

## **Gerardo Dominguez**

U.C. President's Postdoctoral Fellow  
Dept. of Chemistry and Biochemistry  
University of California, San Diego  
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### **Education**

U.C. Berkeley, Physics, Ph.D. 2005

Thesis: *Fluorescent Aerogels for the Capture and Identification of Hypervelocity Extraterrestrial Particles*

U.C. Berkeley, Physics, M.A. 2001

U.C. Berkeley, Physics with Honors, B.A. 1998

### **Research Interests**

interstellar, interplanetary, and cometary dust; capture and impact cratering of hypervelocity particles in aerogels, calorimetric aerogels; atmospheric physics and chemistry using stable and radiogenic isotopes, development of IR spectroscopic instruments for environmental and laboratory measurements of extraterrestrial samples.

### **Appointments**

**NASA Stardust Preliminary Examination Team**, Cratering Subteam Member

**U.C. President's Postdoctoral Fellow**, UCSD (2007-2009)

Dreyfus Foundation Postdoctoral Fellow, UCSD (2005-2007)

Postdoctoral Researcher, U.C. Berkeley, Space Sciences Laboratory (2005)

Graduate Student Researcher, U.C. Berkeley (1998-2005)

Intern, Corning Inc. (Summer of 1999 and 2000)

Graduate Student Instructor, U.C. Berkeley (Fall 1998, Spring 1999, Fall 2000)

### **Awards**

U.C. President's Postdoctoral Fellowship (2007-2008)

Ford Foundation Postdoctoral Fellowship (declined offer in 2007)

Camille and Henry Dreyfus Foundation Environmental Chemistry Fellowship (2005-2007)

National Physical Science Consortium Graduate Student Fellowship  
(1998-2004)  
NASA Graduate Student Research Fellowship (2001)  
Physics Undergraduate Research Scholar, U.C. Berkeley (1998)  
Chancellor's Scholar, U.C. Berkeley (1994-1998)  
Ronald E. McNair Scholar, U.C. Berkeley (1997-1998)  
Minority Summer Research Exchange Program-Fellow, Physics Dept.,  
Stanford University, summer of 1996.

### **Research Grants-Awarded**

**Co-I, Infrared Spectro-Microscopy for Analysis of Extraterrestrial Samples, NASA-Sample Return Instrument Development Program(SRLIDAP)**, awarded starting in January 2008 (\$1,040,025).

**Co-I/Science-PI, Analytical Modeling Studies of the Capture Process in Aerogels, NASA-Stardust Data Analysis Program**, awarded starting May 2007 (\$108,000).

### **Publications**

Josep M. Trigo-Rodríguez, **Gerardo Domínguez**, Mark J. Burchell, Fred Hörz, Jordi Llorca, *Bulbous Tracks Arising From Hypervelocity Capture In Aerogel*, **Meteoritics and Planetary Science**, 43, Nr 1/2 (1-12)2008.

Burchell M.J., Fairey S.A.J., Wozniakiewicz P., Brownlee D.E., Hörz F., Kearsley A.T., See T.H., P Tsou, A. Westphal, S.F. Green S.F., J.M. Trigo-Rodríguez, **G. Domínguez**, *Characteristics of cometary dust tracks in Stardust aerogel and laboratory calibrations*, accepted for publication in **Meteoritics and Planetary Science** (2007).

D. Brownlee and the **Stardust Preliminary Examination Team**, *Comet 81P/Wild 2 Under a Microscope*, **Science** 314, 1711 (2006).

F. Hörz and the **Stardust Preliminary Examination Team-Impact Cratering Sub-team**, *Impact Features on the Stardust Collector and implications for Wild 2 Coma Dust*, **Science**, 314, 1716 (2006)

**G. Domínguez**, A.J. Westphal, M.L.F Phillips, S.M. Jones, G.A. Graham, A.T. Kearsley & G. Drolshagen, *Passive Detector Technology for the Capture of Micrometeoroids and Orbital Debris: Calorimetric Aerogels*, **Proceedings of the 4<sup>th</sup> European Conference on Orbital Debris.**, ESA/ESOC Darmstadt Germany, 18-20<sup>th</sup> of April, 2005.

- Domínguez, G.**; Westphal, A. J.; Jones, S. M.; Phillips, M. L. F.; *Energy Loss and Impact Cratering in Aerogels: Theory and Experiment. Icarus*, v. 172, pgs. 613-624. 2004.
- Graham, G.A., Grant, P.G., Chater, R.J., Westphal, A.J., Kearsley, A.T., Snead, C., **Domínguez, G.**, Butterworth, A.L., McPhail, D.S., Bench, G., Bradley, J.P., *Investigation of ion beam techniques for the analysis and exposure of particles encapsulated by silica aerogel: Applicability for Stardust. Meteoritics and Planetary Science* 39, 1461-1474. 2004.
- Domínguez, G.**, Westphal, A. J., Jones, S. M., Phillips, M. L. F., *Fluorescent Impact Cavities in a Titanium Doped Al<sub>2</sub>O<sub>3</sub>-SiO<sub>2</sub> Aerogel: Implications for the Velocity Resolution of Calorimetric Aerogels. Journal of Non-Crystalline Solids*, v. 350C pp 385-390. 2004.
- Domínguez, G.**, Westphal, A. J., Phillips, M. L. F., Jones, S. M., *A Fluorescent Aerogel for Capture and Identification of Extraterrestrial Dust, The Astrophysical Journal*, v. 592, pgs. 631-635, July 2003.

### Working Manuscripts

- Dominguez, G.**, Jackson T., Brothers, L., Nguyen, B., Barnett, B., Thiemens, M., *Discovery and measurement of an isotopically distinct source of sulfate in Earth's atmosphere*, under review, PNAS.
- Dominguez, G.**, Wilkins, G., Shaheen, R., Thiemens, M., *Evaluation of Sensitivity of mass-independent oxygen isotopes in aerosol nitrate to environmental factors using a photochemical box model*, manuscript in prep.

### Invited Talks

- Dominguez, G., *Quantifying the impact of primary sulfate from marine vessels using triple-isotope measurements of oxygen in aerosol sulfate*, Gordon Research Conference-Isotopes In Biological and Chemical Sciences, Ventura, CA, February 2008.
- Dominguez, G., *Reconstructing the Formation of the Solar System From the Analysis of Extraterrestrial Samples in the Lab*, invited astrophysics seminar, UC Irvine, November 2007.

### Presentations

- Dominguez, G.**, Wilkins, G., Jackson, T., Brothers, L., McCabe J., Thiemens, M.H., *Evaluation Of Sensitivity Of Mass-independent*

*Oxygen Isotopes In Aerosol Nitrate To Environmental Factors Using A Photochemical Box Model*, American Geophysical Union Meeting, San Francisco, CA, USA 2007.

Thiemens, M.H., Jackson, T., Barnett, B., Nguyen, B., Corbin, A., Prospero, J.M., **Dominguez, G.**, *Quantifying the influence of particulate sulfate in a variety of marine environments: from coastal California to the tropical Atlantic*, American Geophysical Union Meeting, San Francisco, CA, USA 2007.

Brothers, L.A., **Dominguez, G.**, Bluen, B., Corbin, A., Abramian, A., Thiemens, M.H., *Measuring <sup>35</sup>S of Aerosol Sulfate: Techniques and First Results*, American Geophysical Union Meeting, San Francisco, CA, USA 2007.

**Dominguez, G.**, Trigo-Rodriguez, J. M., Burchell, M. J., Horz, F., Llorca, J., Tsou, P., Anderson, W., *Analysis of Factors Contributing to the Bulbous Capture Tracks from Cometary Dust Particles in Stardust Aerogel Collector*, Meteoritical Society Meeting, Tucson, AZ, USA, August 2007.

Watson, A.; Strong, S., Dawson, O., Likar, J., Balint, T., Aubrey, A., Bramall, N.; Chereck, A.; **Dominguez, G.**; Hultgren, E.; Levy, J.; Liu, T.; Elwood Madden, M.; Plesko, C.; Sigel, D.; Soderlund, C.; Takahashi, Y.; Thompson, S.; Thomson, B. J.; Wiese, D., *Dual Probes to Saturn: A New Frontiers Mission Design Concept*, 38<sup>th</sup> Lunar and Planetary Science Conference, LPI Contribution No. 1338, League City, Texas, USA March 2007.

**Dominguez, G.** , Jackson, T., Nguyen, B., Barnett, B., Thiemens, M., *Towards Quantifying the Contribution of Ship Emissions to the Aerosol Environment in San Diego Using multi-Oxygen Isotopic Analysis of Aerosol Nitrate*, American Geophysical Union Meeting, San Francisco, CA, USA 2006.

Dawson, Olivia R.; Strong, S.; Likar, J.; Watson, A.; Balint, T.; Aubrey, A.; Bramall, N.; Chereck, A.; **Dominguez, G.**; Hultgren, E.; Levy, J.; Liu, T.; Elwood Madden, M.; Plesko, C.; Sigel, D.; Soderlund, K.; Takahashi, Y.; Thompson, S.; Thomson, B.; Wiese, D., *Comparative Planetology at Saturn: Mission Concept for a Flyby with Shallow Probes*, American Astronomical Society, DPS meeting #38, #45.21, 2006

Likar, J. J.; Strong, S.; Dawson, O.; Watson, A.; Balint, T.; Aubrey, A.; Bramall, N.; Chereck, A.; **Dominguez, G.**; Hultgren, E.; Levy, J.;

Liu, T.; Elwood Madden, M.; Plesko, C.; Sigel, D.; Soderlund, K.; Takahashi, Y.; Thompson, S.; Thomson, B.; Wiese, D., *Mission Design Concept for in Situ Characterization of Saturnian Atmospheric Composition*, American Geophysical Union, Fall Meeting 2006, abstract #P41C-1297

**Dominguez, G.**, Westphal, A. J.; Jones, S. M.; Phillips, M. L. F.; Schrier, M., *Calorimetric Aerogel Performance and Interstellar Dust Velocities*, Dust in Planetary Systems: Proceedings of the conference held September 26-28, 2005 in Kaua'i, Hawaii. LPI Contribution No. 1280., p.39.

**Dominguez, G.**; Westphal, A. J.; Phillips, M. L. F.; Jones, S. M.; Graham, G. A.; Kearsley, A. T.; Drolshagen, G., *Passive Detector Technology for the Capture of Micrometeoroids and Orbital Debris: Calorimetric Aerogels*, 4th European Conference on Space Debris, 18-20 April 2005, ESA/ESOC, Darmstadt, Germany.

**Dominguez, G.**, Westphal, A. J., *Modeling Large Interstellar Dust Grain Impacts in Sample Return Missions*, 38<sup>th</sup> Lunar and Planetary Science Conference, March 14-18, 2005, in League City, Texas,

Westphal, A. J.; Butterworth, A. L.; Snead, C. J.; **Dominguez, G.**; Weber, P. K.; Hutcheon, I. D.; Huss, G. R.; Nguyen, C. V.; Graham, G. A.; Ryerson, F.; Bradley, J. P., *Technique for Concentration of Carbonaceous Material from Aerogel Collectors Using HF-Vapor Etching*, 35<sup>th</sup> Lunar and Planetary Science Conference, March 15-19, 2004, League City, Texas

**Domínguez, G.**; Westphal, A. J.; Jones, S. M.; Phillips, M. L. F., *Hypervelocity Impact Energy Loss and Track Shape in Aerogels: Theory and Experiment*, 35<sup>th</sup> Lunar and Planetary Science Conference, March 15-19, 2004, League City, Texas

**Domínguez, G.**, et al., *Calorimetric Aerogel Collectors/Detectors of Hypervelocity Dust Grains*, Committees On SPACe Research (COSPAR) 2004, Paris, France.

**Domínguez, G.**, et al., *Fluorescence Properties of Thermally-Activated Alumina Aerogels*, Committees On SPACe Research (COSPAR) 2002, Houston, TX. USA

**Domínguez, G.**, et al., *A Theory of Impact Cratering in Low Density Solids and Application to Aerogels*. Eos Trans. AGU, 84(46), Fall Meet. Suppl., Abstract P52A-0478, 2003

**Domínguez, G.** et al., Fluorescent Aerogels for Capture and Identification of Interplanetary and Interstellar Dust. 34<sup>th</sup> Lunar and Planetary Science Conference, March 17-21, 2003, League City, TX. USA

Westphal, A. J.; Graham, G. A.; Bench, G.; Brennan, S.; Luening, K.; Pianetta, P.; Keller, L. P.; Flynn, G. J.; Snead, C.; **Dominguez, G.**; Grant, P.; Bajt, S.; Bradley, J. P.; Butterworth, A. L., *Robust Extraction and Multi-Technique Analysis of Micrometeoroids Captured in Low Earth Orbit*, Workshop on Cometary Dust in Astrophysics, August 10-15, 2003, Crystal Mountain, Washington.

Snead, C.; Westphal, A. J.; **Domínguez, G.**; Zolensky, M. E., *Successful Capture, Extraction and Identification of Hypervelocity CM2 Meteorite Fragments Shot by Light-Gas Gun*, 34<sup>th</sup> Annual Lunar and Planetary Science Conference, March 17-21, 2003, League City, Texas

Westphal, A. J.; Snead, C.; **Domínguez, G.**; Bradley, J. P.; Zolensky, M. E.; Flynn, G.; Brownlee, D., *An Extraction and Curation Technique for Particles Captured in Aerogel Collectors*, 34<sup>th</sup> Annual Lunar and Planetary Science Conference, March 17-21, 2003, League City, Texas

Flynn, G. J.; Lanzirotti, A.; Westphal, A. J.; **Dominguez, G.**; Snead, C., *Chemical and Mineralogical Analysis of an Extraterrestrial Particle in Aerogel*, 34<sup>th</sup> Annual Lunar and Planetary Science Conference, March 17-21, 2003, League City, Texas

### **Professional Workshops Attended**

**NASA's Planetary Science Summer School**, Jet Propulsion Laboratory, Pasadena, Summer 2006

### **Teaching Interests**

Earth and Planetary Sciences, Solar System Astrophysics, General Astrophysics, Isotope Geo- and Cosmo-chemistry, Atmospheric Physics and Chemistry, Scientific Computing and Instrumentation.

## Teaching Experience

**Graduate Student Instructor:** Physics for Scientists and Engineers (Electricity and Magnetism -Fall 2000), Dept. of Physics at UC Berkeley. Led 2 hour long discussion sections. Duties included presenting new material to students, leading discussion of physics problems, and encouraging student dialogue. Grading of exams also included in duties.

**Graduate Student Mentor:** Ronald E. McNair Scholars Program (Spring 2000). Assisted motivated undergraduates with undergraduate research, writing, and presentation. Weekly duties included providing informal guidance on the graduate school application process as well as tips for taking the math portion of the GRE.

**Graduate Student Instructor:** Advanced Physics Laboratory (Fall 1998 & Spring 1999), Dept. of Physics at UC Berkeley. Assisted advanced undergraduates with their experiments. Engaged and quizzed students on concepts in a wide variety of experiments (holography, Compton Scattering, X-ray diffraction, atomic spectra, particle physics, and NMR). Duties also included grading of technical write-ups of experimental data.

**Undergraduate Student Instructor:** Physics for Scientists and Engineers (Mechanics), Physics Scholars Program at U.C. Berkeley (Fall 1997). Co-led 2 hour long problem solving sessions with students. Duties included creating interesting physics problems, writing up solutions, and explaining concepts to other undergraduates.

## Student Mentoring

Actively engaged in providing technical/mathematical assistance and developing modeling tools for Atmospheric Chemistry graduate students in the UCSD Stable Isotopes Laboratory.

**Graduate Students Mentored (UCSD):** Justin McCabe, Ph.D., Lauren Brothers (ABD), and Anthony Fry.

**Undergraduate Students Mentored(UCSD):** Brian Nguyen (2005-2007), Burt Barnett (2005-2007), Gautam Wilkins (Summer and Winter of 2007), Antoinette Corbin (2007-present), and Anna Abrahamian (2007-present).

**Graduate Student Mentor (UC Berkeley-1999):** Ronald E. McNair Scholar's Program. Helped motivated undergraduates with research, writing, and presentation of results for an undergraduate research journal. Weekly duties included providing guidance on the graduate school

application process, balancing research and classes and planning weekly research meetings. In addition, prepared materials for students on strategies for taking the Math portion of the GRE examination.

### **Professional Service**

**Reviewer**, *Earth, Moon, and Planets*, 2007

**Chair**, *Meteoritics and Planetary Science Conference*; Tucson, AZ, 2007.

**Chair**, *Third International Symposium on Isotopomers*, La Jolla, CA 2006.

### **Professional Memberships**

American Association for the Advancement of Science (AAAS), member.  
American Geophysical Union, member  
Society for the Advancement of Chicanos and Native Americans in Science (SACNAS), member

### **Other Activities**

Actively engaged in providing mathematical assistance and developing modeling tools for Atmospheric Chemistry graduate students in the UCSD Stable Isotopes Laboratory.

Graduate Student Mentor for the *Ronald E. McNair Scholar's Program*. Assisted motivated undergraduates with research, writing, and presentation of results for an undergraduate research journal. Weekly duties included providing guidance on the graduate school application process, balancing research and classes and planning weekly research meetings. In addition, prepared materials for students on tips and strategies for taking the Math portion of the GRE examination.

As an intern at Corning Inc., wrote two internal reports whose purpose was to facilitate and educate future interns and employees. The first report was a guide for using the MIT Plane Wave Expansion Code, which included example files (from designs I had tested) and scripts. The other was a report describing the use of a Matlab code, which I wrote, for calculating the frequency response of simple Photonic Crystal Fibers.

### **Outreach**

Visited an Oakland elementary school classroom and talked to students about careers in science. Demonstration with liquid nitrogen was included (1997).

Mentor for **California Alliance for Minority Participation (CAMP)** undergraduate researcher in the Stable Isotopes Laboratory during Summer of 2007 – present.

## **References**

**Andrew Westphal** (Thesis Co-Advisor)  
Senior Fellow and Associate Director of the Space Sciences Laboratory at UC Berkeley  
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**Buford Price** (Thesis Co-Advisor)  
Member of the National Academy of Sciences  
Professor in the Department of Physics (Emeritus)  
University of California at Berkeley  
[bprice@berkeley.edu](mailto:bprice@berkeley.edu)  
(510) 642-4982

**Mark Thiemens** (Postdoctoral Mentor)  
Member of the National Academies of Sciences  
Dean of the Physical Sciences & Professor,  
Dept. of Chemistry and Biochemistry  
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**Dimitri N. Basov** (Collaborator)  
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