UNIVERSITY OF MARYLAND

Short biographies of Maryland Scientists engaged in planetary science research

UNIVERSITY OF MARYLAND

Prof. Millard H. Alexander

Distinguished University Professor

Affiliation(s): Department of Chemistry and Biochemistry, Institute for Physical Science and Technology

Major Awards

Fellow American Physical Society; John Simon Guggenheim Memorial Fellow; Dr. Lee's Fellow, Oxford; Kirwan Research Prize, University of Maryland; Hillebrand Award, Washington Section, American Chemical Society; President-Elect, Telluride Science Research Center

Research Interests

Molecular collision and reaction dynamics, non-adiabatic coupling in chemical dynamics, simulation of molecular collisions in planetary and interstellar environments, photodissociation of atmospheric molecules.

Selected Bibliography

F. Lique**, F. F. S. van der Tak, J. Klos, J. Bulthuis, and M. H. Alexander, "The importance of non-LTE models for the interpretation of observations of interstellar NO," Astron. Astrophys. **493,** 557-563 (2008).

F. Lique**, M. Jorfi*, P. Honvault, S. Lin, H. Guo, D. Xie, J. Klos, P. J. Dagdigian, and M. H. Alexander, "O + OH $\rightarrow O_2$ + H: A key reaction for interstellar chemistry. New theoretical results and comparison with experiment," J. Chem. Phys. (communication) **131,** 221104 (2009).

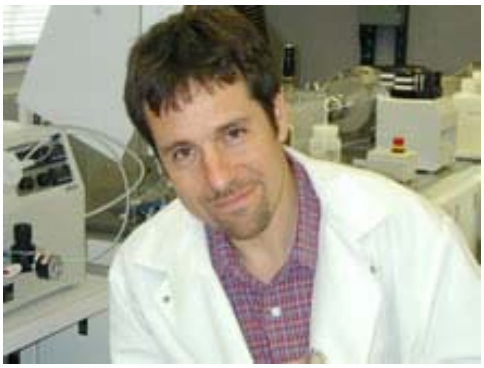
F. Lique**, G. L. Li**, H. J. Werner, and M. H. Alexander, "Communication: Non-adiabatic coupling and resonances in the F + H_2 reaction at low energies," J. Chem. Phys. **134**, 231101 (2011).

J. J. Kay**, J. Klos, M. H. Alexander, K. E. Strecker, and D. W. Chandler, "Cold atoms by kinematic cooling," Phys. Rev. A **82**, 032709 (2010).

M. H. Alexander, "Chemical Kinetics Under Test," Science **331**, 411–412 (2011).

***Post-doc, *Graduate student*

UNIVERSITY OF MARYLAND



Dr. Richard Ash

Faculty Research Assistant/Lab Manager

Affiliation(s): Department of Geology

Research Interests

The origin and evolution of solid materials in the early solar system. I have used a variety of chronometers to date chondritic and Martian meteorites, a mixture of stable isotopes (oxygen, magnesium, iron) to help understand the formation of chondrules and evolution of chondritic meteorites. I now use trace element abundances and distributions to help understand the geological history of achondritic (stony and iron) meteorites.

Selected Bibliography

Day** J.M.D., Ash R.D., Liu Y., Bellucci* J.J., Rumble D., McDonough W.F., Walker R.J. and Taylor L.A. (2009) Early formation of evolved asteroidal crust. Nature 457, 179-182.

Zhu, X.**, Guo, Y., O'Nions, R.K., Galy, A.**, Young, E.D. and Ash, R.D.** (2001) 'Iron isotope homogeneity of the early solar nebula'. Nature 412, 311-313.

Galy, A.**, Young, E.D., Ash, R.D.** and O'Nions, R.K. (2000) 'The formation of chondrules at high gas pressures in the early solar system'. Science 290, 1751-1753.

Young, E.D., Ash, R.D.**, England, P. and Rumble, D. III (1999) 'Fluid flow in chondritic parent bodies: deciphering the compositions of planetesimals'. Science 286, 1331-1335.

Ash, R.D.**, Knott, S.F.* and Turner, G. (1996) 'A 4-Gyr shock age for a Martian meteorite and implications for the cratering history of Mars'. Nature 380, 57-59.

**Post-doc, *Graduate student

UNIVERSITY OF MARYLAND

Prof. L. Drake Deming

Professor of Astronomy

Affiliation(s): Department of Astronomy

Major Awards

2006 Exceptional Scientific Achievement Medal (NASA); 2007 John Lindsey Award for Space Science (NASA's Goddard); 2010 Beatrice Tinsley Prize (American Astronomical Society)

Research Interests

My research is currently focused on the observational characterization of extrasolar planets, principally using the transit technique. I have extensive programs using the Hubble and Spitzer Space Telescopes, as well as ground-based observatories. Most transiting exoplanets emit strongly in the infrared spectral region, and their infrared spectra exhibit molecular absorption or emission features. My colleagues and I reconstruct the emergent spectra of these worlds using secondary eclipse observations, and we measure the transmission spectra of their atmospheres as they pass in front of their stars. We interpret the data to deduce the composition and thermal structure of these exotic atmospheres, as well as the dynamics of their orbits. We use this information to arrive at new insights into the formation and evolution of planetary systems. Eventually, we aim to characterize the molecular composition of a habitable world transiting a nearby red-dwarf star. In addition to exoplanets, I maintain a keen interest in stellar astronomy, and infrared spectroscopy of planets in our Solar System.

Selected Bibliography

Deming, D., Sada, P. V., Jackson, B., et al., Kepler and Ground-based Transits of the Exo-neptune HAT-P-11b, 2011, ApJ, 739, in press.

Deming, D., Knutson, H., et al., Warm Spitzer Photometry of the Transiting Exoplanets CoRoT-1 and CoRoT-2 at Secondary Eclipse, 2011, ApJ, 726, id.95.

Sada, P.V., Deming, D., et al., Recent Transits of the Super-Earth Exoplanet GJ1214b, 2010, ApJ, 720, L215.

Seager, S. & Deming, D., 2010, Exoplanet Atmospheres, ARAA, 48, 631.

Deming, D. & Seager, S., 2009, Light and Shadow from Distant Worlds, Nature, 462, 301.

Deming, D., Harrington, J., et al., Spitzer Transit and Eclipse Photometry of GJ436b, 2007, ApJ, 667, L199.

Deming, D., Seager, S., Richardson, L. J., et al., 2005, Infrared Radiation from an Extrasolar Planet, Nature, 434, 740.

UNIVERSITY OF MARYLAND

Dr. Tony Farnham

Associate Research Scientist

Affiliation(s): Department of Astronomy

Missions

Chief Scientist, Comet Hopper Discovery Mission (currently in Phase A study); Science Team member, Deep Impact extended Investigation (DIXI); Science Team member, Deep Impact Mission (DI); Science Team member, Stardust-NExT Mission

Research Interests

Dynamics of cometary nuclei; Interrelationship between the cometary coma and nucleus; Relationship between comets, Centaurs and Kuiper Belt Objects

Selected Bibliography

Farnham, Tony L. (2009) “Coma Morphology of Jupiter Family Comets”, Planetary and Space Sci 57, 1192-1217.

Jessica M. Sunshine, Tony L. Farnham, Lori M. Feaga, Olivier Groussin, Frederic Merlin, Ralph E. Milliken, Michael F. A'Hearn (2009) "Temporal and Spatial Variability of Lunar Hydration As Observed by the Deep Impact Spacecraft" Science 326, 565-568.

Farnham, T. L., Dennis D. Wellnitz, Don L. Hampton, Jian-Yang. Li, Jessica M. Sunshine, Olivier Groussin, Lucy A. McFadden, Christopher J. Crockett, Michael F. A'Hearn, Michael J.S. Belton, Peter Schultz and Carey M. Lisse (2007) “Dust Coma Morphology in the Deep Impact Images of Comet 9P/Tempel 1”, Icarus 187, 26-40.

Schleicher, David G. and Tony L. Farnham (2005), “Photometry and Imaging of the Coma with Narrowband Filters,” In Comets II (Michel Festou, H. Uwe Keller and Harold Weaver, eds.) Arizona Press. pp. 449-469.

Farnham, Tony L. and Anita L. Cochran (2002), “A McDonald Observatory Study of Comet 19P/Borrelly: Placing the Deep Space 1 Observations into a Broader Context,” Icarus 160, 398.

Prof. James Farquhar

Professor of Geology

Affiliation(s): Department of Geology; Earth System Science Interdisciplinary Center

Major Awards

Guggenheim Fellow, Clarke Medalist, Geochemical Society, Fellow of Hanse WissenschaftsKolleg (2006), Professeur Invité, Institut de Physique du Globe de Paris (2007), Visiting Professor, Biological Institute, Syddansk Universitetet (2008-9), Denmark, Gledden Fellow, University of Western Australia (2012)

Research Interests

Studies of sulfur isotopes relevant to the evolution of planetary atmospheres (Earth and Mars), for identifying metabolic activity of prokaryotes on the early Earth, and for study of sulfur isotope signals of nebular origin in solar system materials (lunar samples and meteorites).

Selected Bibliography

Masterson† A.W., Farquhar J., Wing, B.A. (2011), Sulfur mass-independent fractionation patterns in the broadband UV photolysis of sulfur dioxide: pressure and third body effects, Earth and Planetary Science Letters, 306, 253-260 DOI: 10.1016/j.epsl.2011.04.004

Farquhar J., Zerkle‡, A.L. Bekker, A. Musings on Oxygen: Geological and geochemical constraints on the evolution of oxygen and oxygenic photosynthesis, (2010) Photosynthesis Research 107, 11-36 DOI: 10.1007/s11120-010-9594-0.

Farquhar J, Peters M, Johnston† DT, Strauss H, Masterson† A, Wiechert U, and Kaufman AJ (2007) Isotopic evidence for Mesoarchean anoxia and changing atmospheric sulfur chemistry, Nature Oct 11, 2007, 449 (7163): 706-U5.

Farquhar, J., Kim‡, S.T., Masterson†, A.L. (2007) Implications from sulfur isotopes of the Nakhla meteorite for the origin of sulfate on Mars, Earth and Planetary Science Letters doi:10.1016/j.epsl.2007.08.006, 264 (1-2): 1-8.

Farquhar, J., Johnston†, D.T., Wing., B.A. (2007) Influence of network structure on sulfur isotope phase space of dissimilatory sulfate reduction: Implications of conservation of mass effects on mass-dependent isotope fractionations Geochimica et Cosmochimica Acta doi: 10.1016/j.gca.2007.08.028, 71 (24): 5862-5875.

‡Post-doc, †Graduate or Undergraduate student

UNIVERSITY OF MARYLAND

Dr. Lori M. Feaga

Assistant Research Scientist

Affiliation(s): Department of Astronomy

Major Awards

NASA Early Career Fellow, Co-I of the EPOXI mission, Asteroid 21495 named Feaga

Research Interests

Small body research, specifically compositional analyses of cometary comae, cometary surfaces, and asteroid surfaces in order to better characterize small bodies and their record of the early Solar System conditions. Mission support and Education and Public Outreach programs.

Selected Bibliography

Feaga, L.M., A'Hearn, M.F., Sunshine, J.M., Groussin, O., Farnham, T.L., "Asymmetries in the Distribution of H2O and CO2 in the Inner Coma of Comet 9P/Tempel 1 as Observed by Deep Impact," Icarus, 190, 345, (2007).

M. F. A'Hearn, M. J. S. Belton, W. A. Delamere, L. M. Feaga, D. Hampton, J. Kissel, K. P. Klaasen, L. A. McFadden, K. J. Meech, H. J. Melosh, P. H. Schultz, J. M. Sunshine, P. C. Thomas, J. Veverka, D. D. Wellnitz, D. K. Yeomans, and 18 additional co-authors, "EPOXI at Comet Hartley 2," Science, in press, (2011).

A'Hearn, M.F., Feaga, L.M., Bertaux, J.-L., Feldman, P.D., Parker, J.Wm., Slater, D.C., Steffl, A.J., Stern, S.A., Throop, H., Versteeg, M., Weaver, H.A., Keller, H.U., "The Far-Ultraviolet Albedo of Steins Measured with Rosetta-ALICE," Planetary and Space Science, doi: 10.1016/j.pss.2010.03.005, (2010).

Sunshine, J.M., Farnham, T.L., Feaga, L.M., Groussin, O., Merlin, F., Milliken, R.E., A'Hearn, M.F., "Temporal and Spatial Variability of Lunar Hydration as Observed by the Deep Impact Spacecraft," Science, 326, 565, (2009).

Sunshine, J.M., Groussin, O., Schultz, P.H., A'Hearn, M.F., Feaga, L.M., Farnham, T.L., Klaasen, K.P. "The distribution of water ice in the interior of Comet Tempel 1," Icarus, 190, 284-294, (2007).

UNIVERSITY OF MARYLAND

Dr. Steven J. Greybush

Postdoctoral Research Associate

Affiliation(s): Department of Atmospheric and Oceanic Science

Major Awards

American Meteorological Society Fellowship Recipient; AOSC Best Student Seminar, Best Peer Reviewed Paper, and Service Awards

Research Interests

Weather and Climate of Mars, Data Assimilation, Numerical Weather Prediction, Atmospheric Modeling, Ensemble Forecasting, Predictability, Statistical and Artificial Intelligence Applications

Selected Bibliography

Greybush, Steven J., 2011: Mars Weather and Predictability: Modeling and Ensemble Data Assimilation of Spacecraft Observations. Ph.D. Dissertation, University of Maryland, 161 pp.

Greybush, Steven J., R. J. Wilson, M. J. Hoffman, E. Kalnay, K. Ide, T. Miyoshi, R. N. Hoffman, and J. Eluszkiewicz, 2011: (abstract) Martian Atmosphere Data Assimilation of TES and MCS Retrievals. Presented at the Fourth International Workshop on the Mars Atmosphere: Modeling and Observations, Paris, France, February 2011.

Greybush, Steven J., E. Kalnay, T. Miyoshi, K. Ide, and B. Hunt, 2011: Balance and Ensemble Kalman Filter ocalization Techniques. Mon. Wea. Rev., 139, 511-522.

Hoffman, M. J., S. J. Greybush, R. J. Wilson, G. Gyarmati, R. N. Hoffman, E. Kalnay, K. Ide, T. Miyoshi, and I. Szunyogh, 2010: An ensemble Kalman filter data assimilation system for the Martian atmosphere: Implementation and simulation experiments. Icarus, 209, 470-481.

Greybush, Steven J., S. E. Haupt, and G. S. Young, 2008: The Regime Dependence of Optimally Weighted Ensemble Model Consensus Forecasts of Surface Temperature. Wea. Forecasting, 23, 1146-1161.

Prof. Douglas P. Hamilton

Professor of Astronomy

Affiliation(s): Department of Astronomy

Major Awards

U. Maryland Board of Regent's Faculty Award for Scholarship 2010; Dean's Award for Excellence in Teaching 1997, 2008; Asteroid 12494 DH11 renamed Doughamilton 2000; Harold C. Urey Prize for Outstanding Research in Planetary Science 1999; NSF CAREER Award "Orbital Dynamics of Solar System Dust" 1998-2003.

Research Interests

Origins: The Solar System; Extrasolar Planets; Satellite and Ring Systems.

Solar System Dynamics: Orbital Evolution; Celestial Mechanics; Resonances; Numerical Methods; Rotational Dynamics; Charged Particle Motion.

Selected Bibliography

Jontof-Hutter, D. and D.P. Hamilton, 2011. The fate of sub-micron circumplanetary dust grains I: Aligned dipolar magnetic fields. Icarus, submitted.

Verbiscer, A.J., M.F. Skutskie and D.P. Hamilton 2009. Saturn's largest ring. Nature 461, 1098-1100.

Hamilton, D.P. and H. Krüger 2008. The sculpting of Jupiter's gossamer rings by its shadow. Nature 453, 72-75.

Zhang, K., and D.P. Hamilton 2008. Orbital resonances in the inner neptunian system II: Resonant history of Proteus, Larissa, Galatea, and Despina. Icarus 193, 267-282.

Agnor, C.B. and D.P. Hamilton 2006. Neptune's Capture of Triton by Binary-Planet Gravitational Encounter. Nature 441, 192-194.

UNIVERSITY OF MARYLAND

Prof. Saswata Hier-Majumder

Assistant Professor of Geophysics
Blended Learning Fellow

Affiliation(s): Department of Geology; Center for Scientific Computation and Applied Mathematical Modeling; Applied Math & Statistics and Scientific Computation Program

Research Interests

Currently we are carrying out research projects on developing new numerical methods in multiphase flow, studying melting atop the Earth's core-mantle boundary, developing a coupled thermal-orbital-structural evolution model for terrestrial planets and icy satellites, modeling crystallization in planetary magma oceans, and studying reactive porous flow mechanisms in partially molten and fluid-bearing rocks.

Selected Bibliography

Hier-Majumder, S. and J. Revenaugh, (2010) Relationship between the viscosity and the topography of the ultralow-velocity zone near the core-mantle boundary, Earth and Planetary Science Letters, 299,382-386, doi:10.1016/j.epsl.2010.09.018.

Takei, Y. and S. Hier-Majumder, (2009), A generalized formulation of interfacial tension driven fluid migration with dissolution/precipitation, Earth and Planetary Science Letters,288, 138-148, doi:10.1016/j.epsl.2009.09.016.

Hier-Majumder, S., (2008), Influence of contiguity on seismic velocities of partially molten aggregates, J. Geophys. Res., 113, B12205, doi:10.1029/2008JB005662.

Hier-Majumder, S., Y. Ricard, and D. Bercovici (2006), Role of grain boundaries in magma migration and storage, Earth and Planetary Science Letters, 248,735-749, doi:10.1016/j.epsl.2006.06.015 .

Hier-Majumder, S., I. M. Anderson, and D. L. Kohlstedt (2005), Influence of protons on Fe-Mg interdiffusion in olivine, J. Geophys. Res., 110, B02202, doi:10.1029/2004JB003292.

UNIVERSITY OF MARYLAND

Dr. Tracy Huard

Assistant Research Scientist

Affiliation(s): Department of Astronomy

Research Interests

Formation of stars, brown dwarfs, and planets; structure of molecular clouds; composition and properties of interstellar dust.

Selected Bibliography

Boogert, A.C.A., Huard, T.L., Cook, A.M., Chiar, J.E., Knez, C., Decin, L., Blake, G.A., Tielens, A.G.G.M., & van Dishoeck, E.F. 2011, "Ice and Dust in the Quiescent Medium of Dense Cores," Astrophysical Journal, 729, 92-107.

Shirley, Y.L., Huard, T.L., Pontoppidan, K.M., Wilner, D.J., Stutz, A.M., Bieging, J.H., & Evans, N.J., II 2011, "Observational Constraints on Submillimeter Dust Opacity," Astrophysical Journal, 728, 143-152.

Heiderman, A., Evans, N.J., II, Allen, L.E., Huard, T.L., & Heyer, M. 2010, "The Star Formation Rate and Gas Surface Density Relation in the Milky Way: Implications for Extragalactic Studies," Astrophysical Journal, 723, 1019-1037.

Dunham, M.M., Crapsi, A., Evans, N.J., II, Bourke, T.L., Huard, T.L., Myers, P.C., & Kauffmann, J. 2008, "Identifying the Low-Luminosity Population of Embedded Protostars in the c2d Observations of Clouds and Cores," Astrophysical Journal Supplement Series, 179, 249-282.

Huard, T.L., Myers, P.C., Murphy, D.C., Crews, L.J., Lada, C.J., Bourke, T.L., Crapsi, A., Evans, N.J., II, McCarthy, D.W., Jr., & Kulesa, C. 2006, "Deep Near-Infrared Observations of L1014: Revealing the nature of the core and its embedded source," Astrophysical Journal, 640, 391-401.

Prof. Kayo Ide

Assistant Professor of Atmospheric Science

Affiliation(s): Department of Atmospheric and Oceanic Science; Center for Scientific Computation and Mathematical Modeling; Earth System Science Interdisciplinary Center; Institute for Physical Science and Technology

Research Interests

Data assimilation, numerical weather prediction, weather and climate variability of Mars atmosphere and planetary flows. Predictability of nonlinear dynamical systems. Observing system design. Mixing and transport in planetary flows.

Selected Bibliography

Hoffman, M. J.*, S .J. Greybush*, R. J. Wilson, G. Gyarmati, R. N. Hoffman, E. Kalnay, K. Ide, E. Kostelich, T. Miyoshi, and I. Szunyogh., 2010: An ensemble Kalman filter data assimilation system for the Martian atmosphere: Implementation and simulation experiments. Icarus, 209, 470-481. doi:10.1016/j.icarus.2010.03.034

de la Cámara*, A. C. R. Mechoso, K. Ide, R. Walterscheid and G. Schubert, 2010: Polar night vortex breakdown and large-scale stirring in the southern stratosphere, Climate Dynamics, 35, 965-975, DOI: 10.1007/s00382-009-0632-6

Ide, K., D. Small and S. Wiggins, 2002: Distinguished hyperbolic trajectories in time dependent fluid flows: Analytical and computational approach for velocity fields defined as data sets. Nonl. Proc. Geophys., 9, 237-263.

Ide, K., H. Le Treut, Z.X. Li, and M. Ghil, 2001: Atmospheric radiative equilibria. Part II. Bimodal solutions for atmospheric optical properties. Climate Dynamics. 18(2-3), 29-49.

Weeks, E.R., Y. Tian, J.S. Urbach, K. Ide, H.L. Swinney, and M. Ghil, 1997: Transitions between blocked and zonal flows in a rotating annulus with topography. Science, 278, 1598-1601

*Graduate student

UNIVERSITY OF MARYLAND

Prof. Eugenia Kalnay

Distinguished University Professor

Affiliations: Department of Atmospheric and Ocean Sciences;
Earth System Science Interdisciplinary Center

Major Awards

WMO/IMO 2009 Prize, Member of the US National Academy of Engineering, Academia Europaea, National Academy of Natural Sciences (Argentina). Fellow of the AMS, AGU, AAAS. One gold medal from NASA and two gold medals from DOC. Kalnay et al. (1996) is the most cited paper in all geosciences. Kalnay and Cai (2003) was selected as one of the 2003 top science news of the year by Discovery Magazine. UMD-wide Kirwan 2006 award. 18 doctoral students graduated since 2000.

Research Interests

Numerical Weather Prediction, Data Assimilation, Predictability and Chaos, Ensemble Forecasting, Mars and Venus atmospheres, Climate change and the impact of land use. Population and Climate Change. Carbon cycle and surface carbon fluxes. Ocean data assimilation.

Selected Bibliography

E. Kalnay-Rivas, 1973: Numerical Models of the Circulation of the Atmosphere of Venus. J. Atmos. Sci., 30, 763-779.

E. Kalnay, et al. 1996: The NCEP/NCAR 40-Year Reanalysis Project. Bull. Amer. Meteor. Soc., 77, 437-471.

Zoltan Toth and E. Kalnay, 1993: Ensemble forecasting at NMC: the generation of perturbations. Bull. Am. Met. Soc., 74, 2317-2330.

Kalnay, E. and M. Cai, 2003: Impact of urbanization and land-use change on climate. Nature, 423, 528-531.

Kalnay, E., Hong Li, Takemasa Miyoshi, Shu-Chih Yang and Joaquim Ballabrera, 2007: 4D-Var or EnKF? Tellus A, 59, 758-773.

Book

Kalnay, Eugenia, 2003: Atmospheric Modeling, Data Assimilation and Predictability. Cambridge University Press, 341pp., reprinted 3 times within two years. Translated and published in Chinese in 2005, in Korean in 2011.

UNIVERSITY OF MARYLAND

Ludmilla (Lioudmila) Kolokolova

Senior Research Scientist

Affiliation(s): Department of Astronomy

Major Awards

Asteroid 13723 named "Kolokolova"; Japanese Society for Promotion of Science personal grant (2009); DAAD (Germany) personal grant (2005); University of Florida, College of Liberal Arts and Sciences Research Awards program (2001); Max-Planck Fellowship, Germany (1995-1997); Personal Grant of American Astronomical Society (1994); Personal Grant of International Science Foundation (Soros' Foundation) (1993).

Research Interests

Polarimetry and spectrophotometry as remote sensing methods to reveal structure and composition of cosmic dust grains and surfaces of small bodies. Application of polarization to astrobiology (search for complex organics in space). Numerical methods to compute scattering of radiation by particulate surfaces and grains. Laboratory experiments on simulation of light scattering by planetary surfaces, aerosols, and cosmic dust. Archives of planetary space and ground–based data.

Selected Bibliography

Kolokolova, L., W. Sparks, D. Mackowski, Astrobiological remote sensing with circular polarization In: Polarimetric Detection, Characterization, and Remote Sensing (M. I. Mishchenko, Ya. S. Yatskiv, V. K. Rosenbush, and G. Videen, Eds.), Springer, Berlin, 277 – 294, 2011.

Kolokolova, L., B. Buratti, and V. Tishkovets, Impact of coherent backscattering on the spectra of icy satellites of Saturn and the implications of its effects for remote sensing, Astroph. J. Let., 711, L71-L75, 2010.

Kolokolova, L., H. Kimura, N. Kiselev, and V. Rosenbush, Polarimetric and infrared evidence of two types of dust in comets, Astron. Astrophys., 463, 1189-1196, 2007

Kolokolova, L., K. Muinonen, H. Boehnnhard, S. Bagnulo, A. Barucci, and V. Rosenbush, Probing protosolar nebula using polarization of Kuiper Belt Objects, in Astronomical Polarimetry: Current Status and Future Directions, (Eds. A. Adamson, C. Aspin, C. Davis, and T. Fujiyoshi), Astron.Soc. Pacific, San Francisco, 194 - 198, 2006.

Kolokolova, L., M. Hanner, A-Ch. Levasseur-Regourd, and B. Å. S. Gustafson, Physical properties of cometary dust from light scattering and emission, in Comets II, (Eds. Festou M.C., Keller H.U., Weaver H.A.) University of Arizona Press, 577-604, 2004.

Daniel P. Lathrop

Director, Institute for Research in Electronics and Applied Physics
Professor of Geology and Physics

Affiliation(s): Department of Physics, Department of Geology, and the Institute for Physical Sciences and Technology

Major Awards

Presidential Early Career Award, 1997; Cottrell Scholars Fellowship, Research Corporation, 1997; Richard A. Ferrell Distinguished Faculty Fellowship, 2004; American Physical Society Fellowship, 2005; Bullard Lecturer, American Geophysical Union, Dec. 2006

Research Interests

Professor Lathrop's research focuses on turbulent fluid flows and geomagnetism. Unique experiments are used as rotating liquid metal models of planetary cores.

Selected Bibliography

Lathrop, D. P. and Forest, C.B., "Magnetic dynamos in the lab," Physics Today, 64, 7, 40-45 (2011).

Kelley, D.H., Triana, S.A., Zimmerman, D.S., Tilgner, A., and Lathrop, D.P., "Inertial waves driven by differential rotation in a planetary geometry," Geophys. & Astrophys. Fluid Dyn., 101, 469-487 (2007).

Shew, W.L. and Lathrop, D.P., "Liquid sodium model of geophysical core convection," Phys. Earth and Planetary Interiors, 153, 136-149 (2005).

Sisan, D.R., Mujica, N., Tillotson, W.A., Huang, Y.-M., Dorland, W., Hassam, A.B., Antonsen, T.M. andLathrop, D.P., "Experimental Observation and Characterization of the Magnetorotational Instability," Phys. Rev. Lett., 93, 114502 (2004).

Peffley, N., Cawthorne, A.B., Goumilevski, A.G. and Lathrop, D.P., "Characterization of Experimental Dynamos," Geophys. J. Int., 142, 52-58, (2000).

UNIVERSITY OF MARYLAND

Prof. Wolfgang Losert

Associate Professor of Physics

Affiliation(s): Department of Physics, IPST and IREAP

Major Awards

Research Corporation Research Innovation Award (2002). German National Merit Foundation Fellowship (1995).

Research Interests

Prof. Losert's research focuses on the nonlinear dynamics of granular matter and biomaterials. His group has expertise in modeling and experimental tests of the dynamic evolution of interfaces and far from equilibrium systems. One focus is the investigation of granular flows in geophysical and planetary contexts.

Selected Bibliography

N. Murdoch*, P.Michel, D.C. Richardson, C.R. Berardi^, S.F. Green, and W. Losert "Numerical simulations of granular dynamics II. Particle dynamics in a shaken granular material", submitted to Icarus (2011).

C.R. Berardi^, K. Barros, J.F. Douglas, and W. Losert, "Direct observation of string-like collective motion in a two-dimensional driven granular fluid" Physical Review E 81, 041301 (2010).

J.A. Dijksman*, E. Wandersman, S. Slotterback*, C. Berardi^, W.D. Updegraff^, M. van Hecke, W. Losert, "From Frictional to Newtonian Flows: Three Dimensional Imaging and Rheology of Gravitational Suspensions" Physical Review E 82, 060301 (2010).

S. Slotterback*, M. Toiya*, L. Goff^, J. Douglas, W. Losert, "Particle motion during the compaction of granular matter", arXiv:0802.0485; Phys. Rev. Lett 101, 258001 (2008).

M. Toiya*, J. Stambaugh*, and W. Losert, "Transient and oscillatory granular shear flow" Phys Rev Lett. 83, 088001-1 (2004).

M. Newey*, S. Van der Meer*, J. Ozik*, E. Ott, W. Losert, "Band-in-band segregation of multidisperse granular mixtures" Europhys. Lett. 66 (2004), 205-211.

S.J. Friedmann, G. Kwon^, and W. Losert "Granular memory and its effect on the triggering and distribution of rock-avalanche events," J. Geophys. Res. 108, No. B8, 2380-2391 (2003).

^Undergraduate student, *Graduate student

Prof. William F. McDonough

Professor of Geology

Affiliation(s): Department of Geology

Major Awards

Distinguished Faculty Award 2009, CMPS, Board of Visitors, University of Maryland; Fellow, American Geophysical Union; Fellow, Geochemical Society and the European Association for Geochemistry; Fellow, Mineralogical Society of America; Fellow, Geological Society of America; Fellow, Alexander von Humboldt Society; 2011 Sul Ross State University Alumni Association Award

Research Interests

Composition, structure and evolution of the Earth and the other terrestrial planets. The differentiation of the Earth and compositional modeling of the core and silicate Earth. Chemical and isotopic studies of terrestrial and extra-terrestrial samples.

Selected Bibliography

Arévalo* Jr., R., McDonough, W.F. and Luong†, M. (2009) The K/U ratio of the silicate Earth: Insights intomantle composition, structure and thermal evolution. Earth and Planetary Science Letters, 278:361-369.

Brenan, J. M. and McDonough, W. F. (2009) Core formation and metal-silicate fractionation of osmiumand iridium from gold. Nature Geosciences .2: 798-801.

Chabot, N.L., Saslow†, S., McDonough, W.F. and Jones, J. H. (2009) An investigation of the behavior ofCu and Cr during iron meteorite crystallization. Meteoritics and Planetary Science, 44: 505-519.

McCoy, T.J., Walker, R.J., Goldstein, J.I., Yang, J., McDonough, W.F., Rumble, D., Chabot, N.L., Ash, R.D.,Corrigan, C.M., Michael, J. R. and Kotula, P.G. (2011) Group IVA Irons: New Constraints on theCrystallization and Cooling History of an Asteroidal Core with a Complex History. Geochimica et Cosmochimica Acta, (in press).

McDonough, W.F. and Sun, S.S. (1995) The composition of the Earth. Chemical Geology, 120: 223-254

McDonough, W.F. (2003) Compositional Model for The Earth's Core, 547-568. In The Mantle and Core (ed. R.W. Carlson.) Vol. 2 Treatise on Geochemistry (eds. H.D. Holland and K.K. Turekian), Elsevier-Pergamon, Oxford.

McDonough, W.F. and Arévalo* Jr., R. (2008) Uncertainties in the composition of Earth, its core and silicate sphere. *Journal of Physics: Conference Series*, 136 022006 doi:10.1088/1742-6596/136/2/022006

†Undergraduate student, *Graduate student, ** Post-doc

UNIVERSITY OF MARYLAND

Dr. Takemasa Miyoshi

Assistant Professor of Atmospheric and Oceanic Science

Affiliations: Department of Atmospheric and Oceanic Science; Earth System Science Interdisciplinary Center

Major Awards

2008 Yamamoto-Syono Award, 2003-2005 Japanese Government Long-term Fellowship

Research Interests

Data assimilation with chaotic dynamical systems, including the weather systems and other components of the earth system, and Martian atmosphere. Improving numerical weather prediction through data assimilation, with particular focus on high-impact weather including tropical cyclones (Hurricanes and Typhoons).

Selected Bibliography

Miyoshi, T. and M. Kunii, 2011: The local ensemble transform Kalman filter with the Weather Research and Forecasting model: experiments with real observations. Pure and Appl. Geophys.. doi:10.1007/s00024-011-0373-4

Miyoshi, T., 2011: The Gaussian Approach to Adaptive Covariance Inflation and Its Implementation with the Local Ensemble Transform Kalman Filter. Mon. Wea. Rev., 139, 1519-1535. doi:10.1175/2010MWR3570.1

Miyoshi, T., Y. Sato, and T. Kadowaki, 2010: Ensemble Kalman filter and 4D-Var inter-comparison with the Japanese operational global analysis and prediction system. Mon. Wea. Rev., 138, 2846-2866. doi:10.1175/2010MWR3209.1

Miyoshi, T. and S. Yamane, 2007: Local ensemble transform Kalman filtering with an AGCM at a T159/L48 resolution. Mon. Wea. Rev., 135, 3841-3861. doi:10.1175/2007MWR1873.1

Miyoshi, T. and K. Aranami 2006: Applying a Four-dimensional Local Ensemble Transform Kalman Filter (4D-LETKF) to the JMA Nonhydrostatic Model (NHM). SOLA, 2, 128-131. doi:10.2151/sola.2006-033

Prof. Laurent Montesi

Assistant Professor of Geology

Affiliations: Department of Geology; Department of Applied Mathematics and Statistics, and Scientific Computation

Major Awards

2010 Assistant Professor Award, College of Computer Mathematical and Physical Sciences (CMPS) Board of Visitors, University of Maryland

Research Interests

Mechanics and development of planetary lithospheres. Magma generation and extraction at mid-ocean ridges and subduction zones; Lithospheric structure constrained by the morphology of tectonic structures; applications to the Earth, Mars, Venus, Mercury, Europa, Ganymede, and Enceladus; Ductile shear zones formation; Modeling of postseismic deformation; Seismic hazard estimates.

Selected Bibliography

Montési, L.G.J., 2001. Concentric dike swarms on the flanks of Pavonis Mons: Implications for the evolution of Martian shield volcanoes and mantle plumes, in Mantle Plumes: Their Identification Through Time. Geological Society of America Special Paper, 352. R. E. Ernst and K. L. Buchan (eds.), p. 165-181.

Montési, L.G.J., and M.T. Zuber, 2003. Clues to the lithospheric structure of Mars from the spacing of wrinkle ridges. Journal of Geophysical Research, 108, 5048, doi: 10.1029/2002JE001974.

Zuber, M.T., L.G.J. Montési, G.T. Farmer†, S. A. Hauck II, J. A. Ritzer, R.J. Phillips, S.C. Solomon, D.E. Smith, M.J. Talpe, J.W. Head III, G.A. Neumann, T.R. Watters, C.L. Johnson, 2010. Accommodation of lithospheric shortening on Mercury from altimetric profiles of ridges and lobate scarps measured during MESSENGER Flybys 1 and 2, Icarus, 209, 247–255, doi:10.1016/j.icarus.2010.02.026

Montési, L.G.J., and M.T. Zuber, 2002. Revisiting the origin of tectonic spacing on Venus: Importance of localization and surface temperature. Lunar and Planetary Sciences XXXIII, abstr. 1618.

Montési, L.G.J., and G.C. Collins, 2005. On the mechanical origin of two-wavelength tectonics on Ganymede. Lunar and Planetary Sciences XXXVI, abstr. 2093.

UNIVERSITY OF MARYLAND

Prof. Amy S. Mullin

Professor of Chemistry

Affiliation(s): Department of Chemistry and Biochemistry

Major Awards

Fellow of the American Physical Society; Fellow of the American Association for the Advancement of Science; Office of Naval Research Young Investigator Award; NSF CAREER Award; Camille Dreyfus Teacher Scholar Award; CMNS Creative Educator Award, University of Maryland; JILA Visiting Fellow

Research Interests

High-resolution state- and time-resolved optical measurements of molecular collisions and reaction dynamics, isotopic effects in chemical reactions, photo-dissociation dynamics, behavior of molecules in extreme energy environments and strong external fields

Selected Bibliography

Daniel K. Havey**, Qingnan Liu*, Ziman Li**, Michael Elioff* and Amy S. Mullin, "Collisions of highly vibrationally excited pyrazine with HOD: State-resolved probing of strong and weak collisions," Journal of Physical Chemistry A 111, 13321-13329 (2007)

Qingnan Liu*, Daniel K. Havey** and Amy S. Mullin, "Energy transfer dynamics in the presence of preferential hydrogen bonding: Collisions of highly vibrationally excited pyridine-h5, -d5, and -f5 with water," Journal of Physical Chemistry A 112, 9509-9515 (2008)

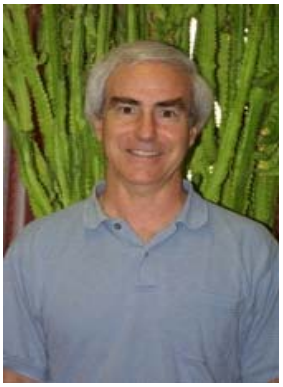
Daniel K. Havey**, Juan Du* and Amy S. Mullin, "Full state-resolved energy gain profiles of CO2 (J=2-80) from collisions with highly vibrationally excited molecules. I. Relaxation of pyrazine (E=37900 cm-1)," Journal of Physical Chemistry A 114, 1569-1580 (2010)

Liwei Yuan**, Carlos Toro**, Mack Bell† and Amy S. Mullin, Spectroscopy of molecules in very high rotational states using an optical centrifuge," Faraday Discussions (2011), DOI: 10.1039/C0FD00021C

Liwei Yuan**, Sam Teitelbaum†, Allison Robinson* and Amy S. Mullin, "Dynamics of molecules in extreme rotational states," Proceeding of the National Academy of Sciences 108, 6872-6877 (2011), DOI: 10.1073/pnas.1018669108

**Post-doc, *Graduate student, †Undergraduate research student

UNIVERSITY OF MARYLAND



Prof. Lee G. Mundy

Professor of Astronomy
Director of Center for Research in Exploration Space Science and Technology
Director of Combined Array for Research in Millimeter-wave Astronomy

Affiliation(s): Department of Astronomy

Research Interests

Formation of stars in our Galaxy, formation and evolution of young stars, formation of planetary systems, chemical heritage of planetary systems, interferometric instrumentation and techniques in astronomy, radiative transfer modeling of molecular clouds and pre-planetary disks

Selected Bibliography

Kwon, Woojin; Looney, Leslie W.; Mundy, Lee G., Resolving the Circumstellar Disk of HL Tauri at Millimeter Wavelengths, Astrophysical Journal, accepted, 2011.

Kwon, Woojin; Looney, Leslie W.; Mundy, Lee G.; Chiang, Hsin-Fang; Kemball, Athol J., Grain Growth and Density Distribution of the Youngest Protostellar Systems, Astrophysical Journal, 696, 841, 2009.

Chapman, Nicholas L.; Mundy, Lee G., Deep JHKs and Spitzer Imaging of Four Isolated Molecular Cloud Cores, Astrophysical Journal, 699, 1866, 2009.

Boogert, A. C. A.; and 25 coauthors including L. G. Mundy, The c2d Spitzer Spectroscopic Survey of Ices around Low-Mass Young Stellar Objects. I. H2O and the 5-8 μm Bands, Astrophysical Journal, 678, 985, 2008.

Mookerjea, B.; Casper, E.; Mundy, L. G.; Looney, L. W., Kinematics and Chemistry of the Hot Molecular Core in G34.26+0.15 at High Resolution, Astrophysical Journal, 659, 447, 2007.

Rodmann, J.; Henning, Th.; Chandler, C. J.; Mundy, L. G.; Wilner, D. J., Large dust particles in disks around T Tauri stars, Astronomy & Astrophysics, 446, 211, 2006.

UNIVERSITY OF MARYLAND

Dr. Marc W. Pound

Associate Research Scientist, Laboratory for Millimeter Astronomy
Computing Coordinator, Combined Array for Research In Millimeter-wave Astronomy

Affiliation(s): Department of Astronomy

Research Interests

Formation of low-mass stars and stellar systems, dynamics of molecular clouds as they interact with newly-formed stars, formation and evolution of protoplanetary disks (incipient solar systems), brown dwarfs

Selected Bibliography

Corder, S., Carpenter, M., Sargent, A., Zauderer, A., Wright, M., White, M., Woody, D., Teuben, P., Scott, S., Pound, M., and 6 co-authors, (2009), A Resolved Ring of Debris Dust around the Solar Analog HD 107146, Astrophysical Journal, 690, L65

Pound, M., Kane, J., Ryutov, D., Remington, B., Mizuta, A., (2007), Pillars of Heaven, Astrophysics and Space Science, 307, 187

Plambeck, R., Wright, M., Friedel, D., Widucus Weaver, S., Bolatto, A., Pound, M., Woody, D., Lamb, J., and Scott, S. (2009), Tracing the Bipolar Outflow from Orion Source I, Astrophysical Journal, 704, 25L

Pound, M., Kane, J., Remington, B., Ryutov, D., Mizuta, A., and Takabe, H., (2005), Eagle Nebula Pillars: From Models to Observation, Astrophysics and Space Science, 298, 17

Greaves, J., Holland, W., and Pound, M., (2003), Star-like activity from a very young 'isolated planet', MNRAS, 346, 441

UNIVERSITY OF MARYLAND

Dr. Igor S. Puchtel

Associate Research Scientist

Affiliation(s): Department of Geology

Major Awards

Alexander-von-Humboldt- and Max-Planck-Society Fellow, Russian Acvademy of Sciences Award, NAUKA International Publishing Company Award.

Research Interests

Chemical evolution of the Earth, Moon, and Mars, and late accretion in the solar system. Studies of trace lithophile and highly siderophile element abundances and radiogenic isotope systems, including Sm-Nd, U-Pb, Pb-Pb, Re-Os, and Pt-Os, in terrestrial and extraterrestrial materials using isotope dilution inductively coupled plasma mass-spectrometry (ID-ICP-MS) and thermal ionization mass-spectrometry (ID-TIMS).

Selected Bibliography

Puchtel, I.S., Walker, R.J., James, O.B., and Kring, D.A. (2008) Osmium isotope and highly siderophile element systematics of lunar impact melt rocks: Implications for the late accretion history of the Moon and Earth. Geochim. Cosmochim. Acta 72: 3022-3042.

Puchtel, I.S., Walker, R.J., Anhaeusser, C.R., and Gruau, G. (2009) Re-Os isotope systematics and HSE abundances of the 3.5 Ga Schapenburg komatiites, South Africa: Hydrous melting or prolonged survival of primordial heterogeneities in the mantle? Chem. Geol. 262: 391-405.

Blichert-Toft, J., Puchtel, I. S. (2010). Depleted mantle sources through time: Evidence from Lu-Hf and Sm-Nd isotope systematics of Archean komatiites. Earth Planet. Sci. Lett. 297 (3-4): 598-606.

Connolly*, B.D., Puchtel, I.S., Walker, R.J., Arevalo, R.Jr., Piccoli, P.M., Byerly, G.R., Robin-Popieul, C., and Arndt, N.T. (2011) HSE systematics of the 3.3 Ga Weltevreden komatiites, South Africa: implications for the early Earth's history. Earth and Planetary Science Letters (in press).

Brandon, A.D., Puchtel, I.S., Walker, R.J., Day, J.M.D, Irving, A.J., and Taylor, L.A. (2011) Evolution of the Martian Mantle Inferred From the 187Re-187Os Isotope and Highly Siderophile Element Abundance Systematics of Shergottite Meteorites. Geochim. Cosmochim. Acta (in press).

*Undergraduate student

Prof. Derek Richardson

Associate Professor of Astronomy

Affiliation(s): Department of Astronomy

Major Award

Asteroid 1998 SH54 renamed 12566 Derichardson**.**

Research Interests

Computational astrophysics with applications toward origins of solar systems and understanding the dynamics of small bodies, including topics such as asteroid collisions and satellite formation, the dynamics of planetary rings, and granular processes.

Selected Bibliography

Lin, D.N.C., Bodenheimer, P., Richardson, D.C. (1996). Orbital migration of the planetary companion of 51 Pegasi to its present location. Nature 380, 606–607.

Richardson, D.C., Quinn, T., Stadel, J., Lake, G. (2000). Direct large-scale N-body simulations of planetesimal dynamics. Icarus 143, 45–59.

Michel, P., Benz, W., Tanga, P., Richardson, D.C. (2001). Collisions and gravitational reaccumulation: Forming asteroid families and satellites. Science 294, 1696–1700.

Richardson, D.C., Elankumaran*, P., Sanderson*, R.E. (2005). Numerical experiments with rubble piles: Equilibrium shapes and spins. Icarus 173, 349–361.

Walsh**, K.J., Richardson, D.C., Michel, P. (2008). Rotational breakup as the origin of small binary asteroids. Nature 454, 188–191.

**Graduate student, *Undergraduate

UNIVERSITY OF MARYLAND

Dr. A. Surjalal Sharma

Senior Research Scientist
Director, Goddard Planetary Heliophysics Institute

Affiliation(s): Department of Astronomy

Major Awards

University of Maryland CMNS Distinguished Research Scientist Prize, 2011(Inaugural); B. P. Das Memorial Lecturer, Physics Academy of Northeast (India), 2010; Lorenz Lecturer, American Geophysical Union, 2009; Distinguished Scientist Award, Manipur Association for Promotion of Science, 2008; NASA Group Achievement Award, 1998.; National Science Talent Search Scholarship, Government of India, 1967-1976.

Research Interests

Planetary magnetospheres: Modeling and simulation of interaction with solar wind, nature of transition regions/shocks, energy and momentum transfer processes.

Exospheres of airless planets and small bodies (Moon, Mercury): Effects due to energetic particles, electric fields, anomalous magnetic fields, surface phenomena (“swirls”)

Data-derived modeling of planetary atmospheres: Data assimilation in global circulation models (Mars), characterization and modeling of dynamics using complexity science

Space weathering of regoliths: Surface and deep implantation phenomena due to solar wind and cosmic rays, long range effects on composition

Selected Bibliography

Sarantos, M., R. M. Killen, A. S. Sharma, and J. A. Slavin, Influence of plasma ions on source rates for the lunar exosphere during passage through the Earth's magnetosphere, Geophys. Res. Lett., 35, L04105, doi:10.1029/2007GL032310, 2008.

Sharma, A. S., and G. M. Milikh, Structure and dynamics of inner cometary plasmas, J. Geophys. Res., 101, 2713, 1996.

Milikh, G. M., and A. S. Sharma, Thermal instability in the inner coma of a comet, Geophys. Res. Lett., 22, 639, 1995.

Lipatov, A. S., and A. S. Sharma, Hybrid simulation of comet Shoemaker-Levy encounter with Jovian bow-shock, Geophys. Res. Lett., 21, 1059, 1994.

Sharma, A. S., P. J. Cargill and K. Papadopoulos, Resonance absorption of Alfven waves at comet-solar wind interaction regions, Geophys. Res. Lett., 15, 740, 1988.

UNIVERSITY OF MARYLAND

Professor Jessica M. Sunshine

Professor of Astronomy

Affiliation(s): Department of Astronomy

Major Awards

SAIC Technology Fellow; Science and Technical Performance Award; Patent # 6,608,931; Asteroid 3742 named Sunshine in honor of contributions to Planetary Science; Member NASA Advisory Council, Planetary Science Subcommittee; Member National Research Council, Planetary Decadal Survey 2013-2022

Research Interests

Compositional constraints on the formation and evolution of small bodies using spectroscopy to remotely study the mineralogy and heterogeneity of comets, asteroids, meteorites, and the Moon. The origin and temporal variability of water on the surface of the Moon to determine its connections to the solar wind. Research involves laboratory, telescopic, and space-based datasets and including membership on the science teams of the Deep Impact eXtended Investigation to comet Hartley 2 (DIXI; Deputy PI), Stardust New Exploration of Tempel (NExT) to comet Tempel 1, Dawn to asteroid Vesta, and Moon Mineralogy Mapper (M3).

Selected Bibliography

Sunshine, J. M., Farnham, T. L., Feaga, L. M., Groussin, O., Merlin, F., Milliken, R. E., and A'Hearn, M. F., Temporal and Spatial Variability of Lunar Hydration as Observed by the Deep Impact Spacecraft, Science, 326, 565-568, 2009.

Sunshine, J. M., Connolly, H. C., Jr., McCoy, T. J., Bus S. J., and La Croix, L. M., Ancient asteroids enriched in refractory inclusions, Science, 32, 514-517, 2008.

Sunshine, J. M., Groussin, O., Schultz, P. H., A'Hearn, A. F., Feaga, L. M., Farnham, T. L., and Klassen, K. P., The Distribution of Water Ice in the Interior of Comet Tempel 1, Icarus, 190, 284-294, 2007.

Sunshine, J. M., A'Hearn, M. F., Groussin, O., Li, J.-Y., Belton, M. J. S., Delamere, W. A., Kissel, J. , Klaasen, K. P., McFadden, L. A., Meech, K. J. ,Melosh, H. J., Schultz, P. H., Thomas, P. C., Veverka, J., Yeomans, D. K., Busko, I. C., Desnoyer, M., Farnham, T. L., Feaga, L. M. , Hampton, D. L., Lindler, D. J., Lisse, C. M., and, Wellnitz, D. D., Water Ice on the Surface of Comet 9P/Tempel 1, Science, 311, 1453-1455, 2006.

Sunshine, J. M., C. M. Pieters, Pratt, S. F., Deconvolution of Mineral Absorption Bands: An Improved Approach, Journal of Geophysical Research, 95, 6955-6966, 1990.

Professor Richard Walker

Professor of Geology

Affiliation(s): Department of Geology

Major Awards

Fellow American Geophysical Union; Fellow Geochemical Society; Clarke Medalist, Geochemical Society; University of Maryland system-wide Kirwan Faculty Research Prize 2011; University of Maryland College of Math and Physical Sciences Faculty Research Award; Alexander von Humboldt Fellow.

Research Interests

Origin and evolution of early solar system materials, including nebular mixing, and the formation of iron meteorites and chondrites. Rhenium-osmium and platinum-osmium isotope systems and associated platinum group element chemistry applied to unraveling the late accretion history of the Earth and Moon, differentiation history of the Solar System.

Selected Bibliography

Bottke, W.F., Walker, R.J., Day**, J.M.D., Nesvorny, D. and Elkins-Tanton, L. (2010) Stochastic late accretion to the Earth, Moon and Mars, Science 330: 1527-1530.

Day** J.M.D., Ash R.D., Liu Y., Bellucci* J.J., Rumble D., McDonough W.F., Walker R.J. and Taylor L.A. (2009) Early formation of evolved asteroidal crust. Nature 457, 179-182.

Horan M.F., Alexander C.M.O'D. and Walker R.J. (2009) Highly siderophile element evidence for early solar system processes in components from ordinary chondrites. Geochim. Cosmochim. Acta 73, 6984-6997.

Walker R.J., McDonough W.F., Honesto* J., Chabot N.L., McCoy T.J., Ash R.D. and Bellucci* J.J. (2008) Origin and chemical evolution of group IVB iron meteorites. Geochim. Cosmochim. Acta 72, 2198-2216.

Yokoyama** T., Rai V.K., Alexander C.M.O'D., Lewis R.S., Carlson R.W., Shirey S.B., Thiemens M.H. and Walker R.J. (2007) Osmium isotope evidence for uniform distribution of s- and r-process components in the early solar system. Earth and Planet. Sci. Lett. 259, 567-580.

**Post-doc, *Graduate student

Dr. Mark Wolfire

Senior Research Scientist, Computer Hardware Manager

Affiliation(s): Department of Astronomy

Major Awards

Senior National Research Council Fellowship; National Research Council Fellowship

Research Interests

Modeling the chemistry and thermal structure of PhotoDissociation Regions (PDRs) – interstellar medium gas illuminated by ultraviolet radiation fields. The analysis of infrared and submillimeter line radiation from molecular clouds and the diffuse interstellar medium. Astrochemistry in the diffuse and dense interstellar medium. The formation of molecular clouds and star formation processes.

Selected Bibliography

M. G. Wolfire, D. Hollenbach, & C. F. McKee ``The Dark Molecular Gas'' 2010, Astophysical Journal, 716, 1191

T. Y. Steiman-Cameron, M. G. Wolfire, & D. Hollenbach `` COBE and the Galactic Interstellar Medium: Arm Geometry from FIR Cooling Lines'', 2010, Astophysical Journal, 722, 1460

M. J. Kaufman, M. G. Wolfire, & D.J. Hollenbach, "[Si II],[Fe II] and H_2 Emission from Massive Star Forming Regions'',2006, Astophysical Journal, 644, 283.

D. A. Neufeld, M. G. Wolfire, & P. Schilke ``The Chemistry of Fluorine-bearing Molecules in Diffuse and Dense Interstellar Gas Clouds'', 2005, Astophysical Journal, 628, 260

M. G. Wolfire, C. F. McKee, D. J. Hollenbach, & A. G. G. M. Tielens``Neutral Atomic Phases of the ISM in the Galaxy'', 2003, Astophysical Journal, 587, 278.

UNIVERSITY OF MARYLAND

Short biographies of Maryland Scientists with interests in engaging in planetary science research

UNIVERSITY OF MARYLAND

Prof. Marco Colombini

Professor of Biology

Affiliation(s): Department of Biology

Major Awards

On the Council of the Biophysical Society, former chair of the Bioenergetics Subgroup of the Biophysical Society, College of Life Science Faculty Award for Excellence in Research, H index=43

Research Interests

Biophysics of membrane channels, molecular basis for ion selectivity and voltage gating, self-assembly of ceramide channels, programmed cell death

Life on earth is very much the same at the cellular/molecular level. It is too complex to represent the forms of life that originated from non-life. I believe that those early forms no longer exist because of competition from the current more sophisticated forms. Thus, in looking for primitive life on nearby planets and moons, one needs to focus on 1) the existence of molecules capable of self-assembly into more complex structures; 2) the existence of microscopic organized structures; 3) preference for one form of stereochemistry reflecting the presence of catalytic structures; 4) the presence of membrane-bound structures and transmembrane electrical potentials; and so forth. It seems to me that the application of biophysical and bioenergetic concepts to the search for primitive life forms, is critical. My research has, for many years, focused on molecular mechanisms, self-assembly, the reductionist approach and bioenergetics. Perhaps my insights at the molecular/mechanistic level might be of interest.

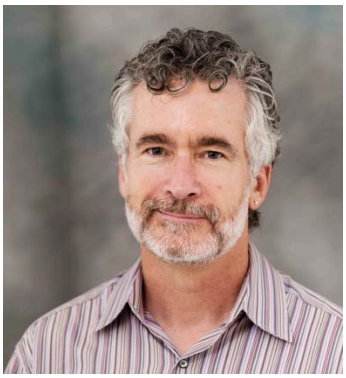
Selected Bibliography

Ganesan, V., Perera, M.N., Colombini, D., Datskovskiy, D., Chadha, K., and Colombini, M. 2010. Ceramide and activated Bax act synergistically to permeabilize the mitochondrial outer membrane. Apoptosis 15: 553-562.

Hiller, S., Garces, R.G., Malia, T.J. Orekhov, V.Y., Colombini, M. and Wagner, G. 2008. Solution structure of the integral human membrane protein VDAC-1 in detergent micelles. Science 321: 1206-1210.

Siskind L.J., Feinstein, L., Yu, T., Davis, J.S., Jones, D., Choi, J., Zuckerman, J.E., Tan, W., Hill, R.B., Hardwick, J.M. and Colombini, M. 2008. Anti-apoptotic Bcl-2 family proteins disassemble ceramide channels. Journal of Biological Chemistry 283: 6622-6630.

Vander Heiden, M.G., Chandel, N.S., Li, X.X., Schumacker, P.T., Colombini, M., and Thompson, C.B. 2000. Outer mitochondrial membrane permeability can regulate coupled respiration and cell survival. Proceedings of the National Academy of Sciences U.S.A., 97: 4666 4671.



Prof. Michael P. Cummings

Associate Professor

Affiliation(s): Center for Bioinformatics and Computational Biology (Department of Biology, and University of Maryland Institute for Advanced Computer Studies)

Research Interests

Molecular evolution, phylogenetics, relationship of genotype to phenotype, computational biology and bioinformatics.

Selected Bibliography

Cummings MP (1994) Transmission patterns of eukaryotic transposable elements - arguments for and against horizontal transfer. Trends Ecol Evol 9:141–145.

Cummings MP, Myers DS (2004) Simple statistical models predict C-to-U edited sites in plant mitochondrial RNA. BMC Bioinformatics 5:132.

Cummings MP, Otto SP, Wakeley J (1995) Sampling properties of DNA sequence data in phylogenetic analysis. Mol Biol Evol 12:814–822.

Cummings MP, Segal MR (2004) Few amino acid positions in rpoB are associated with most of the rifampin resistance in Mycobacterium tuberculosis. BMC Bioinformatics 5:137.

Pollock DD, Eisen JA, Doggett NA, Cummings MP (2000) A case for evolutionary genomics and the comprehensive examination of sequence biodiversity. Mol Biol Evol 17:1776–1788.

Prof. William Fagan

Professor of Biology

Affiliation(s): Department of Biology

Major Awards

Guggenheim Fellow, American Society of Naturalists Presidential Award, National Center for Ecological Analysis and Synthesis Sabbatical Fellowship, University of Maryland Distinguished Scholar-Teacher, University of Maryland College of Life Sciences Faculty Research Award

Research Interests

Theoretical ecology, theoretical food web dynamics, ecological stoichiometry, population growth and biodiversity in harsh environments

Selected Bibliography

Gilbert**, J. and W.F. Fagan. 2011. Contrasting mechanisms of proteomic nitrogen thrift in two ecotypes of Prochlorococcus. Molecular Ecology. 20: 92-104.

Elser, J.J., W.F. Fagan, S. Subramanian, and S. Kumar. 2006. Signatures of ecological resource availability in the animal and plant proteomes. Molecular Biology and Evolution. 23: 1946-1951.

Elser, J.J., W.F. Fagan, R.F. Denno, D.R. Dobberfuhl, A. Folarin*, A. Huberty, S. Interlandi, S. S. Kilham, E. McCauley, K.L. Schulz, E.H. Siemann, and R.W. Sterner. 2000. Convergent N:P stoichiometry in freshwater and terrestrial food webs. Nature 408: 578-580.

Fagan, W.F. and J.G. Bishop. 2000. Trophic interactions during primary succession. American Naturalist. 155:328-251

Fagan, W.F. 1997. Omnivory as a stabilizing feature of natural communities. American Naturalist. 150: 554-568.

**Post-doc, *Graduate student

Prof. Alan Jay Kaufman

Professor of Geochemistry

Affiliation(s): Departments of Geology; Earth System Science and Interdisciplinary Center (*Affiliate Professor*)

Major Awards

Deutsche Forschungsgemeinschaft Mercator Guest Professor, Westfälische Wilhelms-Universität Münster, GERMANY

Research Interests

Co-evolution of life and environment across critical transitions in Earth history, with focus on the origination and diversification of prokaryotic, eukaryotic, and animal life associated with major changes in climate and the redox state of surface environments. Field and laboratory studies of the carbon, nitrogen, and sulfur cycles associated with tectonic reorganization of the continents, potentially global glaciations (i.e., Snowball Earth) and the rise of oxygen at the beginning (i.e. Great Oxidation Event) and end of the Proterozoic Eon.

Selected Bibliography

Guo, Q., Strauss, H., Kaufman, A.J., Schroder, S., Gutzmer, J., Wing, B., Baker, M.A.*, Bekker, A., Kim, S.-T., Farquhar, J. (2009) Reconstructing Earth's surface oxidation across the Archean-Proterozoic transition. Geology 37: 399-402.

Kaufman, A.J., Johnston, D.T.*, Farquhar, J., Masterson, A.L. #, Lyons, T.W., Bates, S., Anbar, A., Arnold, G.L., Garvin, J.*, and Buick, R. (2007) Late Archean biospheric oxygenation and atmospheric evolution. Science 317: 1900-1903.

Bekker, A. and Kaufman, A.J. (2007) Oxidative forcing of global climate change: a biogeochemical record across the oldest Proterozoic ice age in North America. Earth and Planetary Science Letters 258: 486-499.

Kaufman, A.J. and Xiao, Shuhai (2003) High CO2 levels in the Proterozoic atmosphere estimated from analyses of individual microfossils. Nature 424: 279-282.

Hoffman, P.F., Kaufman, A.J., Halverson, G.P.* and Schrag, D.P. (1998) A Neoproterozoic snowball Earth. Science 281: 1342-1346.

*graduate student at time of publication

UNIVERSITY OF MARYLAND

Dr. Yue Li

Director, Mass Spectrometry Facility

Affiliation(s): Department of Chemistry and Biochemistry

Major Awards

Presidential Award, Chinese Academy of Sciences, 1999

Research Interests

Development of atmospheric pressure imaging mass spectrometry technique and applications in the real-time analysis of gas, liquid and solid samples.

Selected Bibliography

Nemes, P., Barton, A.A., Li, Y. and Vertes, A. (2008) Ambient molecular imaging and depth profiling of live tissue by infrared laser ablation electrospray ionization mass spectrometry, Anal. Chem. 80, 4575.

Li, Y., Shrestha, B. and Vertes, A. (2008) Atmospheric Pressure Infrared MALDI Imaging Mass Spectrometry for Plant Metabolomics, Anal. Chem. 80, 407.

Li, Y., Shrestha, B. and Vertes, A. (2007) Atmospheric pressure molecular imaging by infrared MALDI mass spectrometry, Anal. Chem.79, 523.

Li, Y., McGrady, J.E. and Baer, T. (2002) Metal-benzene and metal-CO bond energies in neutral and ionic C6H6Cr(CO)3 studied by threshold photoelectron-photoion coincidence spectroscopy and density functional theory, J. Am. Chem. Soc. 124, 4487.

Li, Y. and Baer, T. (2002) Ethylene Glycol ions dissociate by tunneling through an H-atom transfer barrier: A DFT and TPEPICO study", J. Phys. Chem. A, 106, 8658.

Prof. Ross Salawitch

Professor of Atmospheric Sciences

Affiliation(s): Department of Atmospheric and Oceanic Science, Department of Chemistry and Biochemistry, Earth System Science Interdisciplinary Center.

Major Awards

Highly Cited Researcher in Geosciences, ISI Thompson Scientific; Yoram J. Kaufman Award for Unselfish Cooperation in Research, Atmospheric Sciences Section of the AGU; NASA Exceptional Achievement Medal, June 2007 and May 1999; author, co-author, contributor and reviewer to IPCC Climate Change report, recognized with the 2007 Nobel Peace Prize.

Research Interests

Quantification of the effects of human activity on the composition of Earth's atmosphere by the development of computer models used to analyze a wide variety of observations. Focus on stratospheric ozone depletion and recovery, air quality, climate change, and the global carbon cycle. Participant in numerous NASA atmospheric chemistry field campaigns (TC4, ARCTAS, DISCOVER-AQ) and Earth observing satellite missions (UARS, Aura, OCO, and OCO-2). Author, co-author, contributor or reviewer of numerous chapters in various WMO/UNEP Scientific Assessment of Ozone Depletion and International Panel on Climate Change reports.

Selected Bibliography

Bloomer, B.J. et al., Observed relationships of ozone air pollution with temperature and emissions, Geophys. Res. Lett., 36, L09803, doi:10.1029/2009GL037308, 2009.

McElroy, M.B., R.J. Salawitch, S.C. Wofsy, and J.A. Logan, Antarctic ozone: reductions due to synergistic interactions of chlorine and bromine, Nature, 321, 759-762, 1986.

Oman et al., L. D., Multi-model assessment of the factors driving stratospheric ozone evolution over the 21st century, J. Geophys. Res., 115, D24306, doi:10.1029/2010JD014632, 2010.

Rex, M., et al., Arctic ozone loss and climate change, Geophys. Res. Lett., 31, L04116, 2003GL018844, 2004.

Salawitch, R.J., Atmospheric chemistry: biogenic bromine, Nature, 439, 275-277, 2006.

Salawitch, R.J., G.P.Gobbi, S.C. Wofsy, and M.B. McElroy, Denitrification in the Antarctic stratosphere, Nature, 339, 525-527, 1989.

Salawitch, R.J. et al., Chemical loss of ozone in the Arctic polar vortex in the winter of 1991-92, Science, 261, 1146-1149, 1993.

Salawitch, R. J. et al., A new interpretation of total column BrO during Arctic spring, Geophys. Res. Lett., 37, L21805, doi:10.1029/2010GL043798, 2010.

Wennberg, P.O. et al., Hydrogen radicals, nitrogen radicals, and the production of O3 in the upper troposphere, Science, 279, 49-53, 1998.

Prof. Daphne Soares

Assistant professor

Affiliations: Department of Biology

Major Awards

2011 Fellowship, Marine Biological Laboratory, Woods Hole, MA; 2011 RASA fellowship, University of Maryland, College Park MD; 2008 – 2009 Oak Ridge Associated Universities young investigator award; 2004 Young investigator award. International Society for Neuroethology; 2002 Capranica neuroethology award; 2001 Grass fellowship. Marine Biological Laboratory, Woods Hole, MA.; 2003 – 2005 Minority postdoctoral fellowship. National Science Foundation.; 2001- 2004 Minority fellowship. Society for neuroscience.; 1998-2002 Minority predoctoral supplement award from the National Institutes of Health.

Research Interests

I am interested in the evolution of sensory neural codes and in investigating the constraints involved in modifying neural circuits that underlie behavior. I am especially interested in how animals adapt to extreme environments. To this end I study animals that have evolved in caves, specifically cavefishes.

Selected Bibliography

2011 A Strickler and D Soares Comparative genetics of adaptive behavior in epigean and hypogean Astyanax mexicanus conspecifics. Genetica. 139(3) 383-91

2010 Soares D. The Biology of cavefishes. Journal of the National Association of Cavediving. 4th qrt. 9-10

2010 Yoshizawa M, Goricki S, Soares D, Jeffery WR.. Cavefish evolved attraction behavior, which gives an insight for the different origin of mitochondrial and genomic DNA. Curr Biol. 2010 Sep 28;20(18):1631-6

UNIVERSITY OF MARYLAND

Prof. Wade C. Winkler

Associate Professor of Cell Biology and Molecular Genetics

Affiliation(s): Department of Cell Biology and Molecular Genetics

Major Awards

Searle Scholar Young Investigator Award; W. W. Caruth Jr. Scholar in Biomedical Research

Research Interests

My research group is developing methods to discover new examples of natural RNA structures (a.k.a. 'riboswitches') that sense metabolites or metal ions in bacteria. We also employ in vitro evolution techniques to explore the full sequence and structural range of such sensors. The metabolite-binding properties of some riboswitches appear to have been maintained throughout expansive evolutionary timescales. Also, many of the corresponding riboswitch ligands are thought to be functional relics of a hypothetical RNA-based world, in which RNA polymers provided all of the necessary catalytic and genomic functions of Earth's earliest self-replicating organisms. Therefore, metabolite-sensing domains of riboswitches may have been useful in the context of the primordial world for allosteric modulation of ribozymes, or as cofactor-binding domains of ribozymes. Discovery and analysis of riboswitches therefore helps to uncover potential molecular relics of these ancient origins. Also, the model microorganism that we have chosen for our studies is capable of endospore formation. It is has been hypothesized that bacterial spores could represent viable routes for panspermia, due to the ability of spores to withstand extreme stresses over many millennia. Therefore, one of our interests is to specifically uncover the RNA populations from within bacterial spores, and to investigate the mechanisms that lead to their long-term stabilization, a property that would undoubtedly be essential for any interplanetary travel by bacterial spores.

Selected Bibliography

Irnov*, I., Sharma, C.M., Vogel, J. and Winkler, W.C. (2010) Identification of regulatory RNAs in *Bacillus subtilis*. Nucleic Acids Res. 38:6637-6651.

Dambach*, M.D. and Winkler, W.C. (2009) Expanding roles for metabolite-sensing regulatory RNAs. Curr. Opin. Microbiol. 12:161-169.

Dann**, C.E., Wakeman*, C.A., Sieling, C.L., Baker, S.C., Irnov*, I. and Winkler, W.C. (2007) Structure and mechanism of a metal-sensing regulatory RNA, Cell 130: 878-892.

Winkler, W.C., Nahvi, A., Roth, A., Collins, J.A. and Breaker, R.R. (2004) Control of bacterial gene expression by a natural metabolite-responsive ribozyme. Nature 428:281-286.

Winkler, W.C., Nahvi, A. and Breaker, R.R. (2002) Thiamine derivatives bind messenger RNAs directly to regulate bacterial gene expression. Nature 419:952-956.

**Post-doc, *Graduate student

UNIVERSITY OF MARYLAND

Prof. Michael R. Zachariah

Professor of Chemistry

Affiliation(s): Department of Chemistry & Biochemistry and Mechanical Engineering

Major Awards

Bronze Medal, Department of Commerce, for Superior Federal Service; UMd School of Engineering Faculty Outstanding Researcher Award; Sinclair Award, from Amer. Assoc. Aerosol Research

Research Interests

Aerosol science; development of ion-mobility and mass spec. capabilities to study small particles in liquids and in aerosols. High temperature chemistry of metal oxides and metal oxides composites. Measurement of the optical properties of aerosols. Development of aerosol dynamics and other population dynamics models. Molecular dynamics modeling of phase behavior within aerosol particles.

Selected Bibliography

Prakash, A. Bapat, and M.R. Zachariah "A Simple Numerical Algorithm and Software for Solution of Nucleation, Surface Growth and Coagulation Problems" Aerosol Science & Tech. 37, 892 (2003).

D-H Tsai, L. Pease, R. Zangmeister, M. J., Tarlov and M.R. Zachariah "Aggregation Kinetics of Colloidal Particles Measured by Gas-Phase Differential Mobility Analysis" Langmuir 25, 140 (2009)

L. Zhou, N. Piekiel, S. Chowdhury, M.R. Zachariah, "Time Resolved Mass Spectrometry of the Exothermic Reaction between Nanoaluminum and Metal Oxides: The Role of Oxygen Release" J. Physical Chemistry C. 114, 14269 (2010)

P. Bueno, D. Havey, K. Gillis, J. Hodges, G. Mulholland R. Dickerson and M.R. Zachariah Amplification of the optical absorption cross section of soot aerosol with a nonabsorbing coating from photoacoustic measurements Aerosol . Sci. Tech. 45, 1217 (2011)

X. Ma, P. Chakraborty and M.R. Zachariah Molecular Dynamic Simulation of Dicarboxylic Acid Coated Aqueous Aerosol: Structure and Processing of Water Vapor Physical Chemistry Chemical Physics, 13, 9374 (2011)

D. Havey, P. Bueno, K. Gillis, J. Hodges, G. Mulholland, R. Van Zee, and M.R. Zachariah "Photoacoustic Spectrometer with a Calculable Cell Constant for Measurements of Gases and Aerosols" Analytical Chemistry 82, 7935 (2010)

P. Bueno, D. Havey, K. Gillis, J. Hodges, G. Mulholland R. Dickerson and M.R. Zachariah Amplification of the optical absorption cross section of soot aerosol with a nonabsorbing coating from photoacoustic measurements Aerosol . Sci. Tech. 45, 1217 (2011)