

Name: José Leobardo Bañuelos
Department of Physics
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Position Title: Assistant Professor
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Professional Preparation

2011-2014	Postdoc	Oak Ridge National Laboratory, Oak Ridge, TN	Chemical Sciences Division
2010	Ph.D.	New Mexico State University, Las Cruces, NM	Physics
2004	B.S.	New Mexico State University, Las Cruces, NM	Physics / minor: Math.

Appointments

Assistant Professor of Physics	The University of Texas at El Paso, El Paso, TX	2016-current
Neutron Instrument Staff Scientist	Rutherford Appleton Laboratory, Didcot, UK	2014-2016

Research Interests

I investigate the physicochemical properties of nanoscale fluid-solid interfaces in areas such as energy storage and conversion, natural resource management, environmental remediation, and nanomedicine. My expertise lies in using advanced x-ray and neutron scattering structural and spectroscopic techniques to elucidate the properties of novel materials for supercapacitor applications. I currently lead the Nanomaterials, Interfaces, and Confinement for Energy and the Environment Laboratory (**NICE² Lab**) at The University of Texas at El Paso (UTEP). The NICE² Lab is composed of 4 graduate and 6 undergraduate students and focuses on using x-ray and neutron scattering techniques to study the bulk phase and interfacial nanoscale properties of complex fluids.

Primary Analytical Techniques Experience

- Small-Angle X-ray & Neutron Scattering
- X-ray and Neutron Diffraction
- Neutron Spin Echo Spectroscopy
- Neutron reflectometry
- Electron Microscopy (SEM & TEM)
- Electrochemical Characterization
- Gas Adsorption Analysis

Additional Skills

Programming in Labview, Python, Fortran. Scattering instrument build and design. Data acquisition software development. Conventional machining. Fluent in speaking and writing English and Spanish.

Synergistic Activities

1. Linton-Poodry Summer Leadership Institute (2016) alumnus.
2. American Physical Society and Society for the Advancement of Chicanos and Native Americans in Science (SACNAS) member.
3. Manuscript Reviewer for Journals: Carbon, Environmental Engineering Science
4. Neutron National User Facility Proposal reviewer
5. Future and Current Use of Neutron Spin-Echo Spectroscopy Workshop Contributor
6. Advisory Board member for UTEP Campus Office of Undergraduate Research Initiatives (COURI).
7. UTEP delegation to increase synergistic activities with several institutions in Mexico City, Mexico.
8. Mentor in The University of Texas at El Paso (UTEP) BUILDing SCHOLARS, MERITUS, and SURPASS programs .

9. Keynote speaker at conferences: 2016 Louis Stokes Alliance for Minority Participation (AMP)-UTEP, 2016 Summer Community College Opportunity for Research Experience (SCCORE)-New Mexico State University (NMSU), 2016 NM AMP-NMSU.
10. 2016 NM AMP conference grad school success panelist,
11. UTEP College of Science graduate fellowship review committee
12. Invited speaker: (3/10/17) NMSU Chemical Engineering 2017 Seminar series

Collaborators & Other Affiliations

a) Collaborators (past 4 yr.)

Robert Dalglish, ISIS Neutron Facility, STFC Rutherford Appleton Laboratory, Didcot, UK
Gernot Rother, Chemical Sciences Division, Oak Ridge National Laboratory, Oak Ridge, TN
Pasquale Fulvio, Department of Chemistry, University of Puerto Rico, Rio Piedras, PR
Sheng Dai, Chemical Sciences Division, Oak Ridge National Laboratory, Oak Ridge, TN
Guang Feng, State Key Lab. of Coal Combustion, Huazhong U. of Science & Tech. Wuhan, Hubei, China
Song Li, Dept. of New Energy, Huazhong University of Science & Technology. Wuhan, Hubei, China
Peter Cummings, Dept. of Chemical and Biomolecular Engineering, Vanderbilt University, Nashville, TN
Alexis Navarre-Sitchler, Dept. of Geology & Geol. Engineering, Colorado School of Mines, Golden, CO

b) Graduate and Postdoctoral Advisors

Jacob P. Urquidi, Department of Physics, New Mexico State University, Las Cruces, NM.
David J. Wesolowski, Chemical Sciences Division, Oak Ridge National Laboratory, Oak Ridge, TN.

c) Advisor of Graduate Students

Pawan Koirala, Fall 2016-current
Hasan Rahman, Fall 2016-current
Jose Ali Espitia, Fall 2016-current
Kevin D. Vallejo, Spring 2017-current

d) Mentor of Undergraduate Students

Carlos Cuellar Rodriguez, Summer 2016-current
Francisco Ayala Rodriguez, Summer 2016-current
Crystal Rodriguez, Summer 2016-current
Melissa Cano, Fall 2016-current
Raul Higuera, Fall 2016-current
Alexander Hilstrom, Spring 2017-current
Eduardo Arzabala, Spring 2017-current
Daniel Puentes (UNM) Summer 2017
Alice Alayon (U. Turabo) Summer 2017
Juan Pablo Speer (Silva Magnet HS) Summer 2017
Samuel Cano (Portland State U.) Summer 2017

Detailed Employment History:

September 2014 – Current – Staff Scientist. Large Scale Structures Group, ISIS Neutron and Muon Scattering Facility, STFC Rutherford Appleton Laboratory, Harwell Oxford, Didcot, UK. Line manager: Sarah Rogers.

Helped commission Larmor, a multipurpose diffraction and spectroscopy instrument at Target Station 2 of the ISIS Facility; this was an international effort with the Delft University of Technology (Delft, Netherlands). Helped coordinate efforts in the construction and installation of instrument components, as well as software development for instrument control, data reduction, and analysis. Conducted scientific outreach and user support to both the academic and industrial European and international neutron user communities involved in nanoscience research. Spearheaded the development of a research programme which incorporated electrochemical experiments *in situ* with time-resolved neutron scattering analysis.

January 2011 – July 2014 – Postdoctoral Research Fellow, Fluid Interface Reactions, Structures and Transport (FIRST) Energy Frontier Research Center (EFRC) and Geochemistry and Interfacial Sciences Group, Chemical Sciences Division, Oak Ridge National Laboratory, Oak Ridge, TN. Group leader and PI: David J. Wesolowski.

I investigated the molecular-scale structure and dynamics of the fluid-solid interface formed between electrolytes, such as room temperature ionic liquids, and nanoporous electrodes. I used X-ray and neutron scattering techniques, including small angle scattering, reflectometry, diffraction, and neutron spin echo to study electrical energy storage materials and communicated results across different specialties to integrate theory and simulation in our investigations.

Fall 2010 – Instructor and Conference Organizer, Introduction to science, math, & engineering (SMET101), and NM Alliance for Minority Participation Symposium, Dept. of Civil & Geological engineering, NMSU, Las Cruces, NM. Supervisor: Michele Auzenne.

November 2007 – July 2010 – Graduate Student Research Assistant, Minority Biomedical Support Research Initiative for Scientific Enhancement (MBRS RISE) program. NMSU, Las Cruces, NM, advisor: Jacob Urquidi.

- Managed the x-ray science laboratory at the department of physics, NMSU.
- Designed experiments, set up & constructed experiment ancillary equipment, performed data reduction/analysis for both internal and external users of the laboratory.
- Used Small angle scattering to investigate: **(1)** protein structures during their folding & unfolding. **(2)** *In situ* surfactant-templated nanoporous Pt and Pd synthesis. **(3)** cellulose enzymatic hydrolysis for biofuel production.
- Developed anomalous x-ray scattering instrumentation for the quantitative determination of metal distribution and morphology in bone.

June 2006 – November 2007 – Graduate Research In Neutron Science Fellow, Los Alamos Neutron Science Center (LANSCE), Lujan Neutron Scattering Center, Los Alamos National Laboratory, Los Alamos, NM, advisor: Jacob Urquidi.

- Developed data acquisition and analysis software for the 10 m SAXS instrument (Linus), Wide Angle X-ray diffractometer (WAXS), and MEDUSA (Multiple Energy Diffractometer Using Small, medium and wide Angles).
- Managed the x-ray diffraction laboratory at the department of physics, NMSU.
- Performed SAXS experiments to complement a project (microheterogeneity in water-alcohol systems) on the Low-Q Diffractometer (LQD) at the Lujan Neutron Scattering Center, LANL.
- Built both a liquids and amorphous materials x-ray diffractometer and oversaw the construction of a medium small angle diffractometer.

July 2004 – June 2006, *Bridge to the Doctorate II Fellow*, NSF Division of Human Resource Development, NM Louis-Stokes Alliance for Minority Participation (NM LS-AMP), NMSU, Las Cruces, NM, advisor: Jacob Urquidi.

- Mentored undergraduate students involved in laboratory projects.
- Played a lead role in setting up diffraction experiments, collecting and analyzing SAXS data.
- Summer 2005 – Used a *Labview* graphical user interface to automate the motor controls and data acquisition software for the Los Alamos Neutron Science Center's Single Crystal Diffractometer.

Jun. – July 2004, Instructor, Las Cruces Pre-Freshmen Engineering Program (PREP), NMSU, supervisor: Alyne Fulte.

Taught an algebra course and two physics courses to middle/high school students.

Jan. 2004 – May 2004, Undergraduate Research Assistant, New Mexico Alliance for Minority Participation (NM AMP), NMSU, mentor: Jacob Urquidi.

- Designed and built an apparatus to create hyperquenched and vapor-deposited samples of low density amorphous ice.
- Assembled beam line components for a small angle x-ray diffractometer.

Jun. – July 2003, Senior Mentor, Las Cruces PREP, NMSU, supervisor: Richard Fischer.

- Taught physics and trigonometry. Gave lectures, wrote lab assignments, and evaluated students.
- Ensured that mentors followed daily plans, advised new mentors, helped resolve conflicts.

Jun. 2003 – Dec. 2003, Undergraduate Research Assistant, New Mexico Alliance for Minority Participation, NMSU, mentor: Steve Kanim.

- Designed, built, and operated a magnetic field meter to measure upper atmospheric/magnetospheric disturbances.
- Built measurement circuits and feedback control systems.

Jan. 2001 – Dec. 2002, Undergraduate Research Assistant, New Mexico Alliance for Minority Participation, NMSU, mentor: Steve Kanim.

- Improved design and data acquisition system of a horizontal pendulum tilt meter.
- Collected earth tide and earthquake data for analysis.

Jun. – July 2001, Mentor, Las Cruces Pre-Freshman Engineering Program (PREP), NMSU, supervisor: Alyne Fulte. and,

Jun. - July 2002, Mentor, Las Cruces PREP, NMSU, supervisor: Richard Fischer.

-Mentored middle and high school students in the science, mathematics, and engineering in both seven-week programs (2001 & 2002).

-Taught an introductory calculus to four students within both summer programs.

May 29 – July 24, 2000, Summer Internships in Sciences & Technology (SIST) summer intern, Fermi National Particle Accelerator, Batavia, IL. Supervisor: Jay Dittmann.

-Worked on the integration and testing of the Level 1 tracking trigger (XFT) components at the Collider Detector at Fermilab (CDF).

Publications

1. K. Mouzakis, A.K. Navarre-Sitchler, G. Rother, **J.L. Bañuelos**, X. Wang, J. Kaszuba, J. Heath, Q. Miller, V. Alvarado, J. McCray. *An experimental study of porosity changes in caprocks exposed to supercritical CO₂. I. Evolution of mineralogy, pore connectivity, pore size distribution, and surface area.* Submitted (EES, Dec **2015**).
2. K. Mouzakis, A.K. Navarre-Sitchler, G. Rother, **J.L. Bañuelos**, X. Wang, J. Kaszuba, J. Heath, Q. Miller, V. Alvarado, J. McCray. *An experimental study of porosity changes in caprocks exposed to supercritical CO₂. II. Insights into aqueous geochemistry controls on mineral reactivity and porosity based on evolving brine chemistry.* Companion paper, submitted (EES, Dec **2015**).
3. R.L. Sacci, **J.L. Bañuelos**, G.M. Veith, K.C. Littrell, Y.Q. Cheng, C.U. Wildgruber, L.L. Jones, A.J. Ramirez-Cuesta, G. Rother, N.J. Dudney. *Structure of Spontaneously Formed Solid-Electrolyte Interphase on Lithiated Graphite Determined Using Small-angle Neutron Scattering.* J. Phys. Chem. C. **2015** 119(18), 9816-9823.
4. S. Li, **J.L. Bañuelos**, P. Zhang, G. Feng, S. Dai, G. Rother, P.T. Cummings. *Toward Understanding the Structural Heterogeneity and Ion Pair Stability in Dicationic Ionic Liquids.* Soft Matter. **2014** 10(45), 9193-9200.
5. **J.L. Bañuelos**, G. Feng, P. F. Fulvio, S. Li, G. Rother, N. Arend, A. Faraone, S. Dai, P.T. Cummings, D. J. Wesolowski. *The Influence of a Hierarchical Porous Carbon Network on the Coherent Dynamics of a Nanoconfined Room Temperature Ionic Liquid: A Neutron Spin Echo and Atomistic Simulation Investigation.* Carbon **2014**, 78(0), 415-427.
6. G. Rother, L. Vlcek, M.S. Gruszkiewicz, A.A. Chialvo, L.M. Anovitz, **J.L. Bañuelos**, D. Wallacher, N. Grimm, D.R. Cole. *Sorption Phase of Supercritical CO₂ in Silica Aerogel: Experiments and Mesoscale Computer Simulations.* J. Phys. Chem. C **2014**, 118 (28), 15525-15533.

7. **J.L. Bañuelos**, G. Feng, P. F. Fulvio, S. Li, G. Rother, S. Dai, P.T. Cummings, D. J. Wesolowski. *Densification of Ionic Liquid Molecules within a Hierarchical Nanoporous Carbon Structure Revealed by Small Angle Scattering and Molecular Dynamics Simulation*. Chem. Mater. **2014**. 26, pp1144-1153.
8. A.G. Stack, A. Fernandez-Martinez, L.F. Allard, **J.L. Bañuelos**, G. Rother, L. M. Anovitz, D.R. Cole, G.A. Waychunas. *Pore-Size-Dependent Calcium Carbonate Precipitation Controlled by Surface Chemistry*. Environ. Sci. Technol. **2014**, 48(11), 6177-6183.
9. S. Li, G. Feng, **J.L. Bañuelos**, G. Rother, P.F. Fulvio, S. Dai, P.T. Cummings. *Distinctive Nanoscale Organization of Dicationic versus Monocationic Ionic Liquids*. J. Phys. Chem. C. **2013**. 117(35), pp 18251-18257.
10. J.R. Carmichael, G. Rother, J.F. Browning, J.F. Ankner, **J.L. Bañuelos**, L.M. Anovitz, D.J. Wesolowski, D.R. Cole. *High-pressure cell for neutron reflectometry of supercritical and subcritical fluids at solid interfaces*. Review of Scientific Instruments. **2012**. 83, 045108.
11. S. Li, **J.L. Bañuelos**, J. Guo, L.M. Anovitz, G. Rother, R.W. Shaw, P.C. Hillesheim, S. Dai, G.A. Baker, P.T. Cummings. *Alkyl Chain Length and Temperature Effects on Structural Properties of Pyrrolidinium-Based Ionic Liquids: A Combined Atomistic Simulation and Small-Angle X-ray Scattering Study*. J. Phys. Chem. Lett. **2012**, 3(1), pp125-130.
12. M.S. Kent, G. Cheng, J.K. Murton, E.L. Carles, D.C. Dibble, F. Zendejas, M.A. Rodriguez, H. Tran, B. Holmes, B.A. Simmons, B. Knierim, M. Auer, **J.L. Bañuelos**, J. Urquidi, R.P. Hjelm. *A Study of Enzymatic Digestion of Cellulose by Small Angle Neutron Scattering*. Biomacromolecules. **2010**, 11(2), pp357-368.
13. **J.L. Bañuelos**. *Small angle x-ray scattering: Instrument development and studies of protein aggregation, cellulose hydrolysis, and the production of nanoporous metals using surfactant templates*. ProQuest Dissertations And Theses. **2010**, 72-05.

Research highlighted

Squeezing Molecules for Energy Storage

<http://www.energyfrontier.us/newsletter/201502/when-confinement-gives-you-speed-boost/summary>

When Confinement Gives You a Speed Boost

<http://www.energyfrontier.us/newsletter/201502/when-confinement-gives-you-speed-boost>

Presentations (2013-2015)

1. November 02, 2015. J.L. Bañuelos. *X-rays and Neutrons for Nanoscience: Examples from Interfacial Fluids in Energy Research*. The University of Texas at El Paso. El Paso, TX, USA.

2. October 26-29, 2015. J.L. Bañuelos. *Neutron Scattering as a Probe for Ion Electrosorption in Porous Media*. 2015 International Conference on Capacitive Deionization and Electrosorption (CDI&E). Saarbrücken, Germany.
3. May 13-14, 2015. J.L. Bañuelos. *Dynamics of Ionic Liquid Molecules Under Nanoscale Confinement*. Future and Current Use of Neutron Spin-Echo Spectroscopy in Condensed Matter Research Workshop. Oak Ridge National Laboratory. Oak Ridge, TN, USA.
4. February 25-27, 2015. J.L. Bañuelos. *Nanoscale confinement and surface effects in electrical energy storage systems*. Complex Liquids at Structured Surfaces Workshop. Harnack Hause, Berlin, Germany.
5. January 6-7, 2015. J.L. Bañuelos. *Nanoscale Confinement and Surface Effects in Electrical Energy Storage Systems*. SANDALS 25th anniversary meeting. Hosted by ISIS Facility, STFC Rutherford Appleton Laboratory. The Cosener's House, Abingdon, Oxfordshire, UK.
6. November 26, 2014. J.L. Bañuelos. *Nanoscale Confinement and Surface Effects in Electrical Energy Storage Systems*. 2014 ISIS Seminar Series. STFC Rutherford Appleton Laboratory, Harwell Oxford, Didcot, Oxfordshire, UK.
7. November 7, 2013. J. L. Bañuelos. *Nanoscale Confinement and Surface Effects in Energy Storage Systems: Insights from Experiments and Modeling*. 2013 New Mexico State University (NMSU) Department of Physics Colloquium Series. NMSU, Las Cruces, NM, USA.
8. September, 10, 2013. J. L. Bañuelos. *Nanoscale confinement and surface effects in energy storage and conversion systems: Structural and Dynamical Insight*. NIST Center for Neutron Research. NIST, Gaithersburg, MD, USA.
9. July 18-19, 2013. J.L. Bañuelos, S.M. Chathoth, D.M. Anjos, G. Feng, S. Li, J. McDonough, P.F. Fulvio, E. Mamontov, G. Rother, Y. Gogotsi, S. Dai, S.H. Overbury, P.T. Cummings, D.J. Wesolowski. *Neutron Probes of Interfacial Fluid Structure and Dynamics*, 2013 Energy Frontier Research Center (EFRC) Principal Investigators' (PI) Meeting. Washington, D.C., USA.

Professional Training

2015 Empirical Potential Structure Refinement (EPSR) Workshop. (Jan. 8-9, 2015). Hosted by ISIS Facility, STFC Rutherford Appleton Laboratory. The Cosener's House. Abingdon, Oxfordshire, UK.

Joint Center for Artificial Photosynthesis 2014 Solar-Fuels Winter School: Thin Film Components for Artificial Photosynthesis. (Feb. 10-14, 2014). California Institute of Technology, Pasadena, CA.

2013 High Resolution Neutron Scattering to MEasure SLOW Dynamics (MELODY) workshop participant. (March 12-14). Spallation Neutron Source, Oak Ridge National Laboratory, Oak Ridge, TN.

2011 *DISCUS Workshop on Diffuse Scattering and Defect Structure Simulations* participant. (May 21-24). Dr. Reinhard Neder & Thomas Proffen. Department of Geoscience, Stony Brook University. Stony Brook, NY.

2009 *Principles and Applications of GC/MS (Gas Chromatography / Mass Spectroscopy)* workshop participant. (July 15-22). Dr. Antonio Lara. New Mexico State University, Las Cruces, NM.

2009 *Modeling Biological Systems using Differential Equations – a computational approach* workshop participant. Dr. Alan Garfinkel, UCLA Medical School. Location: New Mexico State University, Las Cruces, NM.

2008 *RISE Responsible Conduct in Research Summer Seminars*. New Mexico State University, Las Cruces, NM.

2006 *Neutron Scattering Joint Winter School on Structural Biology and Soft Condensed Matter* participant, (May 18-26), LANSCE Lujan Neutron Scattering Center, Los Alamos National Laboratory, Los Alamos, NM.

Performed experiments on: (1) FDS – Filter Difference Spectrometer, (2) HIPD – High Intensity Powder Diffractometer, (3) LQD – Low Q Diffractometer, (4) SPEAR – Surface Profile Analysis Reflectometer

2005 *Neutron Scattering Winter School in Structural Materials* participant, (March 3-11), LANSCE Lujan Neutron Scattering Center, Los Alamos National Laboratory, Los Alamos, NM.

Performed experiments on: (1) HIPPO – High Pressure Preferred Orientation diffractometer, (2) LQD, (3) NPDF – Neutron Powder Diffractometer, (4) SMARTS - Spectrometer for Materials Research at Temperature and Stress

2004 *National School on Neutron and X-ray Scattering* participant, (Aug. 16 – 29), Argonne National Laboratory, Argonne, IL.

Performed Experiments: (1) Thin film x-ray reflectometry, (2) X-ray magnetic circular dichroism, (3) Neutron powder diffraction (GPPD, SEPD), (4) Neutron spectroscopy (LRMECS)

Awards and Honors

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| • SACNAS 2012 National Conference Travel Scholarship
Recipient. Seattle, WA | Oct. 2012 | \$1.4K |
| • NM Space Grant Consortium Graduate Research Fellowship | Aug. 2009 –
May 2010 | \$10K |
| • American Physical Society Four Corners Section 2008
Meeting Travel Award | Oct. 2008 | \$250 |
| • SACNAS 2008 National Conference Travel Scholarship
Recipient. Dallas, TX | Oct. 2008 | \$1.2K |

• NM Space Grant Consortium Graduate Research Fellowship	Aug. 2008 – May 2009	\$10K
• MBRS RISE Graduate Scholar, (NIH grant no: R25GM061222)	Nov. 2007 – July 2010	\$21K/yr
• Graduate Research In Neutron Scattering (GRINS) Scholar, Los Alamos, NM	June 2006 – Nov. 2007	\$45K/yr
• NSF Division of Human Resource Development Louis Stokes Alliance for Minority Participation (LSAMP) <i>Bridge to the Doctorate II</i> Fellow	Aug. 2004 – July 2006	\$30K/yr
• Marc Miller – Velma McClelland Memorial Scholarship for Outstanding Laboratory Student	May 2002	\$500
• American Physical Society Corporate Sponsored Scholarships for Minority Undergraduates in Physics recipient	2001, 2002	\$5K
• NMSU Crimson Scholar	2004	n/a
• NMSU Regents Plus Scholar	1999-2003	\$4K/yr
• Dean’s List	Fall 1999, Spring 2000	n/a
• National Science Merit Award (NSMA) winner	1999	n/a
• United States Achievement Academy All-American Scholar	1999	n/a
• Gadsden High School class Valedictorian	1999	n/a

Service/Activities

- Outreach: Helped with facility tours to thousands of Oxfordshire area residents during the *Science Up Close – Harwell Open Days* event July 2015
- Became an official STEMNET (Science, Technology, Engineering & Math) ambassador, June 2015
- Helped teach sessions of the ISIS Neutron Training Course, June 2015
- ISIS Careers Evening, Hosted tour of beamline, discussed career options at the facility, Dec. 2014
- Abstract reviewer and judge, 2012 SACNAS National Conference, Seattle, WA.
- Panelist: *Success strategies in the undergraduate and graduate experience* student panel for NM AMP undergraduate research assistants and Summer Community College Opportunity for Research Experience (SCCORE) program participants, 2007-2008.
- National Society of Physics Students (SPS) NMSU chapter: President (FA2003 - SP 2004), Treasurer (FA2001 - SP 2002), and Lead Organizer of National SPS zone 16 student meeting at NMSU (03/2004).
- Assisted in the NMSU Physics Olympics, Nov. 2002, 2004, 2005.
- Assistant Coach-’09 Northgate Optimist Club machine-pitch baseball league, El Paso TX
- Judge – presentations in the 2009 Graduate Research & Arts Symposium
- Judge-Southern NM science fair, Spring 2003, Spring 2005, Spring 2009

- Judge- 53rd annual NM Science & Engineering Fair, NM Tech. Socorro, NM Spring 2005.
- Judge-New Mexico Boosting Engineering, Science and Technology (BEST) robotics competition, NMSU, October 2003.
- Poster Judge – LS-AMP Expanding Horizons 2 Conference, NMSU, Fall 2005.
- Undergraduate Recruitment Night at NMSU Albuquerque Center, Albuquerque, NM, Fall 2005. (NMSU College of Engineering / Dept. of Physics recruitment event.)

National User Facility Proposal Awards and Activity (Jan. 2011 – Feb. 2014)

Instrument: Extended Q-Range Small Angle Neutron Scattering Diffractometer (EQSANS), Spallation Neutron Source, Oak Ridge National Laboratory, Oak Ridge, TN.

Density and Intermediate Range Order in Confined Room Temperature Ionic Liquids, April 17-19, 2013, **PI: J.L. Bañuelos** (team: G Rother, D. Wesolowski, P.F. Fulvio, S. Dai, S. Li, P.T. Cummings)

Structure Determination of Intercalated MXene, March 27-29, 2013, PI: V. Mochalin, (team: **J.L. Bañuelos**, O. Mashtalir, Y. Gogotsi)

Structure and desolvation of ions in nanometer-scale pores in carbide-derived carbon, April 13-16, 2012. PI: D. Wesolowski (team: **J.L. Bañuelos**, V. Presser, P.F. Fulvio)

Structure of model ionic liquids at porous carbon interfaces as a function of electrical potential. May 13, 2011 – May 16, 2011, PI: L.M. Anovitz (team: **J.L. Bañuelos**, D. Cole, G. Rother, P. Fulvio, S. Dai, D. Wesolowski, L. Adamczyk)

Atomic-scale structure of water in sub-nanometer pores in carbide-derived carbon PI: G. Rother (team: **J.L. Bañuelos**, E. Mamontov, D. Wesolowski, A. Kolesnikov, Y. Gogotsi) May 04, 2011 – May 05, 2011- EQSANS/ SNS

Instrument: Neutron Spin Echo Spectrometer, Spallation Neutron Source, Oak Ridge National Laboratory, Oak Ridge, TN.

Changes in the Coherent Dynamics of the Confined Room Temperature Ionic Liquid $[C_{10}MPy^+][Tf_2N^-]$. Submitted for July-Dec 2013 cycle. **PI: J.L. Bañuelos** (team: D. Wesolowski, G. Rother, S. Dai, P.T. Cummings, P. Fulvio, S. Li)

Water mobility at the oxide interface – measurement of collective motions, Sept 20 – 27, 2012, PI: Lukas Vlcek (team: G. Rother, D. Wesolowski, **J.L. Bañuelos**)

Collective motions in bulk and confined room-temperature ionic liquids, April 26 – May 06, 2012, **PI: J.L. Bañuelos** (team: D. Wesolowski, G. Rother, S. Dai, L. Anovitz, P. Fulvio)

Instrument: Neutron Spin Echo Spectrometer, NIST Center for Neutron Research, National Institute of Standards and Technology, Gaithersburg, MD.

Changes in the coherent dynamics of confined room temperature ionic liquids, May 31 – June 10, 2013, **PI: J.L. Bañuelos**, (team: G. Rother, D. Wesolowski, A. Faraone)

Coherent dynamics of the ionic liquid [C₄mim⁺][Tf₂N⁻] in nanometer-scale pore geometries, Aug. 06 – Aug. 13, 2012, **PI: J.L. Bañuelos** (team: G. Rother, P. Fulvio, D. Wesolowski, A. Faraone)

Instrument: BT-5 Perfect Crystal SANS (USANS), NIST Center for Neutron Research, National Institute of Standards and Technology, Gaithersburg, MD.

Distribution of Alkanes, CO₂, and Hydrogen in Shales at High Pressure. Dec. 4-7, 2012, PI: H. King, (team: A. Eberle, G. Rother, **J.L. Bañuelos**)

Instrument: BL-16B VISION, Spallation Neutron Source, Oak Ridge National Laboratory, Oak Ridge, TN.

Neutron vibration spectroscopy study of spontaneously formed SEI lithiated graphites. Run cycle: March 12-19, 2014, PI: R. Sacci, (team: E. Mamontov, N. Dudney, **J.L. Bañuelos**).

Instrument: Nanoscale-Ordered Materials Diffractometer (NOMAD), Spallation Neutron Source, Oak Ridge National Laboratory, Oak Ridge, TN.

Annealing temperature effects on the structure of microporous and onion-like carbon electrode materials, Nov. 29 – Dec. 02, 2012, **PI: J.L. Bañuelos** (team: P. Ganesh, Y. Gogotsi, J. McDonough, G. Rother, V. Mochalin, V. Presser, D. Wesolowski)

The Structure of the Ionic Liquid 1-Butyl-3-methylimidazolium Bis{(trifluoromethyl)sulfonyl} amide confined in nanoporous carbon. Dec. 01, 2011 – Dec. 04, 2011, **PI: J.L. Bañuelos** (team: G. Rother, P. Fulvio, S. Dai, L. Anovitz, Y. Gogotsi, J. McDonough, V. Presser)

Atomic-scale structure of water in sub-nanometer pores in carbide-derived carbon. June 03-06, 2011, **PI: J.L. Bañuelos** (team: E. Mamontov, D. Wesolowski, J. Neufeind, G. Rother, A. Kolesnikov, Y. Gogotsi, S. Chathoth, J. McDonough, V. Presser)

Instrument: General Purpose Small Angle Neutron Scattering Diffractometer (GP-SANS), High Flux Isotope Reactor (HFIR), Oak Ridge National Laboratory, Oak Ridge, TN.

In situ Study of Spontaneous SEI Formation on Lithiated Graphites. Run Cycle: HFIR 2014-B 01-AUG-2014 to 31-DEC-2014, PI: R. Sacci, (team: E. Mamontov, N. Dudney, **J.L. Bañuelos**).

Pore network change of Wyoming reservoir rock after reaction with supercritical CO₂ and brine related to CO₂ sequestration, April 7 – April 9, 2012, PI: John Kaszuba (team: G. Rother, **J.L. Bañuelos**, A. Sitchler, X. Wang, V. Alvarado)

Pore-Size Dependent Calcium Carbonate Precipitation in Mesoporous Silica. Jan 13-16, 2011. G. Rother A. Fernandez-Martinez, A.G. Stack, **J.L. Bañuelos**, L. M. Anovitz, D.R. Cole.

Instrument: Liquids Reflectometer, Spallation Neutron Source, Oak Ridge National Laboratory, Oak Ridge, TN

Behavior of hydrocarbons at mineral surfaces. June 13-15, 2012. PI: D. Cole, (team: G. Rother, **J.L. Bañuelos**, D. Wesolowski, L. Anovitz, T. Liu, J. Baines).

Density and composition profiles of supercritical CO₂ and CO₂+water mixtures at SiO₂ interfaces. Dec. 14 – 17, 2011. PI: G. Rother (team: **J.L. Bañuelos**, L. Anovitz, D. Wesolowski, D. Cole)

Ionic liquid morphology at charged carbon surfaces, Sept. 28, 2011 – Oct. 01, 2011
PI: G. Rother (D. Wesolowski, **J.L. Bañuelos**, S. Dai, L.M. Anovitz, P. Fulvio, D. Cole)

Instrument: Low-Q Diffractometer, Los Alamos Neutron Science Center (LANSCE), Los Alamos National Laboratory, Los Alamos, NM.

Structure of model ionic liquids at porous carbon interfaces as a function of electrical potential. Sept. 08, 2011 – Sept. 14, 2011, PI: L.M. Anovitz (G. Rother, D. Wesolowski, **J.L. Bañuelos**, P. Fulvio, P. Hillesheim, S. Dai)

National/International Conferences

I have communicated results from research projects at 15 state/regional conferences and at 16 national/international conferences, including the Gordon Research Conference (GRC) on Water and Aqueous Solutions, GRC on Proteins, American Physical Society March meetings, two American Conference on Neutron Scattering meetings, and various other neutron and nanoscience facility user meetings and workshops. Recent topics as a postdoctoral researcher, have included dynamic and structural measurements using neutrons and X-rays on research areas within the FIRST EFRC, including alkyl chain, temperature, and confinement effects on the structure of room temperature ionic liquids, as well as the behavior of electrolytes at charged carbon interfaces. As a graduate student, I presented SAXS studies on various topics including: tracking protein structural changes with variations in several external parameters, probing the properties of water encapsulated in reverse micelles, and the structure of cellulose with enzymatic hydrolysis and ionic liquid pre-treatment. I presented work on various aspects of the LANL Single Crystal Diffractometer upgrades. I have presented work related to the various X-ray instruments that were designed/upgraded, assembled and commissioned in our lab (including sample environments and software), and discussed their capabilities. As an undergraduate, I presented seismological studies from a custom built/refurbished gravimeter, the design and operation of an atmospheric magnetic field meter, and a summer project integrating and testing the Level 1 tracking trigger (XFT) components at the Collider Detector at Fermilab (CDF).

Presentations (2012 & older)

10. September 12-14, 2012. Poster. J.L. Bañuelos, S. Li., G. Feng, P.F. Fulvio, N. Arend, G. Rother, A. Faraone, L.M. Anovitz, P. Hillesheim, J. Guo, R. Shaw, S. Dai, P.T. Cummings, D.J. Wesolowski. *SAXS Studies of alkyl chain, temperature, and confinement effects on the structure of room temperature ionic liquids*, 2012 Center for Nanophase Materials Sciences User Meeting. Oak Ridge, TN.

11. June 24-28, 2012. Poster. J.L. Bañuelos, Gernot Rother, P.F. Fulvio, V. Presser, G. Feng, J.F. Browning, L.M. Anovitz, P.T. Cummings, S. Dai, Y. Gogotsi, D.J. Wesolowski. *The Behavior of Electrolytes at Charged Carbon Interfaces*, 2012 American Conference on Neutron Scattering (ACNS). Washington, D.C.
12. February 27- March 2, 2012. Talk. J.L. Bañuelos, P.F. Fulvio, G. Rother, L.M. Anovitz, J. Browning. *The wetting behavior of electrolytes at charged carbon electrode materials probed using neutron scattering*. American Physical Society March Meeting 2012. Boston, MA.
13. November 14-15, 2011. Poster. J.L. Bañuelos, P.F. Fulvio, G. Rother, L.M. Anovitz, S.M. Mahurin, J. Browning, L. Chen, C. Liao, V. Presser, S. Dai, D. Wesolowski. *The wetting behavior of electrolytes at charged carbon electrode materials*. 2011 ORNL Neutron Scattering User Meeting (ONSUM 2011). Oak Ridge National Laboratory. Oak Ridge, TN.
14. October 14-17, 2009. Talk. José Leobardo Bañuelos, Jacob Urquidi. *Tracking changes in protein solution-structure as a function of temperature with small angle x-ray scattering*. 2009 SACNAS National Conference. Dallas, TX.
15. June 21-26, 2009. Poster. Jose L. Bañuelos, Jacob Urquidi. *Tracking changes in protein solution-structure as a function of temperature with small angle x-ray scattering*. Gordon Research Conference on Proteins. Holderness School, Holderness, NH.
16. March 16-20, 2009. Poster. Jacob Urquidi, Jose L. Bañuelos, Nancy Levinger. *Structural Properties of Water Nano-pockets Encapsulated in Polymerized Reverse Micelles*. 2009 American Physical Society March Meeting. Pittsburgh, PA.
17. March 16-20, 2009. Talk. J.L Bañuelos, J. Urquidi. *Intermediate states of globular proteins during temperature-induced folding and unfolding studied using small angle x-ray scattering*. 2009 American Physical Society March Meeting. Pittsburgh, PA.
18. October 8-12, 2008. Talk. J.L. Bañuelos, J. Urquidi. *Investigations on the temperature-induced intermediate structure of ribonuclease A and other globular proteins by small angle x-ray scattering*. 2008 SACNAS National Conference. Salt Lake City, UT.
19. July 27 – August 1, 2008. Poster. J.L. Bañuelos, J. Urquidi. *Small angle x-ray scattering investigations on the intermediate structures of globular proteins during heat denaturation*. Gordon Research Conference on Water & Aqueous Solutions. Holderness School, Holderness, NH.
20. June 10-13, 2007. Poster. J. Urquidi, G. Sonnenfeld, J.L. Bañuelos. *ISOMER Intermediate and Short Range Order Measurements Software Suite*. Eight annual LANSCE User Group Meeting (LUG 8), Santa Fe, NM.
21. June 18-22, 2006. Poster. J.L. Bañuelos. *Automation of the SCD Instrument Controls and DAQ Using a LabVIEW Interface and Perl script at the Lujan Neutron Scattering Center*. American Conference on Neutron Scattering (ACNS) 2006. St. Charles, IL.

22. June 18-22, 2006. co-author, poster. J. Urquidi, C.J. Benmore, J. Neufeind, J.L. Bañuelos. *The effect of Hoffmeister Salts on the Structure of Water*. ACNS 2006. St. Charles, IL.
23. June 18-22, 2006. co-author, poster. A.I. Acatrinei, J. Urquidi, J.L. Bañuelos. *LANSCE Single Crystal Diffractometer (SCD): Present Status and Future Goals*. ACNS 2006. St. Charles, IL.
24. Fall 2005. co-author, poster. A.I. Acatrinei, J. Urquidi, J.L. Bañuelos. *Automation of the SCD Instrument Controls and DAQ Using a LabVIEW Interface and Perl script at the Lujan Neutron Scattering Center*. LANSCE Users Group (LUG 7) Meeting, LANL, Los Alamos, NM
25. Spring 2003. Talk. J.L. Bañuelos. *Using Earthquakes to Study the Earth*. Florida-Georgia Louis Stokes (LS) AMP conference, Tampa, FL.

Regional Conferences:

26. March 31, 2011 - (talk) – J.L. Bañuelos. *How did I get here?* New Mexico Alliance for Minority Participation Symposium, guest speaker. New Mexico State University, Las Cruces, NM.
27. October 23, 2009 . Talk. José Leobardo Bañuelos, Jacob Urquidi. *A Tunable X-ray Diffractometer for the Quantitative Determination of Metal Distribution and Morphology in Bone*. 2009 New Mexico Space Grant Scholars Colloquium. NMSU, Las Cruces, NM.
28. April 22-23, 2009. Talk. Jose L. Bañuelos, Jacob Urquidi. *Tracking changes in protein solution-structure as a function of temperature with small angle x-ray scattering*. Graduate Research & Arts Symposium (GRAS 2009). NMSU, Las Cruces, NM.
29. October 17-18, 2008. Talk. J.L. Bañuelos, J. Urquidi. *The small angle x-ray scattering of globular proteins in solution during heat denaturation*. 2008 Texas & Four Corners Section: American Physical Society – Joint Meeting. El Paso, TX.
30. April 18, 2008. Poster. J. Cantu, J.L. Bañuelos, J. Urquidi. *The production and detection of photoelectrons for a desktop pulsed x-ray source*. Undergraduate Research & Creative Arts Symposium, NMSU, Las Cruces, NM.
31. April 18, 2008. Poster. L.M. Salguero, J.L. Bañuelos, J. Urquidi. *Quantitative Determination of Metal Distribution and Morphology in Bone*. Undergraduate Research & Creative Arts Symposium, NMSU, Las Cruces, NM.