

Roger C. Wiens, Ph.D.
Earth, Atmospheric, and Planetary Sciences, Purdue University

Current Positions:

- Professor in EAPS with courtesy appointment in Aerospace and Astronautical Engineering
- Senior Fellow of Los Alamos National Laboratory (LANL)

Research Interests:

- Planetary science, with a focus on Mars
- Cosmochemistry: Solar system isotopic and elemental abundances
- Development of instruments, including laser-induced breakdown spectroscopy (LIBS), Raman, and fluorescence spectroscopy to support the above
- Operation of extraterrestrial vehicles and their instrumentation

Professional Highlights and Educational Background:

2022-present, Professor in Earth, Atmospheric, and Planetary Sciences, Purdue University

1997-2022, Scientist, Space Physics & Remote Sensing, Los Alamos National Laboratory (LANL)

2017-2020 Team Leader in Space Planetary Exploration Team at LANL

1990-1997, Staff Scientist at Caltech, developing NASA's Genesis mission

1988-1990, Post-doc in geochemistry at Scripps Institution of Oceanography, UCSD

1988, wrote the first PhD thesis on the Mars atmosphere that used actual samples, trapped in Mars meteorites, Physics Department, University of Minnesota

1982, BS in Physics, with high honors, Wheaton College, Wheaton, Illinois

Peer-Reviewed Publications: > 250, available in a separate list; h index > 75, > 23k citations

Mission Projects

1990-2008 NASA Genesis Discovery Solar Wind Sample Return Mission, LANL lead with overall responsibilities for 3 flight instruments, and flight payload lead. \$13M responsibility.

2003 PI of Atmospheric Sample Experiment (ACE) for the Sample Collection to Investigate Mars (SCIM), a Mars atmosphere and dust sample return mission that was selected for Phase A development.

2004-2021, PI, ChemCam instrument suite on the Mars Science Laboratory rover. ChemCam has the first LIBS instrument to be used in planetary science and also has the highest resolution remote imager on the rover. \$40M development cost.

2014-present, PI, SuperCam instrument suite on the Mars 2020 rover. Successor to ChemCam that includes the first remote Raman spectrometer to be used in planetary science, plus LIBS, visible and infrared reflectance spectrometry, high-resolution imaging, and acoustic spectra. \$60M development cost.

2014-present, co-investigator on the Scanning Habitable Environments with Raman and Luminescence of Organics & Chemicals (SHERLOC) instrument on the Mars 2020 rover. The electronics, software, and spectrometer detection system were built at LANL at a cost of \$8M; the overall instrument cost is ~\$60M.

Non-Mission Research Projects

1998-2001 PI, NASA Planetary Instrument Definition and Development Program (PIDDP) project to develop laser-based instrumentation to analyze ions from laser-produced plasmas with space plasma analyzers.

1998-2001 Co-I, NASA Mars Instrument Development Program (MIDP) project to develop LIBS for space applications; resulted in the ChemCam proposal.

2002-2006 PI, NASA Planetary Instrument Definition and Development Program (PIDDP) project to develop combined stand-off LIBS and Raman spectroscopy instrumentation, resulted in the SAGE Venus Lander Phase-A study and the SuperCam project.

2003-2006 LANL PI of NASA PIDDP project to use LIBS to develop a potassium-argon in-situ dating instrument, with PI Tim Swindle.

2009-2012 PI, LANL Internal R&D project to perform LIBS on lunar samples and analog samples for Venus and asteroids.

2009-2010, Co-I, SAGE Venus New Frontiers mission, which was selected for Phase A development and included a LIBS + Raman spectroscopy instrument led by LANL.

2010-2014 PI, NASA Sample Return Laboratory Instrument Data Analysis Program project on studying fractionation of the solar wind to support the Genesis sample program.

2010-2015 LANL PI, NASA University Research Centers (URC) program to develop and optical center of excellence at Delaware State University, with PI Nouredine Melikechi.

2011-2014, PI, LANL Institute of Geophysics and Planetary Physics (IGPP) project with UC Davis to study carbon-monoxide self shielding (COSS) in the laboratory; COSS is a phenomenon confirmed by the Genesis mission to have fractionated the oxygen and nitrogen isotopes in the early solar nebula.

2013-2015, Co-I on \$5.3M LANL Internal R&D project on Raman and LIBS combined instrumentation.

2015-2019, PI, NASA Laboratory Analysis of Returned Samples Project to analyze Genesis samples for the purpose of understanding solar-wind fractionation.

2016-2020, Co-I, NASA Minority Institution Grant (N. Melikechi, PI, U. Mass. Lowell), development of LIBS.

2017-2020, PI, LANL Internal R&D project to develop OrganiCam, a panoramic fluorescence imager for detection of bio-organic molecules, potentially for the Europa Lander.

2018-2020, Deputy lead for maturation of Raman-LIBS Spectrometer instrument designed for future Venus lander missions.

2023-present, Co-Investigator on OrganiCam MATISSE instrument maturation program.
<https://www.youtube.com/watch?v=DYUHAzaOKvM>.

Personnel Management Skills

- Led two major NASA flight projects and co-led a third
- 2010, passed a course in project management taught by former LANL division leader David Schneider using the book, *Critical Chain* (Eliyahu Goldratt, 2002) among other resources
- 2018-2021, Team Leader for Space Planetary Exploration in LANL's ISR Division

Review Panels and Proposal Evaluations

- NASA: Participation on numerous proposal review panels and write-in evaluations including PIDDP/PICASSO, HCIPE, PG&G, LARS, MFRP, SALMON, ASTID, PLANET, PDART, and Outer Planets evaluations.
- Other: Participated in evaluations for NSF, DTRA, LANL, and foreign proposals including for ESA.

Other NASA Service

2014-present, NASA Curation and Analysis Planning Team for Extraterrestrial Materials (CAPTEM) sub-committee responsible for Genesis mission sample allocation

1999-present, NASA Mars Exploration Planning and Assessment Group (MEPAG) participant; also participate from time to time in Venus exploration planning (VEXAG) meetings.

Courses Taught

- EAPS 59100-135, Mars Exploration (fall, 2022)
- EAPS 59100, Planetary Spacecraft Instrumentation (spring 2023)

Guest or Visiting Scientist

- 1984-87, Johnson Space Center, Houston, TX
- 1992-96, Argonne National Laboratory, Argonne, IL
- 1995, Physikalisches Institut, Bern, Switzerland
- 2009, Institut de Recherche en Astrophysique et Planetologie, Toulouse, France

Professional Memberships

American Geophysical Union (AGU), Life Member

Awards and Special Mention

- 2003, R&D100 Magazine Invention Award for development of a combined LIBS-Raman instrument
- 2009, NASA Group Achievement Award, for the Genesis mission
- 2011, Los Alamos National Laboratory Top 10 Science Stories for the oxygen isotope composition of the Sun

- 2012, 2013, Los Alamos National Laboratory Top 10 Science Stories for ChemCam discoveries
- 2013, Los Alamos National Laboratory Distinguished Performance Award, for Mars-time ChemCam operations
- 2014, NASA Leadership Individual Award, as Principal Investigator of ChemCam
- 2014, NASA Group Achievement Award, for the ChemCam team
- 2015, LANL ISR division scientist of the year
- 2016, Chevalier de l'Ordre National des Palmes Academiques (knighted by the office of the Education Ministry of France for forging ties between the French and American academic communities)
- 2016, Chevalier de l'Ordre National Merite (knighted by the office of the Science Minister of France for forging ties between the French and American scientific communities)
- 2017, Fellow, Los Alamos National Laboratory
- 2017, Doctorus Honoris Causa, University of Toulouse
- 2017, Air and Space Academy Vermeil Medal
- 2017, Asteroid 41795 WIENS
- 2019, LANL Distinguished Performance Award for delivery of SuperCam
- 2020, R&D 100 award, OrganiCam invention;
<https://www.youtube.com/watch?v=DYUHAzaOKvM>
- 2022, Patent #11,467,090 B1, Single Detector Laser-Induced Fluorescence Imager and Raman Spectral Instrument (OrganiCam)

Sponsored Lectures

- 2005, LANL Frontiers in Science, Genesis lecture, Albuquerque, Los Alamos, Taos
- 2008, Larry Haskin Memorial Lecture, Washington University, Saint Louis
- 2009, Lunar and Planetary Institute, Houston, Genesis lecture
- 2010, Planetary Science, Chiba, Japan
- 2010, Planetary Science, Daejeon, South Korea
- 2010, Planetary Science, Seoul National University, South Korea
- 2011, Public and technical lectures, DSU, Dover, Delaware
- 2012, DOE Workshop on Sensors, with the Secretary of Energy, Chicago
- 2013, LANL Frontiers in Science, Curiosity lecture, Albuquerque, Santa Fe, Taos, Los Alamos
- 2013, Princeton Plasma Physics Laboratory
- 2013, Open University, Milton Keynes, UK
- 2013, University of Leicester, UK
- 2013, NSSC Summer School, Berkeley
- 2013, SCCM/AIRAPT Banquet Lecture, Seattle
- 2013, SPIE Optics and Photonics Plenary Talk, San Diego
- 2013, Westmont College, Santa Barbara
- 2013, 2014, Calvin College, Grand Rapids
- 2014, 2015, Pittsburg Analytical Chemistry Plenary Talks, Chicago and New Orleans

- 2015, University of California, Davis
- 2015, National Radio Astronomy Observatory, Socorro
- 2015, University of Florida Chemistry Department, Gainesville (3 lectures)
- 2016, Keynote speaker, American Scientific Affiliation Annual Meeting
- 2017, Stanford University, Department of Geophysics
- 2017, LeTourneau University, plus TV interviews & newspaper front page
- 2017, Calvin College, Grand Rapids
- 2017, Dordt University, First Monday Lecture Series
- 2017, Los Alamos Phi Beta Kappa speaker of the year
- 2017, Spectroscopy Symposium, Purdue University
- 2018, University of Michigan CLASP Department Chair candidate speaker
- 2018, Banquet speaker, Winter Conference on Plasma Spectroscopy
- 2018, Clemson U. Chemistry Symposium keynote speaker
- 2018, Southern Illinois University, Boris Muslin Symposium keynote speaker
- 2018, Los Alamos ProjectY Night with a Nerd
- 2018, Great Lakes Institute, University of Minnesota, Duluth; front page of Duluth newspaper
- 2018, Physics Department, University of Massachusetts, Lowell
- 2019, Geology Department, Baylor University
- 2019, University of Basque Country, Leioa, Spain
- 2019, Keynote speaker, Symposium on Life in the Universe, Wheaton College
- 2019, Banquet speaker, Mountain Lake Area Foundation
- 2019, Distinguished Lecture Series, Wyoming Stargazing, Jackson WY, plus radio and newspaper interviews
- 2019, Levandowski Lecturer; Earth, Atmospheric, and Planetary Sciences, Purdue University
- 2020, Lunar and Planetary Institute, Houston, public seminar speaker (virtual event)
- 2020, American Scientific Affiliation, West Michigan chapter, public seminar (virtual event)
- 2020, Royal Astronomical Society, London, keynote speaker (virtual event)
- 2020, Pajarito Environmental Education Center Astronomy talk on Mars (virtual event)
- 2020, University of New Mexico Geology seminar speaker (virtual event)
- 2021, Planetary Society Mars landing event (virtual event)
- 2021, Modesto Area Planetarium and Science Outreach (virtual event)
- 2021, Eastern Analytical Symposium Plenary Lecture
- 2022, Frank G. and Jean M. Chesley lecturer, Carleton College, Minnesota
- 2022, Planetary Society, Chicago Chapter (virtual event)
- 2022, Wheaton College, local American Scientific Affiliation Chapter
- 2023, Denver, local American Scientific Affiliation Chapter (virtual)

Meeting and Session Convener or Chair

- 2012-2013, Co-convener of an International Team on Solar Wind Fractionation, two week-long meetings at the International Space Science Institute, Bern, along with side meetings elsewhere.
- 2014 Fall AGU Meeting, Co-convener of session, “The Martian Crust: Synergism of Meteorites and Missions”

- 2018 Fall AGU Meeting, Convener of session, “Diagenesis on Mars and Clues from Terrestrial Systems”
- 2019 Co-convener of an International Team on “Cross-calibration of Laser-Induced Breakdown Spectroscopy (LIBS) instruments for planetary exploration, one week-long meeting at the International Space Science Institute in Bern.
- 2019 Session chair at Planetary Caves Workshop, Carlsbad, NM
- 2020 Fall AGU Virtual Meeting, Co-convener of session, “Raman Spectroscopy for Mineralogy and Organics on Planets and Analog Samples”
- 2022 Lunar and Planetary Science Conference, session chair for “A Year of Perseverance at Jezero II”

Outreach

I have given personal presentations on Mars exploration to the following individuals and groups:

- Bill Gates and son Rory, 2013
- University of California Board of Regents, 2012
- Janet Napolitano, 2014
- Chris Godsick, 2014
- Los Alamos National Security Board of Governors, 2014
- Larry Gerschwin, 2015
- Moro Toyoshima, 2015
- John and Linda Mars, Mars Inc. (family owners of \$33B business), 2019

Interviews and appearances: I have given live and taped interviews on many TV and radio news programs and news outlets in the US and in Europe, including National Public Radio, Associated Press, Secrets of the Universe (2021). In 2022 I was interviewed for The Register and the Dutch News Service.

Blogs: I have written NASA Mars rover blogs as follows:

- Curiosity: 2016-2020
- Perseverance: August 2021, March 2022, May 2022, July 2022, December 2022.

Languages

- English: Native tongue
- German: Was nearly fluent at one time
- French: Comprehension and writing, moderate
- Spanish: Starting
- Chinese: Studied for one year
- Greek, written: Hobby

Undergraduate and Post-Baccalaureate Students

- Liese-Marie Nortier Sutherland, New Mexico State University, 2010
- Ryan Jackson, Eastern New Mexico University, 2014
- Hannah Pagel, Calvin College, 2014

- Eric Carlson, New Mexico Tech, 2015
- Alex Parra, West Point, 2015
- Keian Hardy, Naval Academy, 2015
- Veronica Sanford, Ursinus College, 2016
- Ethan Haldeman, Ursinus College, 2016
- Madeleine Bodine, New Mexico Tech, 2016
- Sarah Lamm, KSU, 2016-2018
- Sean Czarnecki, ASU, 2018
- Joseph Sarrao, LAHS, 2018-2021
- Miles Egan, U. Hawaii, 2019
- Alyre Blazon-Brown, U. Mass. Lowell, 2020-2022
- Noah Martin, AAE, Purdue, 2023-present

Graduate Student Mentor

- Stephanie Connell, 2022-
- Henry Manelski, 2022-

Graduate Students, Committee Member

- Mark Shappirio, University of Virginia, 2001. Currently a scientist at Goddard Space Flight Center
- Nina Lanza, University of New Mexico, 2011, institution advisor: Horton Newsom. Currently a scientist at Los Alamos National Laboratory Planetary Exploration Team
- Agnes Cousin, Université Paul Sabatier, Toulouse, 2011, institution advisor: Sylvestre Maurice. Currently Professor at Université Paul Sabatier, Toulouse.
- Xiaoyu Xi, University of California, Davis, 2012, institution advisor: Qing-zhu Yin
- Ann Ollila, University of New Mexico, 2013, institution advisor: Horton Newsom. Currently a scientist at Los Alamos National Laboratory Planetary Exploration Team
- Alissa Mezzacappa, Delaware State University, 2015, institution advisor: Nouredine Melikechi
- Ryan Jackson, University of New Mexico, 2020, institution advisor: Horton Newsom
- Baptiste Chide, U. Toulouse, 2020, advisors: Sylvestre Maurice, David Mimoun
- Zach Gallegos, University of New Mexico, currently a student, institution advisor: Horton Newsom

Graduate Students, Other

- Johan Mazoyer, U. Toulouse, foreign study stage, 2011
- Imanol Torre Fernandez, U. Basque Country, foreign study stage, 2019
- Lenaig Hurtrez, U. Lyon, foreign study stage (virtual), 2022

Post-doctoral Researchers

- Kurt Dekoning, 2003-2004
- Jeremie Lasue, 2010-2012, currently Professor at Université Paul Sabatier, Toulouse
- Nina Lanza, 2012-2014, received LANL Distinguished Post-doc Award and LANL Early Career Award; currently scientist in LANL's Planetary Exploration Team
- Agnes Cousin, 2013-2014, currently Professor at Université Paul Sabatier, Toulouse
- Paolo Pilleri, 2013-2014, currently researcher at Institute pour Rescherche en Astrophysique et Planetologie, Toulouse
- Jens Frydenvang, 2015-2017, currently Professor at U. Copenhagen
- Patrick Gasda, 2015-2018, currently scientist in LANL's Planetary Exploration Team
- Karen Rieck, 2016-2019, currently researcher at New Mexico Consortium
- Ann Ollila, 2016-2019, LANL Director's Postdoc, currently scientist in LANL's Planetary Exploration Team
- Carey Legett IV, 2019-2022, currently scientist in LANL's Planetary Exploration Team
- Baptiste Chide, 2021-2022, LANL Director's Postdoc
- Clement Royer, 2022-

Visiting Scholar

- Lucia Mandon, 2022