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Jet Propulsion Laboratory, California Institute of Technology  
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## EDUCATION

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**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**

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## SELECTED AWARDS & HONORS

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| • <i>Journal of the Optical Society of America</i> Editor's Pick for manuscript titled "Vector vortex coronagraphy for exoplanet detection with spatially-variant diffractive waveplates"                       | <b>2019</b> |
| • 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" | <b>2017</b> |
| • JPL Team Award "for contribution to the Deep Space Atomic Clock (DSAC) Project Assembly Team"   | <b>2017</b> |
| • JPL Voyager Award "for successful organization of the two-part Keck Institute for Space Studies workshop at Caltech"  | <b>2016</b> |
| • 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"                              | <b>2015</b> |
| • JPL Team Award "for outstanding contributions to the Deep Space Atomic Clock (DSAC) Environmental Test Team"  | <b>2015</b> |
| • JPL Team Award "for outstanding contributions to the Deep Space Atomic Clock (DSAC) Flight Clock First Light Team"  | <b>2015</b> |
| • JPL Team Award "for outstanding contributions to the Deep Space Atomic Clock (DSAC) Ion Trap Tube Team"   | <b>2015</b> |
| • JPL Team Bonus Award "for outstanding contributions to the Deep Space Atomic Clock (DSAC) Project Preliminary Design Review (PDR) Team"   | <b>2013</b> |
| • NASA Certificate of Appreciation in recognition of "valuable contribution and outstanding support to the Advanced Component Technologies (ACT) program and the NASA Earth Science Technology Office"          | <b>2009</b> |
| • JPL Team Bonus Award for the "successful balloon flight of the Planetscope Precursor Experiment"  | <b>2008</b> |

- 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

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## EXPERIENCE

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*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

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## PRINCIPAL-INVESTIGATOR AWARDS

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*JPL HBCU/MSI*

<b>A Novel Approach to Coronagraph Design for ExoEarth Observations</b>	2020 – present
<i>JPL Research &amp; Technology Development (R&amp;TD)</i>	
<b>"Chip-Scale Heterodyne Imaging Spectrometers for CubeSats and Small Landers"</b>	2016 – present
<i>JPL Research &amp; Technology Development (R&amp;TD): Special Exoplanet and Comparative Planetary Science Systems Initiative</i>	
<b>"A New Framework for Detecting Exoplanet Habitability and Life"</b>	2015 – present
<i>JPL Advanced Concept Studies Program</i>	
<b>"3-D Spectral-Imager for Venus Observations"</b>	2013
<i>JPL Research &amp; Technology Development Program (R&amp;TD)</i>	
<b>"Chemistry &amp; Transport Modeling of Exoplanetary Atmospheres"</b>	2010 – 2011
<i>NASA Planetary Instrument Definition &amp; Development Program (PIDDP)</i>	
<b>"Massively Parallel, Cavity-Enhanced, Laser Spectroscopy (MCELS) for Planetary and Lunar Exploration"</b>	2009 – 2013
<i>JPL Center for Exoplanet Science</i>	
<b>"Seeing in the Stratosphere"</b>	2009
<i>NASA Mars Fundamental Research Program (MFRP)</i>	
<b>"Kinetic-Isotope Effects of Key Photochemical Reactions on Mars"</b>	2007 – 2010
<i>NASA Planetary Instrument Definition &amp; Development Program (PIDDP)</i>	
<b>"A New <i>In-Situ</i> Measurement Technique for Stable-Isotope Analysis of Methane and Other Important Atmospheric/Volatile Species on Mars"</b>	2005 – 2008
<i>JPL Innovative Spontaneous Concepts (ISC)</i>	
<b>"Proof of a Novel Concept for Measuring Optical Properties of Aerosols"</b>	2006
<i>JPL Research &amp; Technology Development Program (R&amp;TD)</i>	
<b>"A Promising New Near-Infrared Laser Technique for <i>In-Situ</i> Mars Exploration"</b>	2003 – 2005
<i>NASA New Investigator Program in Earth Science (NIP)</i>	
<b>"Tropospheric Monitoring of CO Isotopes by Cavity-Enhanced, Optical Heterodyne Spectroscopy"</b>	2002 – 2005

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#### CO-INVESTIGATOR AWARDS

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<i>JPL Research &amp; Technology Development Program (R&amp;TD)</i>	
<b>"Prebiotic and Microbial Bioindicators for Exoplanetary Discovery"</b>	2018 – 2019
<i>NASA Strategic Astrophysics Technology</i>	
<b>"Super Lyot ExoEarth Coronagraph (SLEEC)"</b>	2018 – 2021
<i>NASA Solar System Workings</i>	

<b>"Mars' Ancient Climate: Production and Evolution of a Reduced Greenhouse Atmosphere,"</b> PI: Dr. A. Jim Friedson (JPL) <i>JPL President's &amp; Director's Fund</i>	2015 – 2018
<b>"Exoplanet Clouds and Hazes,"</b> Co-PIs: Dr. Mark Swain (JPL) & Prof. Yuk Yung (Caltech) <i>JPL President's &amp; Director's Fund</i>	2015 – 2016
<b>"NIR-Visible Astrocomb with Frequency Doubling for Broadband Spectrograph Calibration,"</b> Co-PIs: Dr. Chas Beichman (JPL) & Prof. Kerry Vahala (Caltech) <i>JPL President's &amp; Director's Fund</i>	
<b>"Micro-Astrocomb for Planet Finding Through Precision Radial Velocity Measurements",</b> Co-PIs: Dr. Chas Beichman (JPL) & Prof. Kerry Vahala (Caltech) <i>JPL President's &amp; Director's Fund</i>	2013 – 2015
<b>"Next Generation Tunable Laser Spectrometer (TLS) - Maintaining JPL's Leadership Position",</b> Co-PIs: Dr. Lance Christensen (JPL) & Prof. Mitchio Okumura (Caltech) <i>JPL Innovative Spontaneous Concepts (ISC)</i>	2013 – 2015
<b>"Divergent Evolution of Earth's and Venus' Atmospheres,"</b> PI: Dr. A. Jim Friedson (JPL) <i>NASA Experimental Program to Stimulate Competitive Research (EPSCoR)</i>	2012
<b>"New Mexico Exoplanet Spectroscopic Survey Instrument (NESSI),"</b> PI: Dr. Patricia Hynes (New Mexico State University) <i>NASA Planetary Instrument Definition &amp; Development Program (PIDDP)</i>	2009 – 2012
<b>"Aquarius: An <i>In Situ</i> Water Isotope Analyzer for Exploring Planetary Ice,"</b> PI: Dr. Miles Smith (JPL) <i>JPL Research &amp; Technology Development Program (R&amp;TD)</i>	2008 – 2011
<b>"Advanced InGaAs-based Single-Mode Semiconductor Lasers for Atmospheric Sensing and Lidar,"</b> PI: DR. Yueming Qiu (JPL) <i>JPL Bio-Nano Technology Program</i>	2002 – 2005
<b>"Quantum Dot Lasers for NASA <i>In-Situ</i> Sensing Applications,"</b> Dr. Yueming Qiu (JPL)	2002 – 2005

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#### INVITED LECTURES/SEMINARS

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<i>AOGS (Asia Oceania Geosciences Society) 8<sup>th</sup> Annual Meeting, Taipei, Republic of China (Taiwan)</i>	
<b>"Massively Parallel, Cavity-Enhanced, Laser Spectroscopy (MCELS) for Planetary Exploration"</b> <i>Institute of Astronomy &amp; Astrophysics, Academia Sinica, Taipei, Republic of China (Taiwan)</i>	Aug 2011
<b>"Atmospheric Chemistry of Extrasolar Planets"</b> <i>IGPP (Institute of Geophysics Planetary Physics) Seminar Series, University of California, Los Angeles, CA, USA</i>	Aug 2011

<b>"Atmospheric Chemistry of Extrasolar Planets"</b> <i>Planetary Evolution &amp; Habitability course, California Institute of Technology, Pasadena, CA, USA</i>	May, 2011
<b>"Extrasolar Planets: Life, Habitability, Climate, &amp; Atmosphere"</b> <i>Workshop on Innovative Approaches to Exoplanet Spectra, Keck Institute for Space Studies, California Institute of Technology, CA, USA</i>	Mar 2011
<b>"Balloon Environment"</b> <i>Planetary Evolution &amp; Habitability course, California Institute of Technology, Pasadena, CA, USA</i>	Nov 2009
<b>"Atmospheric Laser Spectroscopy for In-Situ Habitability Detection"</b> <i>The Center for Adaptive Optics Fall 2007 Retreat, Lake Arrowhead, CA, USA</i>	Mar 2009
<b>"Stratospheric seeing &amp; contrast limits for a balloon-borne coronagraph"</b> <i>Yuk Yung Lunch Seminar Series, California Institute of Technology, CA, USA</i>	Nov 2007
<b>"Noise-immune, cavity-enhanced spectroscopy and ultra-sensitive atmospheric measurements"</b> <i>"Enlightenment Lecture", Nippon Institute of Technology, Japan</i>	Feb 2006
<b>"Optoelectronic terahertz sources based on photomixers"</b>	Feb 2003

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TEACHING/MENTORING EXPERIENCE (some redundancy with "Invited Lectures/Seminars")

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*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**

Presented lecture on "Atmospheric Laser Spectroscopy for In-Situ Habitability Detection" to the "Planetary Evolution & Habitability" class in the Geological & Planetary Sciences Division. 2009

*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.

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.

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#### COMMUNITY ORGANIZATION & SERVICE

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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/STTR 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

<b>Poster Award Judge, JPL Postdoc Research Day</b>	<b>Aug 2017</b>
<i><u>Palm Crest Elementary School, 5<sup>th</sup> Grade Class, Pasadena, CA, USA</u></i>	
<b>Volunteer Speaker for Space Exploration</b>	<b>May 2017</b>
<i><u>Palm Crest Elementary School, Gifted and Talented Education (GATE) Class, Pasadena, CA, USA</u></i>	
<b>Volunteer JPL Speaker</b>	<b>Feb 2016</b>
<i><u>Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA</u></i>	
<b>Co-Lead, JPL Exoplanet Science Initiative</b>	<b>2016</b>
<i><u>Keck Institute for Space Studies, California Institute of Technology, Pasadena, CA, USA</u></i>	
<b>Co-Lead, "Methane on Mars" KISS Study Program</b>	<b>2015 – present</b>
<i><u>Keck Institute for Space Studies, California Institute of Technology, Pasadena, CA, USA</u></i>	
<b>Core Member, "Optical Frequency Combs for Space Applications" KISS Study Program</b>	<b>2015 – present</b>
<i><u>Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA</u></i>	
<b>Member, Science Team, "The Exoplanet and Comparative Planetary Systems Science Initiative"</b>	<b>2014 – present</b>
<i><u>Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA</u></i>	
<b>Member, Hiring Committee: Scientist III &amp; Scientist VI, Exoplanet and Comparative Planetary Systems Science Strategic Hires</b>	<b>2015</b>
<i><u>Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA</u></i>	
<b>Member, Hiring Committee: Postdoctoral Research in the Exoplanetary and Comparative Planetary Sciences at JPL/Caltech</b>	<b>2014 – 2015</b>
<i><u>NASA, Research Opportunities in Space and Earth Sciences (ROSES)</u></i>	
<b>Panelist, Proposal Review Panel</b>	<b>2013</b>
<i><u>Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA</u></i>	
<b>Co-Author, "Faint Object Explorer," NASA Study on Applications of Large Space Optics (SALSO)</b>	<b>2013</b>
<i><u>Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA</u></i>	
<b>Organizer, "UCLA-JPL Planets Meeting" workshop</b>	<b>2013</b>
<i><u>Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA</u></i>	
<b>Organizer, "UCLA-JPL Planets/Exoplanets Day" workshop</b>	<b>2011</b>
<i><u>Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA</u></i>	
<b>Member, hiring committee, staff scientist position in earth atmospheric science</b>	<b>2010</b>
<i><u>Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA</u></i>	
<b>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.</b>	<b>2009</b>
<i><u>Keck Institute for Space Studies, California Institute of Technology, Pasadena, CA, USA</u></i>	
<b>Core member of study program: "Innovative Approaches to Exoplanet Spectra."</b>	<b>2009</b>

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

Applied Optics, Applied Physics B, Chemical Physics Letters, Journal of Molecular Spectroscopy, Science

**Peer Reviewer** 1999 – Present

NASA Advanced Component Technology Program

**Proposal Peer Reviewer** 2008

Earth System Scholars Network (ESSN)

**Member, Mission Statement Committee** 2004

National Urban League Conference, Los Angeles, CA, USA

**Volunteer, Career Fair for JPL** July, 2002

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

**Organizer, "Atmospheric Chemistry, Dynamics & Radiation Seminar Series"** 2001 – 2002

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#### PEER-REVIEWED PUBLICATIONS

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- 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
- 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; Vandaale, AC; Viscardy, 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. "NH<sub>3</sub> and PH<sub>3</sub> 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<sup>-</sup> 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<sup>-</sup> ion-source by VUV spectroscopy," *Rev. Sci. Instrum.*, **63**(4): 2744-2746 Part 2, 1992.

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#### CONFERENCE PAPERS (INCOMPLETE LIST)

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- 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.
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## LANGUAGES

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

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## MEMBERSHIPS

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