
(818) 393-0412
E-mail: Pin.Chen@jpl.nasa.gov

ResearcherID: B-1112-2008
ORCID: 0000-0003-1195-9666

EDUCATION

California Institute of Technology, Pasadena, CA, USA

Ph.D. in Chemistry (chemical physics) **June, 1999**

Dissertation: "Terahertz Generation via Optical-Heterodyne Conversion: Development of a New Far-Infrared Spectrometer and Its Applications toward a Better Understanding of Nonrigid, Astronomically Important Molecules."

University of California, Berkeley, CA, USA

B.S. in Chemistry **December, 1991**

SELECTED AWARDS & HONORS

- NASA Group Achievement Award for "dedicated service and sustained exemplary performance for the Deep Space Atomic Clock Project in support of the Technology Demonstration Missions Program" **2020**
- *Journal of the Optical Society of America* Editor's Pick for manuscript titled "Vector vortex coronagraphy for exoplanet detection with spatially-variant diffractive waveplates" **2019**
- NASA Group Achievement Award for "the development and tests at Mauna Kea observatories of a near-infrared Laser Frequency Comb as a wavelength standard for the detection and characterization of exoplanets" **2017**
- JPL Team Award "for contribution to the Deep Space Atomic Clock (DSAC) Project Assembly Team" **2017**
- JPL Voyager Award "for successful organization of the two-part Keck Institute for Space Studies workshop at Caltech" **2016**
- JPL Discovery Award "for being the lead for Exoplanets informal meetings that were valuable to formulating the Exoplanets strategic initiative at the Jet Propulsion Laboratory" **2015**
- JPL Team Award "for outstanding contributions to the Deep Space Atomic Clock (DSAC) Environmental Test Team" **2015**
- JPL Team Award "for outstanding contributions to the Deep Space Atomic Clock (DSAC) Flight Clock First Light Team" **2015**
- JPL Team Award "for outstanding contributions to the Deep Space Atomic Clock (DSAC) Ion Trap Tube Team" **2015**
- JPL Team Bonus Award "for outstanding contributions to the Deep Space Atomic Clock (DSAC) Project Preliminary Design Review (PDR) Team" **2013**
- NASA Certificate of Appreciation in recognition of "valuable contribution and outstanding support to the Advanced" **2009**

- Component Technologies (ACT) program and the NASA Earth Science Technology Office”
- JPL Team Bonus Award for the “successful balloon flight of the Planetscope Precursor Experiment” **2008**
 - NASA Group Achievement Award for the “Molecular Spectroscopy Team” **2006**
 - NASA Group Achievement Award for the “Aura Microwave Limb Sounder Instrument Team” **2005**
 - NASA Group Achievement Award for the “Balloon Observations of the Stratosphere Team” **2004**
 - NASA New Investigator in Earth Science **2002 – 2005**
 - National Research Council’s Postdoctoral Research Associateship **1999 – 2000**
 - NASA New Technology Report Award for “Tunable Terahertz Source Using Near Infrared Diode Lasers” **1999**

EXPERIENCE

Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA

Deputy Technology Manager, NASA Exoplanet Exploration Program **2019 – present**

Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA

Research Scientist (Planetary Science Section) **2006 – present**

Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA

Cognizant Engineer, Deep Space Atomic Clock Project **2013 - 2015**

California Institute of Technology, Pasadena, CA, USA

Visiting Associate (Division of Chemistry & Chemical Engineering) **2007 – 2013**

Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA

Group Supervisor, Acting (Atmospheric Laser Spectroscopy Group) **12/2006 – 2/2007**

Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA

Scientist (Earth Science Section, Planetary Science Section) **2000 – 2006**

National Institute of Standards & Technology (NIST), Boulder, CA, USA

Research Chemist (post-doctoral, Time and Frequency Division) **1999 – 2000**

California Institute of Technology, Pasadena, CA, USA

Graduate Research Assistant **1992 – 1999**

Air Instruments & Measurements, LLC, Baldwin Park, CA, USA

Consultant **1997 – 1998**

Lawrence Berkeley Laboratory (LBL), Berkeley, CA, USA

Undergraduate Research Assistant, Research Associate (approximate title) **1990 – 1992, 1988 – 1989**

PRINCIPAL-INVESTIGATOR AWARDS

JPL HBCU/MSI

"A Novel Approach to Coronagraph Design for ExoEarth Observations" 2020

JPL Research & Technology Development (R&TD)

"Chip-Scale Heterodyne Imaging Spectrometers for CubeSats and Small Landers" 2016 – present

**JPL Research & Technology Development (R&TD):
Special Exoplanet and Comparative Planetary Science
Systems Initiative**

"A New Framework for Detecting Exoplanet Habitability and Life" 2015 – present

JPL Advanced Concept Studies Program

"3-D Spectral-Imager for Venus Observations" 2013

**JPL Research & Technology Development Program
(R&TD)**

"Chemistry & Transport Modeling of Exoplanetary Atmospheres" 2010 – 2011

**NASA Planetary Instrument Definition & Development
Program (PIDDP)**

"Massively Parallel, Cavity-Enhanced, Laser Spectroscopy (MCELS) for Planetary and Lunar Exploration" 2009 – 2013

JPL Center for Exoplanet Science

"Seeing in the Stratosphere" 2009

NASA Mars Fundamental Research Program (MFRP)

"Kinetic-Isotope Effects of Key Photochemical Reactions on Mars" 2007 – 2010

**NASA Planetary Instrument Definition & Development
Program (PIDDP)**

"A New *In-Situ* Measurement Technique for Stable-Isotope Analysis of Methane and Other Important Atmospheric/Volatile Species on Mars" 2005 – 2008

JPL Innovative Spontaneous Concepts (ISC)

"Proof of a Novel Concept for Measuring Optical Properties of Aerosols" 2006

**JPL Research & Technology Development Program
(R&TD)**

"A Promising New Near-Infrared Laser Technique for *In-Situ* Mars Exploration" 2003 – 2005

NASA New Investigator Program in Earth Science (NIP)

"Tropospheric Monitoring of CO Isotopes by Cavity-Enhanced, Optical Heterodyne Spectroscopy" 2002 – 2005

CO-INVESTIGATOR AWARDS

**NASA Development & Advancement of Lunar
Instrumentation (DALI):**

"Water Isotope Tunable Laser Spectrometer," PI: Dr. Lance Christensen 2022 - 2025

<u>NASA Exoplanet Research Program (XRP)</u>	
"Adaptation of high precision atmospheric trace gas retrieval technique and updated spectroscopy to model micro-telluric features enabling EPRV," PI: Dr. Keeyoon Sung (JPL)	2021 – present
<u>JPL Research & Technology Development Program (R&TD)</u>	
"Precision modeling of telluric absorption features through the retrieval of atmospheric trace gases and spectroscopy update toward Extreme Precision Radial Velocity (EPRV) measurements," PI: Dr. Keeyoon Sung (JPL)	2020 – present
<u>JPL Research & Technology Development Program (R&TD)</u>	
"Prebiotic and Microbial Bioindicators for Exoplanetary Discovery," PI: Dr. Tiffany Kataria (JPL)	2018 – 2020
<u>NASA Strategic Astrophysics Technology</u>	
"Super Lyot ExoEarth Coronagraph (SLEEC)," PI: Dr. John Trauger (JPL)	2018 – 2021
<u>NASA Solar System Workings</u>	
"Mars' Ancient Climate: Production and Evolution of a Reduced Greenhouse Atmosphere," PI: Dr. A. Jim Friedson (JPL)	2015 – 2018
<u>JPL President's & Director's Fund</u>	
"Exoplanet Clouds and Hazes," Co-PIs: Dr. Mark Swain (JPL) & Prof. Yuk Yung (Caltech)	2015 – 2016
<u>JPL President's & Director's Fund</u>	
"NIR-Visible Astrocomb with Frequency Doubling for Broadband Spectrograph Calibration," Co-PIs: Dr. Chas Beichman (JPL) & Prof. Kerry Vahala (Caltech)	2015 – 2016
<u>JPL President's & Director's Fund</u>	
"Micro-Astrocomb for Planet Finding Through Precision Radial Velocity Measurements", Co-PIs: Dr. Chas Beichman (JPL) & Prof. Kerry Vahala (Caltech)	2013 – 2015
<u>JPL President's & Director's Fund</u>	
"Next Generation Tunable Laser Spectrometer (TLS) - Maintaining JPL's Leadership Position", Co-PIs: Dr. Lance Christensen (JPL) & Prof. Mitchio Okumura (Caltech)	2013 – 2015
<u>JPL Innovative Spontaneous Concepts (ISC)</u>	
"Divergent Evolution of Earth's and Venus' Atmospheres," PI: Dr. A. Jim Friedson (JPL)	2012
<u>NASA Experimental Program to Stimulate Competitive Research (EPSCoR)</u>	
"New Mexico Exoplanet Spectroscopic Survey Instrument (NESSI)," PI: Dr. Patricia Hynes (New Mexico State University)	2009 – 2012
<u>NASA Planetary Instrument Definition & Development Program (PIDDP)</u>	
"Aquarius: An <i>In Situ</i> Water Isotope Analyzer for Exploring Planetary Ice," PI: Dr. Miles Smith (JPL)	2008 – 2011
<u>JPL Research & Technology Development Program (R&TD)</u>	
"Advanced InGaAs-based Single-Mode Semiconductor Lasers for Atmospheric Sensing and Lidar," PI: DR. Yueming Qiu (JPL)	2002 – 2005

JPL Bio-Nano Technology Program

"Quantum Dot Lasers for NASA *In-Situ* Sensing Applications,"
Dr. Yueming Qiu (JPL)

2002 – 2005

INVITED LECTURES/SEMINARS

AOGS (Asia Oceania Geosciences Society) 8th Annual Meeting, Taipei, Republic of China (Taiwan)

"Massively Parallel, Cavity-Enhanced, Laser Spectroscopy (MCELS) for Planetary Exploration"

Aug 2011

Institute of Astronomy & Astrophysics, Academia Sinica, Taipei, Republic of China (Taiwan)

"Atmospheric Chemistry of Extrasolar Planets"

Aug 2011

IGPP (Institute of Geophysics Planetary Physics) Seminar Series, University of California, Los Angeles, CA, USA

"Atmospheric Chemistry of Extrasolar Planets"

May, 2011

Workshop on Innovative Approaches to Exoplanet Spectra, Keck Institute for Space Studies, California Institute of Technology, CA, USA

"Balloon Environment"

Nov 2009

Planetary Evolution & Habitability course, California Institute of Technology, Pasadena, CA, USA

"Atmospheric Laser Spectroscopy for *In-Situ* Habitability Detection"

Mar 2009

The Center for Adaptive Optics Fall 2007 Retreat, Lake Arrowhead, CA, USA

"Stratospheric seeing & contrast limits for a balloon-borne coronagraph"

Nov 2007

Yuk Yung Lunch Seminar Series, California Institute of Technology, CA, USA

"Noise-immune, cavity-enhanced spectroscopy and ultra-sensitive atmospheric measurements"

Feb 2006

"Enlightenment Lecture", Nippon Institute of Technology, Japan

"Optoelectronic terahertz sources based on photomixers"

Feb 2003

TEACHING/MENTORING/OUTREACH EXPERIENCE

Pasadena City College (PCC)

Industrial Advisor, LaserTech program (a PCC career technical education program)

Oct 2021 - present

Shadow Hills Elementary School (Fontana, CA), College & Career Week

Invited Speaker: "Searching for Life in our Galaxy & Discovering Diverse Career Paths on Earth"

May 2021

Howard University, Electrical Engineering & Computer Science Graduate Seminars (EECE501)

"To See Another Planet Like Earth"

Oct 2020

Palm Crest Elementary School, Gifted and Talented Education (GATE) Class, Pasadena, CA, USA

Volunteer JPL Speaker Feb 2016

Chinese-American Oceanic & Atmospheric Association, Irvine, CA

Invited Speaker

Spoke about career development and proposal writing in the session "Golden Keys to Success" to young researchers 2012

California Institute of Technology, Pasadena, CA, USA

Invited Lecturer

Presented lecture on "Extrasolar Planets: Life, Habitability, Climate, & Atmosphere" to the "Planetary Evolution & Habitability" class in the Geological & Planetary Sciences Division 2011

California Institute of Technology, Pasadena, CA, USA

Invited Lecturer 2009

Presented lecture on "Atmospheric Laser Spectroscopy for In-Situ Habitability Detection" to the "Planetary Evolution & Habitability" class in the Geological & Planetary Sciences Division.

Jet Propulsion Laboratory, California Institute of Technology, CA, USA

Post-Doctoral Research Mentor 2011 – present

California Institute of Technology, Pasadena, CA, USA

Graduate-Student Mentor/Ph.D. Thesis Committee Member 2003 – present

Mentoring chemistry graduate students conducting research in spectroscopic instrumentation and planetary habitability.

Jet Propulsion Laboratory, California Institute of Technology, CA, USA

Undergraduate-Student Mentor 2007 – present

Mentoring summer undergraduate research interns

Nippon Institute of Technology, Saitama Prefecture, Japan

Invited Lecturer 2003

Presented four lectures to graduate students in the Department of Electrical and Electronics Engineering on advanced theories and techniques in the areas of collisional broadening of molecular lines, quantitative spectroscopic measurements, and terahertz technology. Directly advised graduate students on experimental design and data analysis techniques. Presented an "enlightenment lecture" to department faculty and general audience.

California Institute of Technology, Pasadena, CA, USA

Teaching Assistant – "Fundamental Techniques of Experimental Chemistry." 1993

Instructed and supervised students in introductory undergraduate laboratory chemistry course.

Teaching Assistant – "Chemical Equilibrium and Analysis Laboratory." 1993

Instructed and supervised students in conducting experiments designed to illustrate modern instrumental techniques that are currently employed in industrial and academic research. Emphasis was on determinations of chemical composition, measurement of equilibrium constants, evaluation of rates of chemical reactions, and trace-metal analysis.

SCIENTIFIC COMMUNITY ORGANIZATION & SERVICE

NASA Headquarters

Panelist, NASA Technology Interchange Meeting organized by HQ to discuss the best approaches to mature key technology for the IR/Optical/UV Great Observatory Flagship Mission recommended by the *Astro2020* Decadal Survey **2021**

Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA

Co-Author, White Paper, Planetary and Astrobiology Decadal Survey: "Importance of Applying Abiotic / Prebiotic Chemistry to the Search for Life on Other Planets" **2020**

NASA Exoplanet Exploration Program Survey on Deformable Mirror Technology

Expert Panelist **2020**

NASA Exoplanet Exploration Program's Virtual Workshop on Wavefront Sensing

Member, Science Organizing Committee **Apr 2020**

19th Annual Mirror Technology SBIR/SSTR Workshop, Redondo Beach, CA, USA

Member, Organizing Committee **Nov 2019**

Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA

Co-Author, White Paper, Astro 2020 Decadal Survey: "The Super-Earth Opportunity – Search for Habitable Exoplanets in the 2020s" **Mar 2019**

Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA

Poster Award Judge, JPL Postdoc Research Day **Jun 2018**

Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA

Tiger Team, NASA CAL (Cold Atom Laboratory) project: Review of the frequency-locking approach for CAL's master laser **May-Jun 2017**

Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA

Poster Award Judge, JPL Postdoc Research Day **Aug 2017**

Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA

Co-Lead, JPL Exoplanet Science Initiative **2016**

Keck Institute for Space Studies, California Institute of Technology, Pasadena, CA, USA

Co-Lead, "Methane on Mars" KISS Study Program **2015 – present**

Keck Institute for Space Studies, California Institute of Technology, Pasadena, CA, USA

Core Member, "Optical Frequency Combs for Space Applications" KISS Study Program **2015 – present**

Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA

Member, Science Team, "The Exoplanet and Comparative Planetary Systems Science Initiative" **2014 – present**

Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA

Member, Hiring Committee: Scientist III & Scientist VI, Exoplanet and Comparative Planetary Systems Science Strategic Hires 2015

Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA

Member, Hiring Committee: Postdoctoral Research in the Exoplanetary and Comparative Planetary Sciences at JPL/Caltech 2014 – 2015

NASA, Research Opportunities in Space and Earth Sciences (ROSES)

Panelist, Proposal Review Panel 2013

Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA

Co-Author, "Fain Object Explorer," NASA Study on Applications of Large Space Optics (SALSO) 2013

Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA

Organizer, "UCLA-JPL Planets Meeting" workshop 2013

Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA

Organizer, "UCLA-JPL Planets/Exoplanets Day" workshop 2011

Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA

Member, hiring committee, staff scientist position in earth atmospheric science 2010

Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA

Co-author, white paper on "Laboratory Spectroscopy to Support Remote Sensing of Atmospheric Composition," submitted to the National Academies Space Studies Board's Planetary Science Decadal Survey. 2009

Keck Institute for Space Studies, California Institute of Technology, Pasadena, CA, USA

Core member of study program: "Innovative Approaches to Exoplanet Spectra." 2009

Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA

Co-author, "Planetscope: Exoplanet Characterization from a Balloon Platform," in response to the request for information from Astro2010: Astronomy and Astrophysics Decadal Survey Subcommittee on Programs. 2009

Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA

Co-signer, white paper on "Exoplanet Characterization and the Search for Life," submitted to *Astro2010: the Astronomy and Astrophysics Decadal Survey*. 2009

Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA

Member, Technical Excellence Committee 2008 - Present

Small Business Innovation Research Program (SBIR)

Proposal Peer Reviewer	2000 – Present
<u><i>Applied Optics, Applied Physics B, Chemical Physics Letters, Journal of Molecular Spectroscopy, Science</i></u>	
Peer Reviewer	1999 – Present
<u><i>NASA Advanced Component Technology Program</i></u>	
Proposal Peer Reviewer	2008
<u><i>Earth System Scholars Network (ESSN)</i></u>	
Member, Mission Statement Committee	2004
<u><i>National Urban League Conference, Los Angeles, CA, USA</i></u>	
Volunteer, Career Fair for JPL	July, 2002
<u><i>Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA</i></u>	
Organizer, "Atmospheric Chemistry, Dynamics & Radiation Seminar Series"	2001 – 2002

PEER-REVIEWED PUBLICATIONS

- Klusman, R.W., Luo Y.-C., Chen, P., Yung, Y.L., Tallapragada, S., "Seasonality in Mars atmospheric methane driven by microseepage, barometric pumping, and adsorption," *Icarus*, 383(2022), 115079, DOI: <https://doi.org/10.1016/j.icarus.2022.115079>, 2022.
- Ruane, G., Wallace, J.K., Steeves, J., Mejia-Prada, C., Seo, B.-J., Bendek, E., Coker, C., Chen, P., Crill, B., Jewell, J., Kern, B., Marx, D., Poon, P.K., Redding, D., Riggs, A.J., Siegler, N., & Zimmer, R., "Wavefront sensing and control in space-based coronagraph instruments using Zernike's phase-contrast method," *J. Astron. Telesc. Instrum. Syst.*, 6(4), doi: 10.1117/1.JATIS.6.4.045005, 2020.
- Serabyn, G; Mejia Prada, C; Chen, P; Mawet, D. "Vector vortex coronagraphy for exoplanet detection with spatially variant diffractive waveplates," *J. Opt. Soc. Am. B*, 36(5), DOI: 10.1364/JOSAB.36.000D13, 2019.
- Yung, YL; Chen, P; Nealson, K; Atreya, S; Beckett, P; Blank, JG; Ehlmann, B; Eiler, J; Etiope, G; Ferry, JG; Forget, F; Gao, P; Hu, RY; Kleinbohl, A; Klusman, R; Lefevre, F; Miller, C; Mischna, M; Mumma, M; Newman, S; Oehler, D; Okumura, M; Oremland, R; Orphan, V; Popa, R; Russell, M; Shen, LH; Lollar, BS; Staehle, R; Stamenkovic, V; Templeton, A; Vandaele, AC; Viscardi, S; Webster, CR; Wennberg, PO; Wong, ML; Worden. "Methane on Mars and Habitability: Challenges and Responses," *Astrobiology*, 18(10), 1221-1242, DOI: 10.1089/ast.2018.1917, 2018.
- Kleinhöhl, Armin; Willacy, Karen; Friedson, A. James; Chen, Pin; and Swain, Mark R. "Buildup of Abiotic Oxygen and Ozone in Moist Atmospheres of Temperate Terrestrial Exoplanets and Its Impact on the Spectral Fingerprint in Transit Observations," *The Astrophysical Journal*, 862(2), 92, doi: 10.3847/1538-4357/aaca36, 2018.
- Tjoelker, Robert; Prestage, John; Burt, Eric; Chen, Pin; Chong, Yong; Chung, Sang; Diener, William; Ely, Todd; Enzer, Daphna; Mojaradi, Hadi; Okino, Clayton; Pauken, Mike; Robison, David; Swenson, Brad; Tucker, Blake. "Mercury Ion Clock for a NASA Technology Demonstration Mission," *Transactions on Ultrasonics, Ferroelectrics, and Frequency Control*, 63(7), 1034-1043, doi: 10.1109/TUFFC.2016.2543738, 2016.
- Yi, X; Vahala, K; Li, J; Diddams, S; Ycas, G; Plavchan, P; Leifer, S; Sandhu, J; Vasisht, G; Chen, P; Gao, P; Gagne, J; Furlan, E; Bottom, M; Martin, EC; Fitzgerald, MP; Doppmann, G; Beichman, C. "Demonstration of a near-IR line-referenced electro-optical laser frequency comb for precision radial velocity

measurements in astronomy," *Nature Communications*, **7**, doi: 10.1038/ncomms10436, 2016.

- Yung, YL & Chen, P. "Methane on Mars," *Astrobiol. Outreach*, **3**: 125, doi:10.4172/2332-2519.1000125, 2015.
- Line, MR; Zhang, X; Vasisht, G; Natraj, V; Chen, P; Yung YL. "Information Content of Exoplanetary Transit Spectra: an Initial Look," *Astrophys. J.*, **749**(93), doi:10.1088/0004-637X/749/1/93, 2011.
- Line, MR; Gautam, V; Chen, P; Angerhausen, D; Yung, YL. "Thermochemistry and Photochemistry in Cooler Hydrogen Dominated Extrasolar Planets: the Case of GJ 436b," *Astrophys. J.*, **738**(32), doi:10.1088/0004-637X/738/1/32, 2011.
- Swain, MR; Deroo, P; Griffith, CA; Tinetti, G; Thatte, A, Vasisht, G; Chen, P; Bouwman, J; Crossfield, IJ; Angerhausen, D; Afonso, C; Henning, T. "A ground-based near-infrared emission spectrum of the exoplanet HD189733b," *Nature*, **463**, doi: 10.1038, 2010.
- Swain, MR; Tinetti, G; Vasisht, G; Deroo, P; Griffith, C; Bouwman, J; Chen, Pin; Yung, Y; Burrows, A. Brown, LR; Matthews, J; Rowe, JF; Kuschnig, R; Angerhausen, D. "Water, methane, and carbon dioxide present in the dayside spectrum of the exoplanet HD 209458b," *Astrophys. J.*, **704**: 1616-1621, 2009.
- Swain, MR; Vasisht, G; Tinetti, G; Bouwman, J; Chen, Pin; Yung, Y; Deming, D; Deroo, P. "Molecular Signatures in the Near Infrared Dayside Spectrum of HD 189733b," *Astrophys. J. Lett.*, **690**: L114-L117, 2009.
- Trudeau, ME; Chen, P; de Andrade Garcia, G., Hollberg, LW; Tans, PP. "Stable isotopic analysis of atmospheric methane by infrared spectroscopy using diode laser difference-frequency generation," *Appl. Optics*, **45**(17): 4136-4141, 2006.
- Chen, P; Pearson, JC; Pickett, HM; Matsuura, S; Blake, GA. "Measurements of $^{14}\text{NH}_3$ in the $v_2 = 1$ state by a solid-state, photomixing, THz spectrometer and a simultaneous analysis of the microwave, terahertz, and infrared transitions between the ground and v_2 inversion-rotation levels," *J. Mol. Spectrosc.*, **236**(1): 116-126, 2006.
- Kleiner, I; Tarrago, G; Cottaz, C; Sagui, L; Brown, LR; Poynter, RL; Pickett, HM; Chen, P; Pearson, JC; Sams, RL; Blake, GA; Matsuura, S; Nemtchinov, V; Varanasi, P; Fusina, L; Di Lonardo, G. "NH₃ and PH₃ line parameters: the 2000 HITRAN update and new results." *J. Quant. Spectrosc. Radiat. Transf.*, **82**(1-4): 293-312, 2003.
- Chen, P; Pearson, JC; Pickett, HM; Matsuura, S; Blake, GA. "Submillimeter-wave measurements and analysis of the ground and $v_2 = 1$ states of water," *Astrophys. J. Suppl. Ser.*, **128**(1): 371-385, 2000.
- Matsuura, S; Chen, P; Blake, GA; Pearson, JC; Pickett, HM. "A tunable cavity-locked diode laser source for terahertz photomixing," *IEEE Trans. Microw. Theory Tech.*, **48**(3): 380-387, 2000.
- Chen, P; Pearson, JC; Pickett, HM; Matsuura, S; Blake, GA. "A Three-Diode-Laser, Terahertz-Difference-Frequency Synthesizer and Its Applications toward Far-Infrared Spectroscopy of Ammonia and Water," in L. Hollberg and R. J. Lang (Eds.), *Trends in Optics and Photonics: Advanced Semiconductor Lasers and Their Applications vol. 31*, pp. 103-105, Washington, D.C., Optical Society of America, Washington, DC, 2000.
- Matsuura, S; Chen, P; Blake, GA; Pearson, JC; Pickett, HM. "Simultaneous amplification of terahertz difference frequencies by an injection-seeded semiconductor laser amplifier at 850 nm," *Int. J. Infrared Millimeter Waves*, **19**(6): 849-858, 1998.
- Chen, P; Blake, GA; Gaidis, MC; Brown, ER; McIntosh, KA; Chou, SY; Nathan, MI; Williamson, F. "Spectroscopic applications and frequency locking of THz

photomixing with distributed-Bragg-reflector diode lasers in low-temperature-grown GaAs," *Appl. Phys. Lett.*, **71**(12): 1601-1603, 1997.

- Young, AT; Chen, P; Leung, KN; Pan, L; Ponce, D; Stutzin, GC. "Laser and spectroscopic diagnostics of H⁻ ion-source plasmas," *Rev. Sci. Instrum.*, **65**(4): 1416-1418 Part 2, 1994.
- Young, AT; Stutzin, GC; Chen, P; Kunkel, WB; Leung, KN. "Measurement of Atomic and Molecular-hydrogen in a tandem magnetic multicusp H⁻ ion-source by VUV spectroscopy," *Rev. Sci. Instrum.*, **63**(4): 2744-2746 Part 2, 1992.

CONFERENCE PAPERS (INCOMPLETE LIST)

- Potier, A., Ruane, G., Dewell, L., Nordt, A., Stark, C., Pueyo, L., Riggs, E. AJ, Chen, P., Redding, D., "ExoEarth yield provided by an 8m off-axis segmented telescope equipped with an adaptive optics system," *SPIE Astronomical Telescopes + Instrumentation Conference*, Motreal, Canada, July 16-22, 2022
- Yan, S., Chen, P., Wade, M., Gill, T., Trauger, J., "Model Order Reduction Based Sensitivity Analysis of Coronagraph Pupil Aperture," *2022 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting*, Denver, CO, USA, July 10-15, 2022.
- Potier, A., Ruane, G., Chen, P., Chopra, A., Dewell, L., Juanola-Parramon, R., Nordt, A., Pueyo, L., Redding, D., Riggs, AJ., Sirbu, D., "LUVOIR-ECLIPS closed-loop adaptive optics performance and contrast predictions," *Proc. SPIE 11823, Techniques and Instrumentation for Detection of Exoplanets X*, 118231L, 3 September 2021.
- Yan, S., Wade, M.I., Gill, T.L., Trauger, J.T., "Method of Moments Based Coronagraph Pupil Design for Exoplanet Exploration," *Applied Computational electromagnetics Symposium*, virtual, August 1-5, 2021.
- Dick, S., Li, M., Adams, D., Kataria, T., Chen, P., Perl, S. M., Barge, L. M., Yung, Y. L., "Synthetic Spectra of Potential Exo-Earths: Quantifying Biotic Signatures with AROC," *American Geophysical Union, Fall Meeting 2019*, abstract #508810, San Francisco, CA, USA, December, 2019.
- Luo, Y., Mischna, M., Yung, Y. L., Kleinböhl, A., Chen, P., "Localizing Putative Sources on Mars from Back-Trajectory Modeling Techniques," *American Geophysical Union, Fall Meeting 2019*, abstract #508810, San Francisco, CA, USA, December, 2019.
- Luo, Y., Mischna, M., Yung, Y. L., Kleinböhl, A., Chen, P., "Localizing Putative Sources on Mars from Spacecraft Observations and Back-Trajectory Modeling Techniques," *Ninth International Conference on Mars*, Pasadena, CA, U.S.A., July 2019.
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LANGUAGES

- Mandarin Chinese – native language
- English – as proficient and fluent as native speakers.
- German – two years of college coursework, very rusty now.

MEMBERSHIPS

- American Chemical Society (ACS)
- American Geophysical Union (AGU)
- American Physical Society (APS)
- Asia Oceana Geosciences Society (AOGS)
- American Astronomical Society (AAS)