CURRICULUM VITAE

Luther Beegle
Jet Propulsion Laboratory
California Institute of Technology
M/S 183-335B 4800 Oak Grove Dr.
Pasadena, California 91109
Phone: (818)-354-2400 Email: Luther.Beegle@jpl.nasa.gov

Education

University of Alabama at Birmingham	Ph.D.	1997	Astrophysics
A Model of the Complex Hydrocarbon Component of the Interstellar Medium: Observational and Experimental Considerations			
University of Alabama at Birmingham	MS	1995	Physics
University of Delaware	BS	1990	Physics/Astronomy

Present Position:

2014-present: Principal Investigator, SHERLOC.
2016-present: Deputy Division Manager, Science.
2015-present: Principal Scientist, Jet Propulsion Laboratory. Responsibilities include conducting NASA funded research as a PI and Co-I in planetary science focusing on detection and characterization of organic molecules for the identification of potential biosignatures.
2009-present: Surface Sampling System Scientist MSL SASHaP system. Supported the development of the hardware testbeds and identified samples for ambient testing until MSL landed. Participation in scientific operations focusing on properties of surface material and the acquisition and processing of samples in Gale Crater.

Past Positions:

2013-2016: Deputy Section Manager, Planetary Science Section, Science Division at JPL.
2003-2015: Research Scientist, Jet Propulsion Laboratory, California Institute of Technology, Pasadena California. Responsibilities include conducting NASA funded research as a PI and Co-I in planetary science focusing on detection of organic molecules off in situ platforms.
2005-2013 Group Supervisor Group 3225, Planetary Chemistry and Astrobiology group, Science Research Division, Jet Propulsion Laboratory, California Institute of Technology.
- Supervised a research group of 8 to 15 Ph.D. scientists

2001-2003: Scientist, Jet Propulsion Laboratory, California Institute of Technology, Pasadena California. Conducted NASA funded research as a PI and Co-I on the collection, extraction, detection and identification of organic molecules as part of a future *in situ* rover platform.
1999- 2001: Postdoctoral Scholar, California Institute of Technology, Pasadena California Developing analytical instrumentation techniques for the *in-situ* search for organic molecules. Conducted astrobiological experiments to help elucidate conditions organic molecules might face on extraterrestrial planets.
1997- 1999: National Research Council Post-Doctoral Scholar, Jet Propulsion Laboratory, California Institute of Technology, Pasadena California. Performed first ever

temperature dependent absorption spectroscopy of atmospheric species. Performed electron impact studies on the atmospheric species of CO and SO_2.

1996: Instructor, PHS110, An Overview of Space Exploration, The University of Alabama at Birmingham.

1993-1997: Research Assistant, The University of Alabama at Birmingham, under NASA programs: Origins of Solar Systems, Exobiology, UV Astronomy, and IR Astronomy. Investigated interstellar molecules and ions which make up the interstellar medium and are responsible for several Astronomical features including the 2175 Å bump, Unidentified Infrared bands, and Diffuse Interstellar Bands (UV Astronomy, IR Astronomy and Origins of Solar Systems). Addition investigations included work on the miniaturization of a laser Raman spectrometer (PIDDP), and identification of carbonaceous material in ancient terrestrial rock samples as Martian Analogs (Exobiology).

1991-1993: Teaching Assistant, The University of Alabama at Birmingham. Taught Classical Mechanics laboratory for majors and non-majors, Thermodynamics for majors, Electricity and Magnetism for majors, and Modern Physics for majors.

Funded Proposals (PI):

Scanning Habitable Environments with Luminescence and Raman for Organics and Chemistry: SHERLOC. An investigation on Mars 2020 to launch August 2020.

Proof of Concept Study for a Laser Desorption-Infrared Spectroscopy System to Remotely Identify Astrobiologically Important molecules on Icy worlds, NASA Astrobiology Science and Technical Instrument Development (ASTID), 2 Yrs, $400,000. 2009-2011.

Development of an automated sample preparation system (ASPS), Mars Instrument Development Program (MIDP), 3 years, $1,573K. 2008-11.

A Novel Field-Induced Droplet Ionization (FIDI) for the in situ detection of organic molecules, JPL Directors Research and Development Fund, 1 yr, $199,000. 2007-8

Microbiology of the Cima Lava Fields, JPL Research and Technology Development Program, 4 Months, $30K. 2007.

Diffusion of Methane through regolith under simulated Martian Conditions, JPL Research and Technology Development Program, 1 yr, $81,000. 2006.

Microwave Enhanced Extraction of Organic Molecules from Soil and Rock Samples, NASA Astrobiology Science and Technical Instrument Development (ASTID), 3 Yrs, $650,000. 2004-2006.

A Laboratory Proof-of-Concept Study of an Organic Molecule Collector/Preconcentrator for Future Planetary Missions, NASA Astrobiology Science and Technical Instrument Development (ASTID), 3 Yrs, $400,000, 2002-2005.

Microwave enhanced extraction of organic molecules from rock and soil samples. JPL Director's Research and Development Fund, 1 year $40,000, 2002.

Funded Proposals (Co-I):

Co-Investigator on 18 peer-reviewed proposals which were funded under 7different NASA programs: ASTEP, MIDP, PIDDP, ASTID, Vision Missions, Origins of Solar Systems, Exobiology and UV/VIS Astrophysics.

Funded Proposals (Task Manager-Co-I):

Advanced Robotic Detection of Chemical/Biological Agents, Toxic Industrial Gases and IEDS for Force Health Protection PHASE II SBIR from the Army. Small Business point of contact: IonFinity, *LLC*. 2.5 years, $225K. 2008

Miniature Electric Sniffer for Navy Vertical Take-Off Unmanned Aerial Vehicle (VTUAVS) SBIR from the Army. Small Business point of contact: IonFinity, *LLC*. 2 years, $225K. 2008.

Professional Activities:

- Editor, *Astrobiology* Journal
- Member of a multi-center ad hoc committee (*Keeping the candle lit*) for future human exploration of Mars (2010-2013).
- Member of the American Association for the Advancement of Science, the International Society of Ion Mobility Spectroscopy, the American Geophysical Union, and the American Chemical Society.
- Member of the Astrobiology Science Steering Group to define Astrobiological objectives for future Mars missions (2004)
- Member of the Mars Human Precursor Science Steering group defining risks and measurements needed for human exploration of Mars (2005)
- Worked with the University of Alabama at Birmingham's Media Relations department as science expert for local interviews with television stations and newspapers.
- Worked with education outreach at University of Alabama at Birmingham as guest lecturer at local schools (elementary, middle and high).
- Judge for the Alabama Science Olympiad (1995, 1996, 1997).
- Mail in reviewer for PIDDP program (2001, 2004, 2005, 2006)
- Member of review panel for Laboratory Astrophysics program (2007), Moon, Mars Analog Mission Activities (MMAM, 2011)
- Reviewer for Planetary and Space Science, Astrobiology, and Analytical Chemistry
- Reviewer for NASA Mars Fundamental Research Program (2005)
- Organized topical session "Mars Analogue Research and Instrument Field Testing" for The Geological Society of America Annual Meeting, Salt Lake City, October, 2005.

Mentor:

Post Doctorial Mentor for: Joseph Razzell Hollis, Brandi Carrier, Hugh Kim and Everett Salas

Summer Students: Hanieh Amoozegar, Brett Beckett,Alexa Raquel Bilek, Andrew Carnes, Juliana Capri, Nathan Figlewski, Kristina Goltz, Benjamin Hall, Samuel Long, Hugh Kim, Ernest Ryu, Alison Saltzman, Shakher Sijapati, Santosh Soparawalla, Meagan Spencer, Saman Halabian

Patents:

- Proton-Transfer Reaction/Ion Mobility Spectrometer. Developed a novel high-pressure hollow cathode ionizer for use in ambient Martian environments. Patent number: 6,794,645 B2, 21 September 2004.
- Development of an automated de-salting apparatus. NPO 45428
- Non-Contact Conductivity Measurement for Automated Sample Processing Systems. Provisional Patent CIT-5831-P.

Awards and Recognitions:

JPL Voyager Award:

2017 For leading the Lab-wide conference travel adjudication process.

JPL Explorer Award:

2014 For leading the winning SHERLOC instrument proposal for Mars 2020

JPL Mariner Award:

2013 MSL Science operations

2010 ExoMars 2016 instruments AO call.

NASA Group Achievement Award:

2017 MSL Extended Mission-1 Science and Operations Team: For exceptional technical innovations + execution of rover surface operations leading to numerous, profound new discoveries about the ancient climate

2017 MSL Non-Percussive Drilling Development Team: For exceptional achievement in developing the non-percussive drilling capability for the Mars Science Laboratory.

2015 MSL Prime Mission Science and Operations Team: MSL Prime Mission Science and Operations Team Group Achievement Award

2014 MSL SA/SPaH Dirty Testing Team Group Achievement Award

2014 NASA Instrument Cost Model Team Group Achievement Award

2013 MSL Surface Sampling and Science Systems Team

2013 MSL Science Office Development and Operations Team

2013 MSL Project Operations Team

2007 NASA Instrument Cost Model Group

2005 MER 3rd and 4th Extended Mission Team

JPL Team Bonus Award:

2017 For the successful completion of the SHERLOC CDR milestone

2016 For the successful completion of the SHERLOC PDR milestone

2012 MSL QMDT Rework Team

2010 Decadal Survey Support Team

2005 Mars Roadmapping Support Team

2004 Mars Next Decade Study Team

2004 In situ Sample Processing Team

Outstanding Physics Graduate Student (1996-97) The University of Alabama at Birmingham

Peer Reviewed Publications:

Carrier Brandi, Luther Beegle, William Abbey, Rohit Bhartia, Yang Liu (2019) Attenuation of Ultraviolet Radiation in Rocks & Minerals: Implications for Mars Science. Journal of Geophysical Research: Planets. In Press

Eshelman, E. J., M. J. Malaska, K. S. Manatt, I. J. Doloboff, G. Wanger, M. C. Willis, W. J. Abbey, L. W. Beegle, J. C. Priscu, and R. Bhartia (2019) WATSON: In Situ Organic Detection in Subsurface Ice Using Deep-UV Fluorescence Spectroscopy. Astrobiology 19 (6) 771-784. DOI: 10.1089/ast.2018.1925

Sapers, H. M., J Razzell Hollis, R. Bhartia, L.W. Beegle, V. J. Orphan, J.P. Amend (2019) The Cell and the Sum of Its Parts: Patterns of Complexity in Biosignatures as Revealed by Deep UV Raman Spectroscopy. Frontiers in Microbiology 10, DOI: 10.3389/fmicb.2019.00679

Abbey, W. J., R. C. Anderson, L. Beegle, J. Hurowitz, K. Williford, G. Peters, J. M. Morookian, C. Collins, J. Feldman, R. Kinnett, L. Jandura, D. Limonadi, C. Logan, S, McCloskey, J. Melko, A. Okon, M. Robinson, C. Roumeliotis, C. Seybold, J. Singer, N. Warner (2018). A Look Back: The Drilling Campaign of the Curiosity Rover during the Mars Science Laboratory's Prime Mission. Icarus 319, 1-13. DOI: https://doi.org/10.1016/j.icarus.2018.09.004

Peters, G.H., E.M. Carey, R.C. Anderson, W.J. Abbey, R. Kinnett, J.A. Watkins, M. Schemel, M.O. Lashore, M.D. Chasek, W. Green, L.W. Beegle, A.R. Vasavada (2018). Uniaxial

compressive strengths of rocks drilled at Gale crater, Mars. Geophysical Research Letters 45, 108-116. DOI: 10.1002/2017GL075965

Abbey, W. J., R. Bhartia, L. W. Beegle, L. DeFlores, V. Paez, K. Sijapati, S. Sijapati, K. Williford, M. Tuite, W. Hug, R. Reid (2017). Deep UV Raman spectroscopy for planetary exploration: The search for in situ organics. Icarus 290, 201–214. DOI 10.1016/j.icarus.2017.01.039 0019-1035

Jackson, R., R.C. Wiens, D. Vaniman, L. W. Beegle, O. Gasnault, H. Newsom, S. Maurice, P.-Y. Meslin, S. Clegg, A. Cousin, S. Schröder, J. Williams (2016). ChemCam investigation of the John Klein and Cumberland drill holes and tailings, Gale crater, Mars. Icarus 277, 330-341. DOI: 10.1016/j.icarus.2016.04.026

Anderson, R. C., L. W. Beegle, J. Hurowitz, C. Hanson, W. Abbey, C. Seybold, D. Liminodi, S. Kuhn, L. Jandura, K. Brown, G. Peters, C. Roumeliotis, M. Robinson, K. Edgett, M. Minitti and J. Grotzinger (2015). The Mars Science Laboratory scooping campaign at Rocknest. Icarus 256: 66-77. DOI**:** 10.1016/j.icarus.2015.03.033

Grotzinger, J. P., D. Y. Sumner, L. C. Kah, K. Stack, S. Gupta, L. Edgar, D. Rubin, K. Lewis, J. Schieber, N. Mangold, R. Milliken, P. G. Conrad, D. DesMarais, J. Farmer, K. Siebach, F. Calef, J. Hurowitz, S. M. McLennan, D. Ming, D. Vaniman, J. Crisp, A. Vasavada, K. S. Edgett, M. Malin, D. Blake, R. Gellert, P. Mahaffy, R. C. Wiens, S. Maurice, J. A. Grant, S. Wilson, R. C. Anderson, L. Beegle, R. Arvidson, B. Hallet, R. S. Sletten, M. Rice, J. Bell, J. Griffes, B. Ehlmann, R. B. Anderson, T. F. Bristow, W. E. Dietrich, G. Dromart, J. Eigenbrode, A. Fraeman, C. Hardgrove, K. Herkenhoff, L. Jandura, G. Kocurek, S. Lee, L. A. Leshin, R. Leveille, D. Limonadi, J. Maki, S. McCloskey, M. Meyer, M. Minitti, H. Newsom, D. Oehler, A. Okon, M. Palucis, T. Parker, S. Rowland, M. Schmidt, S. Squyres, A. Steele, E. Stolper, R. Summons, A. Treiman, R. Williams, A. Yingst and M. S. L. S. Team (2014). A Habitable Fluvio-Lacustrine Environment at Yellowknife Bay, Gale Crater, Mars. Science 343(6169). Doi: 10.1126/science.1242777.

Farley, K. A., C. Malespin, P. Mahaffy, J. P. Grotzinger, P. M. Vasconcelos, R. E. Milliken, M. Malin, K. S. Edgett, A. A. Pavlov, J. A. Hurowitz, J. A. Grant, H. B. Miller, R. Arvidson, L. Beegle, F. Calef, P. G. Conrad, W. E. Dietrich, J. Eigenbrode, R. Gellert, S. Gupta, V. Hamilton, D. M. Hassler, K. W. Lewis, S. M. McLennan, D. Ming, R. Navarro-Gonzalez, S. P. Schwenzer, A. Steele, E. M. Stolper, D. Y. Sumner, D. Vaniman, A. Vasavada, K. Williford, R. F. Wimmer-Schweingruber and MSL Science Team (2014). In Situ Radiometric and Exposure Age Dating of the Martian Surface. Science 343(6169). Doi: 10.1126/science.1247166

Minitti, M. E., L. C. Kah, R. A. Yingst, K. S. Edgett, R. C. Anderson, L. W. Beegle, J. L. Carsten, R. G. Deen, W. Goetz, C. Hardgrove, D. E. Harker, K. E. Herkenhoff, J. A. Hurowitz, L. Jandura, M. R. Kennedy, G. Kocurek, G. M. Krezoski, S. R. Kuhn, D. Limonadi, L. Lipkaman, M. B. Madsen, T. S. Olson, M. L. Robinson, S. K. Rowland, D. M. Rubin, C. Seybold, J. Schieber, M. Schmidt, D. Y. Sumner, V. V. Tompkins, J. K. Van Beek and T. Van Beek (2013). MAHLI at the Rocknest sand shadow: Science and science-enabling activities. Journal of Geophysical Research-Planets 118(11): 2338-2360. doi:10.1002/2013JE004426.

Jaramillo-Botero, A., Q. An, M. Cheng, W. A. Goddard III, L. W. Beegle and R. Hodyss (2012). Effects of Hypervelocity Impact of Molecules from Enceladus' Plume and Titan's Upper Atmosphere on NASA's Cassini Spectrometer from Reactive Dynamics Simulations. Physical Review Letters, 109 (21) Article 213201. doi: 10.1103/PhysRevLett.109.213201.

Abbey, W., E. Salas, R. Bhartia, and L. W. Beegle (2013) “The Mojave Vadose Zone: A Subsurface Biosphere Analog for Mars.” Astrobiology 13(7): 637-646. doi: 10.1089/ast.2012.0948.

Anderson, R. C., L. Jandura, A.B. Okon, D. Sunshine, C. Roumeliotis, L. W. Beegle, J.Hurowitz, B. Kennedy, D. Limonadi, S. McCloskey, M. Robinson. C. Seybold, K.Brown, and J. Crisp (2012) Collecting Powdered Samples in Gale Crater, Mars; An Overview of the Mars Science Laboratory Sample Acquisition, Sample Processing and Handling System. Space Science Reviews 170, 57-75, doi: 10.1007/s11214-012-9898-9.

Tsou, P. D. E. Brownlee, C. P. McKay, H. Yano, N. Strange, L. W. Beegle, R. Dissley, and I. Kanik (2012). "LIFE: Life Investigation for Enceladus: A Sample Return Mission Concept in Search for Evidence of Life. Astrobiology. 12(8): 730-742, doi: 10.1089/ast.2011.0813.

Sokol, E., R.J. Noll, R.G. Cooks, L.W. Beegle, H.I. Kim, and I. Kanik, (2010). "Miniature Mass Spectrometer Equipped with Electrospray and Desorption Electrospray Ionization for Direct Analysis of Organics from Solids and Solutions." International Journal of Mass Spectrometry, 306 (2-3), 187-195, doi:10.1016/j.ijms.2010.10.019

Kim H. I., H. Kim, Y. S. Shin, L. W. Beegle, W. A. Goddard, J. R. Heath, I. Kanik, and J. L. Beauchamp (2010). Time Resolved Studies of Interfacial Reactions of Ozone with Pulmonary Phospholipid Surfactants Using Field Induced Droplet Ionization Mass Spectrometry. Journal of Physical Chemistry B, 114, 9496-9503, doi: 10.1021/jp102332g.

Kim, H. I., H. Kim, Y.S. Shin, L.W. Beegle, S.S. Jang, E.L. Neidholdt, W.A. Goddard, J.R. Heath, I. Kanik and J.L. Beauchamp (2010) Interfacial Reactions of Ozone with Surfactant Protein B in a Model Lung Surfactant System, Journal of the American Chemical Society, 132 (7), 2254-22663 DOI: 10.1021/ja908477w.

Beegle, L.W., G. H. Peters, R. C. Anderson, R. Bhartia, A. G. Ball, and L. Sollitt (2009). Particle Sieving and Sorting Under Simulated Martian Conditions. Icarus 204, 687-696, doi:10.1016/j.icarus.2009.07.008.

Anderson, R. C., L. W. Beegle, Gregory H. Peters, G. Fleming, L.Jandura, K. Kriechbaum, K. Manatt, A. Okon, E. Pounders, L. Sollitt, and D. Sunshine (2009). Particle Transport and Distribution on the Mars Science Laboratory Mission: Effects of Triboelectric charging. Icarus 204, 545-557 doi:10.1016/j.icarus.2009.07.006.

Kim, H. I., H. Kim, E. Pang, L. W. Beegle, J. Loo, W. A. Goddard and I. Kanik (2009). Structural Characterization of Phospholipids Using Traveling Wave Ion Mobility Spectrometry in N2. Analytical Chemistry 81 (20), 8289-8297 doi: 10.1021/ac900672a.

Peters, G.H. G. S. Mungas, G. H. Bearman, S. Douglas, W. Abbey, R.C. Anderson, and L. W. Beegle (2008). Mojave Mars Simulant – a New Approach to Martian Soil Simulants. Icarus 197(2): 470-479.

Liu, D., L. W. Beegle, and I. Kanik. (2008). Analysis of Underivatized Amino Acids of Geological Interest using Ion-Pairing Liquid Chromatography/Electrospray Ionization/Tandem Mass Spectrometry. Astrobiology 8(2), 229-241 doi: 10.1089/ast.2007.0176.

Kim, H, H. I. Kim, P. V. Johnson, L. W. Beegle, J. L. Beauchamp, W. A. Goddard, and I. Kanik (2008). An Experimental and Theoretical Investigation into the Correlation between Mass and Ion Mobility for Choline and Other Ammonium Cations in N_2. Analytical Chemistry 80 (6), 1928-1936 doi: 10.1021/ac701888e.

Peters, G. H., J. A. Smith, G. S. Mungas, G. H. Bearman, L. Shiraishi and L. W. Beegle (2008). RASP Based Sample Acquisition of Analogue Martian Permafrost Samples: Implications for NASA's Phoenix Scout Mission. Planetary and Space Science 56 (3-4), 303-309 doi:10.1016/j.pss.2007.10.001.

Beegle, L. W., M. G. Wilson, F. Abilleira, J. F. Jordan and G. R. Wilson (2007). A concept for NASA's Mars 2016 Astrobiology Field Laboratory. Astrobiology 7 (4): 545-577.

Johnson, P. V., L. W. Beegle, H. I. Kim, G. A. Eiceman and I. Kanik (2007). Ion mobility spectrometry in space exploration. International Journal of Mass Spectrometry 262 (1-2): 1-15.

Kim, H. I., P. V. Johnson, L. W. Beegle, J. L. Beauchamp and I. Kanik (2005). Electrospray Ionization Ion Mobility Spectrometry of Carboxylate Anions: Ion Mobilities and a Mass-Mobility Correlation. Journal of Physical Chemistry A 109 (35): 7888-7895.

Johnson, P. V., H. I. Kim, L. W. Beegle and I. Kanik (2004). Electrospray Ionization Ion Mobility Spectrometry of Amino Acids: Ion Mobilities and a Mass-Mobility Correlation. Journal of Physical Chemistry A 108 (27): 5785-5792.

Ajello, J. M., D. L. Hansen, L. W. Beegle, C. A. Terrell, I. Kanik, G. K. James and O. P. Makarov (2002). Middle Ultraviolet and Visible Spectrum of SO2 by Electron Impact. Journal of Geophysical Research-Space Physics 107 (A7).

Beegle, L. W., I. Kanik, L. Matz and H. H. Hill (2002). Effects of Drift-Gas Polarizability on Glycine Peptides in Ion Mobility Spectrometry. International Journal of Mass Spectrometry 216 (3): 257-268.

Matz, L. M., H. H. Hill, L. W. Beegle and I. Kanik (2002). Investigation of Drift Gas Selectivity in High Resolution Ion Mobility Spectrometry with Mass Spectrometry Detection. Journal of the American Society for Mass Spectrometry 13 (4): 300-307.

Beegle, L. W., I. Kanik, L. Matz and H. H. Hill (2001). Electrospray Ionization High-Resolution Ion Mobility Spectrometry for the Detection of Organic Compounds, 1. Amino acids. Analytical Chemistry 73 (13): 3028-3034.

Beegle, L. W., T. J. Wdowiak and J. G. Harrison (2001). Hydrogenation of Polycyclic Aromatic Hydrocarbons as a Factor Affecting the Cosmic 6.2 Micron Emission Band. Spectrochimica Acta Part a-Molecular and Biomolecular Spectroscopy 57 (4): 737-744.

Kanik, I., L. W. Beegle, J. M. Ajello and S. C. Solomon (2000). Electron-Impact Excitation/Emission and Photoabsorption Cross Sections Important in the Terrestrial Airglow and Auroral Analysis of Rocket and Satellite Observations. Physics and Chemistry of the Earth Part C-Solar-Terrestrial and Planetary Science 25 (5-6): 573-581.

Arnoult, K. M., T. J. Wdowiak and L. W. Beegle (2000). Laboratory Investigation of the Contribution of Complex Aromatic/Aliphatic Polycyclic Hybrid Molecular Structures to Interstellar Ultraviolet Extinction and Infrared Emission. Astrophysical Journal 535 (2): 815-822.

Beegle, L. W., J. M. Ajello, G. K. James, D. Dziczek and M. Alvarez (1999). High Resolution Emission Spectroscopy of the A (1)Pi-X (1)Sigma(+) Fourth Positive Band System of CO Excited by Electron Impact. Astronomy and Astrophysics 347 (1): 375-390.

Kanik, I., L. Beegle, C. Noren, S. M. Ahmed and R. Link (1997). Temperature-Dependent photoabsorption Cross Section Measurements of O-2 at the NI Airglow and Auroral Emission Lines. Chemical Physics Letters 279 (5-6): 297-302.

Beegle, L. W., T. J. Wdowiak, M. S. Robinson, J. R. Cronin, M. D. McGehee, S. J. Clemett and S. Gillette (1997). Experimental Indication of a Naphthalene-Base Molecular Aggregate for the Carrier of the 2175 Angstrom Interstellar Extinction Feature. Astrophysical Journal 487 (2): 976-982.

Beegle, L. W., T. J. Wdowiak and K. M. Arnoult (1997). A Laboratory Analog for the Carrier of the 3 Micron Emission of the Protoplanetary Nebula IRAS 05341+0852. Astrophysical Journal 486 (2): L153-L155.

Robinson, M. S., L. W. Beegle and T. J. Wdowiak (1997). Inference of a 7.75 eV Lower Limit in the Ultraviolet Pumping of Interstellar Polycyclic Aromatic Hydrocarbon Cations with Resulting Unidentified Infrared Emissions. Astrophysical Journal 474 (1): 474-478.

Wdowiak, T. J., W. Lee, J. Cronin, L. W. Beegle and M. S. Robinson (1995). Plasma Processing of Interstellar PAHs into Solar-System Kerogen. Planetary and Space Science 43 (10-11): 1175-1182.

Robinson, M. S., L. W. Beegle and T. J. Wdowiak (1995). Spectroscopy of PAH Species in the Gas-Phase. Planetary and Space Science 43 (10-11): 1293-1296.

Wdowiak, T. J., L. W. Beegle, M. S. Robinson and W. Lee (1995). DIBs in Captivity. Planetary and Space Science 43 (10-11): 1429-1435.

Book Chapters:

https://www.elsevier.com/books/from-habitability-to-life-on-mars/cabrol/978-0-12-809935-3

Bhartia, R., W. Hug, R. Reid and L. Beegle (2014) "Explosives Detection and Analysis by Fusing Deep UV Native Fluorescence and Resonance Raman Spectroscopy." P.M. Pellegrino, E.L. Holthoff, M.E. Ferrell (Eds.) *Laser-based Optical Detection methods of Explosives*, Boca Raton, FL: Taylor & Francis Group.

Beegle, L. W., S. Feldman, P. Johnson and C. B. Dreyer (2009) "Instruments for *In-Situ* Sample Analysis." (Eds.) Y. Bar-Cohen and K. Zacny. John Wiley & Sons. Drilling in Extreme Environments: Penetration and Sampling on Earth and other Planets. ISBN: 978-3-527-40852-8. Pages 643-706

Johnson, P.V., L.W. Beegle, and I. Kanik (2012) "Mass Spectroscopy in Space Exploration." (Ed) M. Lee. Applied Mass Spectroscopy Handbook John Wiley & Sons. ISBM 978-0-470-53673-5

Invited Talks:

L.W. Beegle. The Mars 2020 missions: The first step in sample return. MarsFest 2018, Death Valley National Park 2018.

L.W. Beegle and the SHERLOC Science team. SHERLOC on Mars 2020: From Physics to Engineering to Geobiology. American Association of Physics Teachers. San Diego Ca. 2017

L.W. Beegle and the SHERLOC Science team. SHERLOC, an investigation to find signs of life. Ghana Planetarium. Accra Ghana 2017.

L.W. Beegle and the MSL SASPaH team. Drilling on the Martian Surface with the Mars Science Laboratory. 15th ASCE Earth and Space Conference. Orlando Fl. 2016

L.W. Beegle and the SHERLOC Science team. SHERLOC: an Investigation to Find Potential Biosignatures on Mars 2020. University of Alabama at Birmingham, Birmingham Al. 2014.

L.W. Beegle. Mars and the Mojave: Studying the Red Planet from Death Valley. Mars in the Mojave Festival, Death Valley 2012, 2013, 2014.

L.W. Beegle. Palmer Quest: A Mission to the Martian Polar Caps. Committee on Science Opportunities Enabled by NASA's Constellation System, National Research Council, Washington, DC. February 21, 2008.

L.W. Beegle. Mars Exploration: Past, Present and Future. The University of Nevada Las Vegas, November 2006.

L.W. Beegle. Status of Astrobiology Instrument Development, National Research council for Astrobiology. Space Studies Board's Mars Astrobiology Strategy Committee, Washington DC May 11, 2006.

L.W. Beegle. Sample handling and planetary protection for in situ analysis and sample return. Workshop on Mars Astrobiology Science and Technology. Carnegie Institution of Washington. 8-10 September 2004.

L. W. Beegle. Temperature Dependent photoabsorption Cross Sections Measurements at the Aeronomicly Important Wavelengths. TIGRE Conference, Friburg Germany 1999.

Peer Reviewed Conference Publications:

Y. Bar-Cohen, K. Zacny, M. Badescu, H. J. Lee, S. Sherrit, X. Bao, G. L Paulsen, and L. Beegle", Auto-Gopher II– a biologically inspired deep drill for planetary exploration", IEEE HKN, the BRIDGE magazine, Special issue featuring bio-inspired engineering, Vol. 112, No. 1 (April 2016) pp. 20-24

Beegle, L.; Bhartia, R.; White, M.; DeFlores, L.; Abbey, W.; Yen-Hung Wu; Cameron, B.; Moore, J.; Fries, M.; Burton, A.; Edgett, K.S.; Ravine, M.A.; Hug, W.; Reid, R.; Nelson, T.; Clegg, S.; Wiens, R.; Asher, S.; Sobron, P. (2015) SHERLOC: Scanning habitable environments with Raman & luminescence for organics & chemicals Aerospace Conference, 2015 IEEE. DOI: 10.1109/AERO.2015.7119105

Badescu, M., A. Ressa, H. J. Lee, Y. Bar-Cohen, S. Sherrit K. Zacny, G. L. Paulsen, L. Beegle, X. Bao (2013) Auto-Gopher: A wireline deep sampler driven by piezoelectric percussive actuator and EM rotary motor Proc. SPIE. 8692, Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2013, 86922S. (April 19, 2013) doi: 10.1117/12.2010319

Zacny, K., G. Paulson, B. Mellerowicz, Y. Bar-Cohen, L. Beegle, S. Sherrit, M. Badescu, F. Corsetti, J. Craft, Y. Ibarra and X. Bao (2013) Wireline Deep Drill for Exploration of Mars, Europa, and Enceladus. Aerospace Conference, 2013 IEEE DOI: 10.1109/AERO.2013.6497189

Guerrero, J., L. W. Beegle, W. Abbey, R. Bharita, E. Salas, M. Russell, and D. Towles The Mojave Subsurface Bio-Geochemistry Explorer (MOSBE) Earth and Space 2012: 592-599. (doi: 10.1061/9780784412190.063)

Bar-Cohen, Y. Mircea Badescu, S.Sherrit, K. Zacny, G. L Paulsen, L. Beegle, X. Bao (2012) Deep Drilling and Sampling via the Wireline Auto-Gopher Driven by Piezoelectric Percussive Actuator and EM Rotary Motor. Proc. SPIE. 8345, Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2012, 83452A. (April 26, 2012) doi: 10.1117/12.914257

Soparawalla, S. J. Duncan, A. M. Fisher, I. Kanik, and L. W. Beegle (2012) *In situ* Analysis of Organic Material with a Portable Mass Spectrometer. Earth and Space 2012 Conference. ASCE. pp. 444-456 (doi: 10.1061/9780784412190.049)

Beegle, L.W. J. P. Kirby, A. Fisher, R. Hodyss, A. Saltzman, J. Soto, J. Lasnik and S. Roark (2011) Automated Sample Handling and Processing on Mars for Future Astrobiology Missions. Aerospace Conference, 2011 IEEE, paper # 1602 10.1109/AERO.2011.5747298

Zacny, K., D. McKay, L. Beegle, T. Onstott, R. Mueller, G. Mungas, P. Chu, and J. Craft, (2009) Novel Method of Regolith Sample Return from Extraterrestrial Body using a Puff of Gas Aerospace Conference, 2010 IEEE, paper #1082. DOI: 10.1109/AERO.2010.5446987

Mungas, G. S., Y. Gürsel, C. A. Sepulveda, C. La Baw, K. R. Johnson, M. Deans, L. Beegle, J. Boynton Development and optical testing of the camera, hand lens, and microscope probe with scannable laser spectroscopy (CHAMPS). Proc. SPIE 7060, 2008.

Mix, L. J., J. C. Armstrong, A. M. Mandell, A. C. Mosier, J. Raymond, S. N. Raymond, F. J. Stewart, K. von Braun, O. Zhaxybayeva, L. Billings, V. Cameron, M. Claire, G. J. Dick, S. D. Domagal-Goldman, E. J. Javaux, O. J. Johnson, C. Laws, M. S. Race, J. Rask, J. D. Rummel, R. T. Schelble, S. Vance, Z. Adam, P. Backus, L. Beegle, J. Bishop, K. Boering, M. Briley, W. Calvin, D. Catling, C. Cleland, K. E. Dodson, J. Fletcher, E. D. Acosta, I. de Zwart, J. Eigenbrode, J. Farmer, S. Frank, P. Gogarten, E. Goolish, R. Grymes, N. Haghighipour, T. Hudson, V. Ivkovic, M. Jahangeer, B. Jakosky, S. Kenyon, S. Kilston, A. Knoll, E. Korpela, D. Lamb, J. Lazio, R. Lenski, L. Link, K. Lloyd, J. Lunine, M. Manga, T. McCoy, K. Meech, G. Mello, S. Mojzsis, D. Morrison, O. Morton, D. Moser, K. Nealson, F. Nimno, R. Norris, E. Offerdahl, T. Olien, N. Pace, S. Pfiffner, C. Philips, S. Rao, D. Rodriquez, J. Rummel, B. Schopf, S. Seager, N. Sleep, M. Sogin, N. Solovaya, W. Sullivan, B. Thomas, T. Thorsteinsson, C. Tomow, M. Wevrick, N. Woolf, K. Yamaguchi and M. Zerella (2006). The astrobiology primer: An outline of general knowledge - Version 1, 2006. Astrobiology 6 (5): 735-813.

Habib-Agahi H. et al. NASA Instrument Cost Model (NICM). JPL Document#982-0000 Rev. 1, October, 2006.

Boynton, J. G. Mungas, C. Sepulveda, M. Balzer, L. W. Beegle, H. Hobel, T. Fisher, D. Klein, M. Deans, and P. Lee. CHAMP: Camera Hand lens, and Microscope Probe. IEEEAC paper 1510, 2005. DOI: 10.1109/AERO.2005.1559353

Contributed to: D. W. Beaty, et al. An Analysis of the Precursor Measurements of Mars Needed to Reduce the Risk of the First Human Mission to Mars. JPL Document CL#05-0381, 2005

Kanik I. and L.W. Beegle. Portable Instrument Detects Very Dilute Airborne Organics. NASA Tech Briefs, 71-72, March 2002.

Wdowiak, T. J., D. G. Agresti, S. B. Mirov, A. B. Kudryavtsev, and L. W. Beegle. Instrumental Considerations for the Exobiological Exploration of Europa. Europa Ocean Conference (San Juan Capistrano Research Institute, San Juan Capistrano) Capistrano Conf. No. 5, 83-84 1996.

Wdowiak, T. J., L. W. Beegle, W. Lee, and M. S. Robinson. Investigation of a Laboratory Candidate for the Carrier of the 4428 Å Diffuse Interstellar Band. in The Diffuse Interstellar Bands, ed. A. G. G. M. Tielens (NASA CP-10144), 65-70, 1994.

Editorials:

Stamenkovic, V., L. W. Beegle, K. Zacny, D. D. Arumugam, P. Baglioni, N. Barba, J. Baross, M.S. Bell, R. Bhartia, J.G. Blank, P.J. Boston, D. Breuer, W. Brinckerhoff, M.S. Burgin, I. Cooper, V. Cormarkovic, A. Davila, R.M. Davis, C. Edwards, G. Etiope, W. W. Fischer, D.P. Glavin, R.E. Grimm, F. Inagaki, J. L. Kirschvink, A. Kobayashi, T. Komarek, M. Malaska, J. Michalski, B. Menez, M. Mischna, D. Moser, J. Mustard, T. C. Onstott, V. J. Orphan, M. R. Osburn, J. Plaut, A. C. Plesa, N. Putzig, K. L. Rogers, L. Rothschild, M. Russell, H. Sapers, B. S. Lollar, T. Spohn, J.D. Tarnas, M. Tuite, D. Viola, L.M. Ward, B. Wilcox, R. Woolley (2019). The next frontier for planetary and human exploration. Nature Astronomy 3(2) 116-120. DOI: 10.1038/s41550-018-0676-9

Selected Meeting Abstracts:

Eshelman, E.; Bhartia, R.; Wanger, G.; Willis, M.; Carrier, B.; Abbey, W.; Malaska, M.; Beegle, L. W.; DeFlores, L.; Priscu, J.; Lane, A. L.; Mellerowicz, B.; Kim, D.; Paulsen, G.; Zacny, K. (2017) Wireline Analysis Tool for Subsurface Observation of Northern Ice Sheets (WATSON) 48th Lunar and Planetary Science Conference. The Woodlands, Texas. Lunar and Planetary Institute: Abstract #2326

Y. Bar-Cohen, K. Zacny, M. Badescu, H. J. Lee, S. Sherrit, X. Bao, G. L Paulsen, and L. Beegle, "The Auto-Gopher – A Wireline Rotary-Percussive Deep Sampler", Proceedings of the ASCE Earth and Space 2016 conference, Symposium 2: Exploration and Utilization of Extraterrestrial Bodies, Orlando, FL, April 11-15, 2016.

Y. Bar-Cohen, K. Zacny, M. Badescu, H. J. Lee, S. Sherrit, X. Bao, D. Freeman, G. L Paulsen, and L. Beegle, "Auto-Gopher-2 – Wireline deep sampler driven by percussive piezoelectric actuator and rotary EM motors". Proceedings of the CIMTEC 2016, 7th Forum on New Materials, Symposium O: Mining Smartness from Nature, from Bio-inspired Materials to Bionic Systems Symposium; O-5: Biologically inspired systems and robotics, Perugia, Italy, June 5-9, 2016

Y. Bar-Cohen, K. Zacny, M. Badescu, H. J. Lee, S. Sherrit, X. Bao, J. Chesin, G. L. Paulsen, and L. Beegle, 2016, "The Auto-Gopher – A Wireline Rotary-Percussive Sampler for deep subsurface planetary exploration", The 3rd International Workshop on Instrumentation for Planetary Missions (IWIPM-3), Pasadena, California, October 24-27, 2016,

Anderson, R.C., Calle, C., Shoop, S., Sullivan, R., Buehler, M., Chin, K., Beegle, L., Abbey, W., Carey, E., Peters, G. (2016) Soil Shear Properties Assessment, Resistance, Thermal, and Triboelectric Analysis (SPARTTA) Tool: A New Multitool Instrument for Identifying the Physical Properties of In-Situ Soils on Planetary Surfaces. 47th Lunar and Planetary Science Conference. The Woodlands, Texas. Lunar and Planetary Institute: Abstract #2478

Martin, P.E., Ehlmann, B.L., Blaney, D.L.; Bhartia, R., Allwood, A.C., Thomas, N.H., Clegg, S.M.; Wiens, R.C.; Beegle, L.W. (2016). Outcrop-Scale Studies of a Lacustrine-Volcanic Mars Analog with a Mars 2020-Like Instrument Suite. 47th Lunar and Planetary Science Conference. The Woodlands, Texas. Lunar and Planetary Institute: Abstract #2569

Anderson, R. C., Beegle, L., Abbey, W. (2015) Drilling on Mars: What We Have Learned from the Mars Science Laboratory Powder Acquisition Drill System (PADS) 46th Lunar and Planetary Science Conference. Houston, Lunar and Planetary Institute: Abstract #2417

Jackson, R. S., Wiens, R. C., Newsom, H. E., Beegle, L. W., Maurice, S., Williams, J. M. (2015) ChemCam Investigation of the John Klein and Cumberland Drill Tailings 46th Lunar and Planetary Science Conference. Houston, Lunar and Planetary Institute: Abstract #2301

Beegle, L. W., Anderson, R. C., Abbey, W. J. (2014) Mars Science Laboratory Sample Acquisition, Sample Processing and Handling Subsystem: A Description of the Sampling Functionality of the System after being on the Surface for Two Years. AGU Fall meeting, San Francisco

Beegle, L. W., Bhartia, R., DeFlores, L. P., Asher, S. A., Burton, A. S.; Clegg, S. M., Conrad, P. G., Edgett, K. S.; Ehlmann, B. L.; Langenhorst, F.; and 7 coauthors SHERLOC: Scanning Habitable Environments With Raman & Luminescence for Organics & Chemicals, an Investigation for 2020 AGU Fall meeting, San Francisco

Bhartia, R., Wanger, G., Orphan, V. J., Fries, M., Rowe, A. R., Nealson, K. H., Abbey, W. J., DeFlores, L. P.; Beegle, L. W. Spatially Resolved Chemical Imaging for Biosignature Analysis: Terrestrial and Extraterrestrial Examples (2014) AGU Fall meeting, San Francisco

Williford, K. H., Allwood, A., Beegle, L. W., Bhartia, R., Flannery, D., Hoffmann, A., Mora, M. F., Orbay, J.; Petrizzo, D. A., Tuite, M. L. Jr., Willis, P. A. Sample Return Science (2014) AGU Fall meeting, San Francisco

Bhartia, R.; Wanger, G. P., Orphan, V. J.; Fries, M. D., Rowe, A., Nealson, K.; Abbey, W. J., Beegle, L. W. (2014) Combining Chemistry and Morphology to Assess Biosignatures Eighth International Conference on Mars, Pasadena. Abstract #1434W

Williford, K. H., Allwood, A. C.; Liu, Y., Beaty, D.; Beegle, L., Bhartia, R.; Chen, Y., Flannery, D., Hoffmann, A., Lopes, R.; and 4 coauthors (2014) The JPL Center for Analysis of Returned Samples. Eighth International Conference on Mars, Pasadena. Abstract #1434

Stockton, A. M., Kim, J.; Willis, P. A.; Lillis, R.; Amundson, R.; Beegle, L.; Butterworth, A.; Curtis, D.; Ehrenfreund, P.; Grunthaner, F.; and 9 coauthors (2014) The Mars Organic Analyzer: Instrumentation and Methods for Detecting Trace Organic Molecules in our Solar System Eighth International Conference on Mars, held July 14-18, 2014 in Pasadena, Abstract #1171

Jaramillo-Botero, A. J. B.; Beegle, L. W. B.; Hodyss, R. P. H.; Goddard, W. A. G.; Darrach, M. R. (2014) Hypervelocity Impact Effects on Space Mission Instrumentation. 45th Lunar and Planetary Science Conference. Houston, Lunar and Planetary Institute: Abstract #1795

Beegle, L. W., and 20 Co-Authors (2014). SHERLOC: Scanning Habitable Environments with Raman and Luminescence for Organics and Chemicals, an Investigation for 2020. 45th Lunar and Planetary Science Conference. Houston, Lunar and Planetary Institute: Abstract #2835.

Long, S. K., L. W. Beegle and L. S. Sollitt (2014). Laser Desorption Infrared Spectroscopy: A Proof of Concept Study for Future Icy World Exploration. 45th Lunar and Planetary Science Conference. Houston, Lunar and Planetary Institute: Abstract #2437.

Anderson, R. C., L. W. Beegle, J. A. Hurowitz, D. Limonadi, L. Jandura, J. Melko, C. C. Seybold, M. Robinson, K. S. Edgett, R. A. Yingst and M. E. Minitti (2013). Results to Date for the Mars Science Laboratory Sample Acquisition, Sample Processing and Handling System (SA/SPaH). 44th Lunar and Planetary Science Conference. Houston, Lunar and Planetary Institute: Abstract #1728.

Eigenbrode, J. L….32 Co-Authors… and M. S. Team (2013). Detection of Organic Constituents Including Chloromethylpropene in the Analyses of the Rocknest Drift by Sample Analysis at Mars (SAM). 44th Lunar and Planetary Science Conference. Houston, Lunar and Planetary Institute: Abstract #1666.

Eigenbrode, J. L… 19 Co-Authors and MSL Science Team (2013). Fluorocarbon Contamination from the Drill on the Mars Science Laboratory: Potential Science Impact on Detecting Martian Organics by Sample Analysis at Mars (SAM). 44th Lunar and Planetary Science Conference. Houston, Lunar and Planetary Institute: Abstract #1652.

Paulsen, G., K. Zacny, B. Mellerowicz, Y. Bar-Cohen, L. W. Beegle, S. Sherrit, M. Badescu, F. Corsetti and Y. Ibarra (2013). Wireline Deep Drill for the Exploration of Icy Bodies. 44th Lunar and Planetary Science Conference. Houston, Lunar and Planetary Institute: Abstract #1333.

Edgett, K. S. …(34 co-Authors) …and the MSL Science Team (2013) Mars Hand Lens Imager (MAHLI) Efforts and Observations at the "Rocknest" Eolian Sand Shadow in Curiosity's Gale Crater Field Site, 44th Lunar and Planetary Science Conference. Houston, Lunar and Planetary Institute: Abstract 1201.

Edgett, K. S. …(47 Co-Authors) … and the MSL Science Team (2013) Curiosity's Mars Hand Lens Imager (MAHLI): Initial Observations and Activities, 44th Lunar and Planetary Science Conference. Houston, Lunar and Planetary Institute: Abstract 1199.

Zacny, K., G. Paulsen, B. Mellerowicz, J. Craft, L. Beegle, Y. Bar-Cohen, S. Sheritt, M. Badescu, Wireline Rotary-Percussive Coring Drill for Deep Exploration of Planetary Bodies 43rd Lunar and Planetary Science Conference, held March 19–23, 2012 at The Woodlands, Texas. LPI, 2012LPI. 43.1173Z, 2012

Sollitt, L.S., L. W. Beegle,O ff-Nadir LIDAR to Detect Bouguer Anomaly on Airless Worlds 43rd Lunar and Planetary Science Conference, held March 19–23, 2012 at The Woodlands, Texas. LPI, 2012LPI. 43.1236S, 2012

Figlewski, N.M. L.W. Beegle, L.S. Sollitt, Laser Desorption Infrared Spectrometry for Icy Moon Surfaces 43rd Lunar and Planetary Science Conference, held March 19–23, 2012 at The Woodlands, Texas. LPI, 2012LPI....43.2642F, 2012

Zacny, K., L. Beegle, T. Onstott, R. Mueller MarsVac: Actuator free Regolith Sample Return Mission from Mars Mars Balloon Science. Concepts and Approaches for Mars Exploration, held June 12–14, 2012 in Houston, Texas. LPI, 2012LPICo1679.4263Z, 2012

Bhartia, R, W.F. Hug, L.P. DeFlores, M.D. Fries, R.D. Reid, A. Allwood, W. Abbey, E.C. Salas, L. Beegle, Finding the Organics: A Compact Non-Conact, Non-Invasive Trace Organic and Mineralogical Mapping Arm Instrument Concepts and Approaches for Mars Exploration, held June 12–14, 2012 in Houston, Texas. LPI 2012LPICo1679.4188B, 2012

Wolf, A., L, Beegle, C. Raymond, J. Plaut, b. Pollard, Y. Gim, X, Wu, J. Hall. Mars Balloon Science. Concepts and Approaches for Mars Exploration, held June 12–14, 2012 in Houston, Texas. LPI, 2012LPICo1679.4294W, 2012

Beegle L.W., R. Kinnett and E. Klien (2012) Future Human Precursor Mission Missions and Architectures to Achieve Humans to Mars, Concepts and Approaches for Mars Exploration, held June 12–14, 2012 in Houston, Texas. LPI 2012LPICo1679.4365B, 2012

Bar-Cohen, Y., X. Bao, M. Badescu, L. Beegle, S. Sherrit, K. Zacny, Construction of Human Habitation Facility on Mars Using Low-Power Low-Mass Autonomous Robotic System Concepts and Approaches for Mars Exploration, held June 12–14, 2012 in Houston, Texas. LPI 2012LPICo1679.4072B, 2012

Amini, R. B., L. Beegle, J. C. Castillo-Rogez, K. Giapis, J. S. Snyder, Electric Propulsion Induced Secondary Mass Spectroscopy (EPI-SMS) 43rd Lunar and Planetary Science Conference, held March 19–23, 2012 at The Woodlands, Texas. LPI, 2012LPI....43.2781A 2012.

Jaramillo-Botero, A., M. J. Cheng, V. Cvicek, L. W. Beegle, R. Hodyss, W. A. Goddard III, First Principles Based Reactive Atomistic Simulations to Understand the Effects of Molecular Hyper Velocity Impact on Cassini's Ion and Neutral Mass Spectrometer Abstract #1948 42nd Lunar and Planetary Science Conference, Lunar and Planetary Institute, Houston 2011.

Tsou, P., D. E. Brownlee, C. P. McKay, L. Spilker, L. W. Beegle, I. Kanik, LIFE: Enceladus Sample Return Mission Concept for Searching Evidence of Life Abstract #247842nd Lunar and Planetary Science Conference, Lunar and Planetary Institute, Houston 2011.

Lasnik, J., J. Soto, S. Roark, L. W. Beegle Automated Sample Processing for Future Martian Astrobiology Missions Abstract #1589, 42nd Lunar and Planetary Science Conference, Lunar and Planetary Institute, Houston 2011.

Salas, E., W. Abbey, R. Bhartia, and L. W. Beegle The Mojave Desert: A Martian analog site for future Astrobiology Themed missions. Analogue Sites for Mars Missions: MSL and Beyond. March 5-6. The Woodlands Tx. 2011

Anderson, R. C. L. W. Beegle, and G. M. Fleming II, Understanding the Effects of Triboelectric Charging on Cross Sample Contamination in the Mars Science Laboratory Sample Handling System Abstract #2003 41st Lunar and Planetary Science Conference, Lunar and Planetary Institute, Houston 2010

Kirby, J. P. S. Halabian, I. Kanik, L. W. Beegle, S. Roark, J. Lasnik, J.Soto, Automated Sample Handling and Processing on Future Mars Missions Abstract # 2153 41st Lunar and Planetary Science Conference, Lunar and Planetary Institute, Houston 2010

Bhartia, R. M. D. Fries, W. H. Hug, R. D. Reid, L.W. Beegle, A. Alwood, A.L. Lane, E. C. Salas, K. H. Nealson. Deep UV Native Fluorescence and Resonance Raman Imaging Spectroscopy for In Situ Orgainc detection. Abstract #2674 41st Lunar and Planetary Science Conference, Lunar and Planetary Institute, Houston 2010

Beegle, L. W., R. C. Anderson, G. M. Fleming. Understanding cross sample talk as a result of triboelectric charging on future mars missions. AGU Fall meeting abstracts 2009.

Beegle, L. W., B. Beckett, E. Ryu, H. I. Kim, I. Kanik. Development of an APPIS-IMS instrument for space applications. Harsh Environment Mass Spectroscopy work shop. 2009.

Peters G. H. Mungas G. S. Murray S. D. Polk J. E. Lindeman R. Beegle L. Venus Analog Testbed for RASP and Sample Collection Testing Lunar and Planetary Science Conference XXXX Abstract #2518, Lunar and Planetary Institute, Houston 2009.

Anderson R. C. Peters G. H. Beegle L. Pounders E. Manatt K. Solitt L. Fleming G. Particle Transport on the Mars Science Laboratory Mission: Effects of Triboelectric Charging Lunar and Planetary Science Conference XXXX Abstract #1648, Lunar and Planetary Institute, Houston 2009.

Kim, H. I., L. W. Beegle, and J. L. Beauchamp Probing Interfacial Chemistry of Phospholipid Monolayers Using Field Induced Droplet Ionization Mass Spectrometry. Lipidomics and Lipids in Mass Spectrometry American Society for Mass Spectroscopy, Tampa 2009

Mungas, G. S., Y. Gürsel, C. A. Sepulveda, C. La Baw, K. R. Johnson, M. Deans, L. Beegle, J. Boynton Development and optical testing of the camera, hand lens, and microscope probe with scannable laser spectroscopy (CHAMPS). Proc. SPIE 7060, 2008.

Beegle, L. W., P.V. Johnson, R. Hoydess, R. Mielke, G. E. Orzechowska, Luke Sollitt and I. Kanik Toward the in situ quantification of organic molecules in solid samples: Effects due to sample handling and processing, Goldschmidt2008, Vancouver Ca 2008.

Peters, G. H., L. W. Beegle, G. S. Mungas, R. C. Anderson, and G. H. Bearman Rapid Sample Acquisition and Processing for In Situ Missions., Lunar and Planetary Science Conference XXXIX Abstract #2278, Lunar and Planetary Institute, Houston 2008.

Sollitt, L. S. and L. W. Beegle Laser Infrared Desorption Spectroscopy to Detect Complex Organic Molecules on Icy Planetary Surfaces. Lunar and Planetary Science Conference XXXIX Abstract #2242, Lunar and Planetary Institute, Houston 2008.

Mungas, G. S., Y. Gursel, C. B. Dreyer , C. S. Sepulveda, K. R. Johnson, J. E. Boynton , L. Beegle, Integrating Micro-LIBS with the Camera, Hendlens and Microscope Probe for Space Exploration. Lunar and Planetary Science Conference XXXIX Abstract #2492, Lunar and Planetary Institute, Houston 2008.

Beegle, L. W., M. G. Wilson, T. J. Schmidt and G. R. Wilson (2007). Current concept for NASA's 2016 astrobiology field laboratory. Astrobiology 7 (3): 479-479.

Peters, G., G. S. Mungas, G. H. Bearman, J. A. Smith, R. C. Anderson, L. W. Beegle and H. Sun (2007). Science investigations using a rapid active sampling package (RASP). Astrobiology 7 (3): 503-504.

Sollitt L. S. and L. W. Beegle Characterization of Methane Diffusion Through Simulated Martian Regolith. Lunar and Planetary Science Conference XXXVIII Abstract #1870, Lunar and Planetary Institute, Houston 2007

Mungas, G. S. G. H. Peters , J. A. Smith, G. H. Bearman, L. W. Beegle, C. Stuthers, J. Glucoft H2O Sublimation Alteration of Icy Martian Samples Due to Mechanical Work, Heat and Mass Transport. Lunar and Planetary Science Conference XXXVIII Abstract #2002, Lunar and Planetary Institute, Houston 2007

Beegle, L. W. G. H. Peters, G. S. Mungas, G. H. Bearman, J. A. Smith, R. C. Anderson. Mojave Martian Simulant: a New Martian Soil Simulant. Lunar and Planetary Science Conference XXXVIII Abstract #2005, Lunar and Planetary Institute, Houston 2007

Peters, G. H. G. S. Mungas, G. H. Bearman, L. W. Beegle, J.A. Smith. Characterization of RASP sample acquisition on the Phoenix MARS scout mission. Lunar and Planetary Science Conference XXXVIII Abstract #2008, Lunar and Planetary Institute, Houston 2007

Mungas, G. , L.W. Beegle et al. The alteration of icy samples during sample acquisition. AGU Fall meeting abstracts, 2006.

Guerrero J. L., et al. Robotic Drilling Technology and Applications to Future Space Missions. AGU Fall meeting abstracts, 2006.

Beegle, L. W., T.J. Schmidt, M.G. Wilson, and G.R. Wilson, A Concept for the Mars Astrobiology Field Laboratory. AGU Fall meeting abstracts, 2006.

Liu, D. L. L. W. Beegle, and I. Kanik. Ion-Pairing Liquid Chromatography/Electrospray Ionization Tandem Mass Spectrometric Analysis of 20 Underivatized Biotic Amino Acids of Geological Interest. HPLC 2006, San Jose, Ca. 2006

Sollitt L. and L. W. Beegle. Diffusion of methane through Martian regolith simulant. American Astronomical Society 208th Meeting Calgary, Canada 2006

Beegle, L. W., J. Guerrero, S. Douglas, R. Kidd, A. L. Lane, M. Pelletier, S. Feldman, G. S. Mungas, D. Blake, R. Dissly, J. H. Waite, D. T. Young, H. Sun S. Wells and the MSE Team, The Mars Subsurface Explorer. AbSciCon, Washington DC, Astrobiology Vol. 6, p 232, 2006.

Kanik, I. L. W. Beegle, S. Kounaves, R. G. Cooks, M. Hecht and P. V. Johnson. Wet Chemistry Experiment at Mars (WetChem). AbSciCon, Washington DC, Astrobiology Vol. 6, p 257, 2006.

Liu, D.L. L.W. Beegle, and I. Kanik. Determining Underivatized Amino Acids by Ion-Pairing Liquid Chromatography and Tandem Mass Spectrometry. AbSciCon, Washington DC, Astrobiology Vol. 6, p 255, 2006.

Schmidt, T.J. L.W. Beegle, M.G. Wilson, and G.R. Wilson, A concept for the 2016 Mars Astrobiology Field Laboratory. AbSciCon, Washington DC, Astrobiology Vol 6, p 185, 2006.

Beegle, L. W. J. Guerrero, S. Douglas, R. Kidd, A. L. Lane, M. Pelletier, S. Feldman, G. S. Mungas, D. Blake, R. Dissly, J. H. Waite, D. T. Young, H. Sun S. Wells and the MSE Team, The Mars Subsurface Explorer. Lunar and Planetary Science Conference XXXVII, Abstract #1467, Lunar and Planetary Institute, Houston 2006

Kim, H. I., H. Kim, L. W. Beegle, P. V. Johnson, J. L. Beauchamp, and I. Kanik Theoretical Ion Mobility Studies of Amino Acids. Lunar and Planetary Science Conference XXXVII, Abstract #2127, Lunar and Planetary Institute, Houston 2006

Kanik, I. L. W. Beegle, S. Kounaves, R. G. Cooks, M. Hecht and P. V. Johnson. Wet Chemistry Experiment at Mars (WetChem) Lunar and Planetary Science Conference XXXVII, Abstract #2154, Lunar and Planetary Institute, Houston 2006

Schmidt, T.J. L.W. Beegle, M.G. Wilson, and G.R. Wilson, A concept for the 2016 Mars Astrobiology Field Laboratory. Lunar and Planetary Science Conference XXXVII, Abstract #2337, Lunar and Planetary Institute, Houston 2006

Mungas, G.S., K.R. Johnson, M.J. Pelletier, C.A. Sepulveda, J. Feldman, C. Lebow, J.E. Boynton, M. Deans, B. Pain, L. W. Beegle. Raman/CHAMP- Camera, Handlens, microscope probe with integrated Raman laser probe, Lunar and Planetary Science Conference XXXVII, Abstract #2451, Lunar and Planetary Institute, Houston 2006

Johnson, P.V., K. Tang, L.W. Beegle and R.D. Smyth, Laser Ablation-Electrodynamical Ion Funnel for In Situ Mass Spectroscopy on Mars, Lunar and Planetary Science Conference XXXVII, Abstract #2451, Lunar and Planetary Institute, Houston 2006

Carsey, F. D., L. W. Beegle, R. Nakagawa, J. O. Elliott, J. B. Matthews, M. L. Coleman, M. H. Hecht, A. B. Ivanov, J. W. Head, Sarah Milkovich, D. A. Paige, A. N. Hock, D. I. Poston, M. Fensin, R. J. Lipinski, and T. M. Schreiner, Palmer Quest: A Feasible and Valuable Vision Mission to the Mars Polar Caps. Lunar and Planetary Science Conference XXXVI, Abstract #1844, Lunar and Planetary Institute, Houston 2005

Wilson, G.R., J.M. Andringa, L.W. Beegle, J.F. Jordan, G.S. Mungus, D. Mulliere, J. Vozoff, and T.J. Wilson. Mars Surface Mobility: Comparison of Past, Present and Future Rover Systems. Lunar and Planetary Science Conference XXXVI, Abstract #2219, Lunar and Planetary Institute, Houston 2005

Mungas, G.S., L.W. Beegle, J. Boynton, C.A. Sepulveda, T.A. Fisher, M.A. Balzer, H.R. Sobel, M. Deans, P. Lee CHAMP – Camera, Handlens, And Microscope Probe. Lunar and Planetary Science Conference XXXVI, Abstract #2045, Lunar and Planetary Institute, Houston 2005

Kanik, I., L. W. Beegle et. al. A Quantitative Analysis of Extraction of Organic Molecules from Terrestrial Sedimentary Deposit. AGU Fall meeting abstracts, 2004.

Beegle, L.W., et al. Camera, Hand lens, And Microscope Probe (CHAMP): An Instrument Proposed for the 2009 MSL Rover Mission. AGU Fall meeting abstracts, 2004.

Armstrong, J. C. L. W. Beegle, and G. Gonzalez. The Lunar Astrobiology Sample Return Mission: Searching for planetary material on the Moon. International Journal of Astrobiology, Supplement 19, 2004

Beegle, L. W. W. Abbey, A. Tsapin, H. I. Kim, I. Kanik, B. C. Laughlin and R. G. Cooks Solvent extraction of organic molecules from terrestrial samples: Quantitative results utilizing different organic solvents. International Journal of Astrobiology, Supplement 117, 2004

Beegle, L.W. W. A. Abbey, A. T. Tsapin., D. Dragoi, and I. Kanik, Extraction of Molecules from Terrestrial Material: Quantitative Yields from Heat and Water Extractions. Lunar and Planetary Science Conference XXXV, Abstract #2060, Lunar and Planetary Institute, Houston 2004

Kim, H.I. P.V. Johnson, L.W. Beegle and I. Kanik. The Effect of Salts on Electrospray Ionization Of Amino Acids in the Negative Mode. Lunar and Planetary Science Conference XXXV, Abstract #1784, Lunar and Planetary Institute, Houston 2004

Beegle, L. W., P.V. Johnson, I. Kanik, R. Dissly, D. Nicks, K. Kanizay, and C. Mone. Miniature Electrospray Ionization/Ion Mobility Spectrometer System ofr Detection of Organic Molecules on Mars. *Eos Trans. AGU*, 84(46), Fall Meet. Suppl., Abstract B52B-1041, 2003.

Laughlin, B. C., P. V. Johnson, L. W. Beegle, I. Kanik and R. G. Cooks, Hybrid Ion Mobility/Cylindrical Ion Trap Mass Spectrometer for *in situ* Detection of Chemical Warfare Agents, *51st American Society for Mass Spectrometry Conference*, June 8-12, 2003, Montreal, Quebec, Canada.

Dragoi, D., J. Kulleck, I. Kanik and L. W. Beegle Chiral Determination of Amino Acids using X-Ray Diffraction of Thin Films, Lunar and Planetary Science Conference XXXIV, Abstract #1682, Lunar and Planetary Institute, Houston 2003.

Beegle, L.W., C.A. Terrell, H. Kim, and I. Kanik High-Resolution Electrospray Ionization/Ion Mobility Spectroscopy for Detection of Abiotic Amino Acids. Lunar and Planetary Science Conference XXXIV, Abstract #1295, Lunar and Planetary Institute, Houston 2003.

Kanik, I., P. V. Johnson, L. W. Beegle, R. G. Cooks, B. C. Laughlin and H. H. Hill. Electrospray ionization/Ion Mobility Spectrometer/Cylindrical Ion trap mass spectrometer system for in-situ Detection of Organic Compounds, Lunar and Planetary Science Conference XXXIV, Abstract #1292, Lunar and Planetary Institute, Houston 2003.

Tsapin, A., I. Kanik, L.W. Beegle, L. Wu, and R. G. Cooks. Determining D/L ratios of amino acids found in ice above lake Vostok using ESI/CIT mass spectroscopy. Lunar and Planetary Science Conference XXXIV, Abstract #1294, Lunar and Planetary Institute, Houston 2003.

Beegle, L. W., I. Kanik and P. V. Johnson. An Eectrospray-Ionization Ion Mobility/Cylindrical Mass Spectrometer for In-Situ Detection of Organic Molecules on Mars, Europa and Titian. 2nd Astrobiology Science Conference, April 2002, NASA Ames.

Kanik, I., L. W. Beegle, and P. V. Johnson. A High-pressure Ionization Source for In-Situ Ionization and Detection of Organic Molecules in the Ambient Martian Atmosphere. 2nd Astrobiology Science Conference, April 2002, NASA Ames.

Beegle, L. W., and I. Kanik A high pressure hollow cathode ionization source for in-situ detection of organic molecules on Mars. Lunar and Planetary Science Conference XXXII, Abstract #2139 Lunar and Planetary Institute, Houston 2001.

Kanik, I., L. W. Beegle and H. H. Hill. Ultra High resolution electrospray ionization/ion mobility spectrometer system for in situ detection of organic compounds. Lunar and Planetary Science Conference XXXII, Abstract #2090, Lunar and Planetary Institute, Houston 2001.

Beegle, L. W., C. Noren and I. Kanik. A High pressure hollow cathode Discharge Source for Ion Mobility Spectrometers for In Situ Detection of Organic Molecules on Mars. Lunar and Planetary Science Conference XXXI, Lunar and Planetary Institute, Houston 2000.

Arnoult, K. M., T. J. Wdowiak, M. L. Wade, J. R. Garner, L.W. Beegle, and B.G. Coltress Aqueous Processing in Planetesimals of Interstellar Species Lunar and Planetary Science Conference XXXI, Lunar and Planetary Institute, Houston 2000.

Beegle, L. W., J. M. Ajello, G. K. James, M. Alvarez and D. Dziczek High Resolution Emission Spectroscopy of the A $^1\square\square-$ X $^1\Sigma^+$ Fourth Positive Band System of CO Excited by Electron Impact. IECPEC July 1999.

Wdowiak T. J. and L. W. Beegle A New Molecular Model for the Carrier of the 2175 Å Interstellar Extinction Feature. NASA Astrobiology Institute. NASA Ames Research Center, November 1998.

Beegle, L. W., J. M. Ajello, G. K. James, D. Dziczek and M. Alvarez. High Resolution Spectroscopy of the CO A-X Band System. 51st Gaseous Electronics Conference, October 1998.

Wdowiak, T. J., L. W. Beegle and K. M. Arnoult A New Molecular Model for the Carrier of the 2175 Å Interstellar Extinction Feature. Harvard April 1998. In Laboratory Space Science Workshop (Harvard Smithsonian Center for Astrophysics, Cambridge) 254-257 1998.

James, G., J. Ajello, I. Kanik, C. Noren, L. W. Beegle, D. Dziczek, C. Jonin, D. Shamansky, and X. Liu High Resolution UV Emission Spectroscopy of CO and N_2 Excited by Electron Impact. Laboratory

Astrophysics. Harvard April 1998. In Laboratory Space Science Workshop (Harvard Smithsonian Center for Astrophysics, Cambridge) 165-168 1998.

Ajello, J., G. James, I. Kanik, C. Noren, L. W. Beegle, D. Dziczek, C. Jonin, D. Shamansky, and X. Liu. UV Spectroscopy and Electron Impact Cross Sections of H_2, HD, O and H. Laboratory Astrophysics. Harvard April 1998. In Laboratory Space Science Workshop (Harvard Smithsonian Center for Astrophysics, Cambridge) 45 1998.

Wdowiak, T. J., K. M. Arnoult, and L. W. Beegle. Hydrogenated PAH (An Aromatic & Aliphatic Species) as a Component of the Interstellar and Circumstellar Mediums. Sixth Symposium on Chemical Evolution and the Origin and Evolution of Life. NASA Ames Research Center, November 1997.

Beegle, L. W., C. Noren, and I. Kanik. Temperature Dependent Photoabsorption Cross Section Measurements of O_2, 50th Gaseous Electronics Conference, University of Wisconsin October 1997.

Noren, C., S. M. Ahmed, I. Kanik, and L. W. Beegle. Temperature Dependent Photoabsorption Cross Section Measurements of O_2 at Significant Auroral and Airglow Emission Lines. IECPEC July 1997.

Wdowiak, T. J,. D. G. Agresti, S. B. Mirov, A. B. Kudryavtsev, L. W. Beegle, D. J. DeMarais, and A. F. Tharpe. Identification of Ancient Carbonaceous Cherts on Mars Using Raman Spectroscopy. Conference on Early Mars (Lunar and Planetary Institute, Houston Texas) LPI No. 916, 81, 1997.

Beegle, L. W., M. S. Robinson, T. J. Wdowiak, and J. Cronin. Evolution of Interstellar Polycyclic Aromatic Hydrocarbons into Other Species. From Stardust to Planetesimals. Annual Meeting of the Astronomical Society of the Pacific, Santa Clara, California, June 1996.

Robinson, M. S., L. W. Beegle, and T. J. Wdowiak. Inference of a 7.75 eV Lower Limit in the UV Pumping of Interstellar PAH Cations with Resulting UIR Emissions. From Stardust to Planetesimals. Annual Meeting of the Astronomical Society of the Pacific, Santa Clara, California, June 1996.