

## Jorge Alberto Muñoz Jr.

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### Education

Ph.D. in Materials Science, California Institute of Technology, 2013

Thesis: *Electronic structure and phonon thermodynamics of iron alloys*

M.S. in Materials Science, California Institute of Technology, 2009

B.S. in Physics, Applied Math (double major), The University of Texas at El Paso, 2007

Thesis: *Heat capacity and anharmonicity in vanadium and  $V_{93}Co_7$*

### Employment

Sept. 2018 -

Assistant Professor  
Department of Physics  
The University of Texas at El Paso  
El Paso, TX

Aug. 2014 - Aug. 2018

Data Scientist  
Algorithms Pathfinding  
Intel Corporation  
Hillsboro, OR

July 2013 - Aug. 2014

Engineer  
Components Research and Computer Aided Design  
Intel Corporation  
Hillsboro, OR

### Awards

**Cottrell Scholar Award** Research Corporation for Science Advancement, July 2022.

**Miguel Izquierdo Teaching Excellence Award** College of Science, The University of Texas at El Paso, May 2022.

**Gates Millennium Scholarship** Bill and Melinda Gates Foundation. Full cost of attendance at Caltech plus stipend, July 2007 - Sept. 2012; and full cost of attendance at UTEP plus room and board. Aug. 2002 - May 2007.

**Robert S. Hyer Undergraduate Research Award** “For a study of the novel nuclear phenomenon termed isoscaling” (research done at UTEP with Jorge Lopez). Texas Section of the American Physical Society, Oct. 2009.

**W. C. Clark Fellowship** California Institute of Technology, Oct. 2007 - Sept. 2008.

**National Physical Science Consortium Graduate Fellowship** Full cost of attendance and stipend. Sponsoring partner: National Security Agency (NSA). May 2007. (Declined)

**NSF Fellowship Honorable Mention** National Science Foundation, May 2007.

**Bio read by UTEP President at Commencement** University of Texas at El Paso, May 2007.

**Outstanding Undergraduate Thesis in Physics** Research done at Caltech over two summers. College of Science at The University of Texas at El Paso, May 2007.

**Outstanding Undergraduate Student Presentation** Texas Section of the American Physical Society, Oct. 2006.

**Louis Stokes Alliance for Minority Participation Scholarship** National Science Foundation and University of Texas System, August 2005.

## Awards to students under my supervision

**Graduate Student Marshal** Valeria Arteaga (co-mentored with Prof. Ramon Ravelo), College of Science, The University of Texas at El Paso, May 2022.

**Ovshinsky Student Travel Award** Vanessa Meraz, Division of Materials Physics, American Physical Society, March 2022. (\$700)

**Ovshinsky Student Travel Award** Valeria Arteaga (co-mentored with Prof. Ramon Ravelo), Division of Materials Physics, American Physical Society, March 2022. (\$700)

## Faculty Research Fellowships

**Sustainable Research Pathways at Lawrence Berkeley National Laboratory** Development of machine learning tools for first-principles atomistic simulations of materials, with W. A. De Jong, Computational Science Department, Computational Chemistry, Materials, and Climate Group, Summer 2020, Summer 2021.

**Air Force Research Lab Summer Faculty Fellowship Program** Development of machine learning tools to study light propagation in atmospheric turbulence, with V. S. Rao Gudimetla, Maui High Performance Computing Center, Summer 2019.

## Service and Leadership

**Lead organizer.** APS March Meeting 2023 “Computational design and discovery of discovery of novel materials.” April 2022 - March 2023.

**Committee Member.** Richard L. Greene Dissertation Award selection committee, APS. June - July 2022.

**Panelist.** Neutron Scattering Society of America Webinar for current students and postdocs on career options, etc. January 2022.

**Chair.** Faculty Search Committee 2022, Department of Physics, The University of Texas at El Paso. September 2021 - March 2022.

**Co-organizer.** APS March Meeting 2022 “Computational design and discovery of discovery of novel materials.” November - December 2021.

**Co-organizer.** SACNAS 2021 “Nanomaterials Research” Symposium. May 2021 - October 2021.

**Committee Member.** James C. McGroddy Prize for New Materials selection Committee, APS. June - July 2021.

**Reviewer.** NSF Condensed Matter and Materials Theory, 2021.

**Member-at-Large.** APS Division of Materials Physics (elected nationally). March 2020 - March 2023.

**Co-organizer.** 2021 TMS “Computational Thermodynamics and Kinetics” Symposium. March 2020 - February 2021.

**Co-organizer.** SACNAS 2020 “Harnessing the Power of the Sun: Fighting Climate Change with Multidisciplinary Solar Energy Research” Symposium. May 2020 - October 2020.

**Panelist.** “Strengthening National Foundation for Advanced Modeling & Simulations at HBCU/MIs” Virtual Townhall hosted by The University of Texas at El Paso. September 2020.

**Reviewer.** DOE, July 2020.

**Committee Member.** Forum on Physics and Society APS Fellowship Committee (‘Fellow’ is the highest distinction for APS members). May - June 2020.

**Committee Member.** Chemistry and Physics of Materials, TMS. February 2020 - Present.

**Panelist.** Caltech Applied Physics and Materials Science Webinar for current students and postdocs on life after Caltech, career, options, etc. May 2020.

**Reviewer.** LatinX in Artificial Intelligence Research at the Thirty-seventh International Conference on Machine Learning. May 2020.

**Reviewer Board Member.** For the open-access journal *Entropy* published by MDPI. April 2020 - Present.

**Co-organizer.** 2020 TMS Computational Thermodynamics and Kinetics Symposium. March 2019 - February 2020.

**Committee Member.** UTEP Department of Physics Undergraduate Catalog. October 2019.

**Reviewer.** LatinX in Artificial Intelligence Research Workshop at NeurIPS 2019. September 2019.

**Reviewer.** 2019 SACNAS Conference Symposia proposals. June 2019.

**Reviewer.** NSF. March 2019.

**Committee Member.** Computational Science Program Faculty Search 2018-2019.

**Founder and Director.** Eureka Street Mentoring Coporation (nonprofit). October 2018 - Present

**Member-at-Large.** APS Forum on Physics and Society (elected nationally). Jan. 2018 - December 2020.

**Reviewer.** 2018 IEEE International Workshop on Machine Learning for Signal Processing. May 2018.

**Committee Member.** IEEE Computational Intelligence Society Industry Liaison Sub-committee. January 2018 - December 2018.

**Reviewer.** 2018 IEEE International Conference on Acoustics, Speech and Signal Processing (Machine Learning for Signal Processing Technical Committee), January 2018.

**Committee Member.** Intel System and Artificial Intelligence Software Patent Committee, Artificial Intelligence subcommittee. June 2017 - August 2018.

**Organizer.** Intel Data Science Center of Excellence Research Task Group. January 2017 - August 2018.

**Reviewer.** Intermetallics (impact factor: 3.4). August 2014.

**Lead organizer.** Intel Engineering Leadership Program Alumni Pillar. July 2013 - December 2014.

**Member of the Board.** National Society of Hispanic Physicists (NSHP). Graduate student representative (elected nationally). April 2008 - June 2013.

**Reviewer.** Victor M. Blanco Undergraduate Summer Research Fellowship (Caltech and LIGO). February 2013.

**Committee Member.** Caltech Moore-Hufstedler Fund for Student Life (\$3M endowment to improve student life). Oct. 2010 - Sept. 2012.

**Co-founder and VP.** Caltech Strong Ale Club. Brewed beer and trained members on the science/craft/art of brewing. October 2007 - Sept. 2008.

**Founder and member.** UTEP Chapter of  $\Sigma\Pi\Sigma$  (the national physics honor society). April 2007.

**President, VP, and member.** UTEP Chapter of the Society of Physics Students (SPS). Personally led tens of “Physics Circuses” for an aggregate audience of more than 1,000 K-12 students. Aug. 2004 - May 2007.

**Member of the National Council** National Society of Physics Students, elected regionally to represent Zone 16. Contributed to the adoption of the SPS Statement on Diversity. Aug. 2005 - Aug. 2006.

## Publications

Total number of peer-reviewed articles (published or accepted): 36

Total number of citations: 11158; h-index: 15; i-index: 17 (GoogleScholar, as of May 1st, 2021)

### Peer-reviewed

1. O. Delaire, M. Kresch, **J. A. Muñoz**, M. S. Lucas, J. Y. Y. Lin, and B. Fultz, “Electron-Phonon Interactions and High-Temperature Thermodynamics of Vanadium and its Alloys,” Phys. Rev. B 77, 214112 (2008).

2. O. Delaire, M. S. Lucas, **J. A. Muñoz**, M. Kresch, and B. Fultz, “Adiabatic Electron-Phonon Interaction and High-Temperature Thermodynamics of the A15 Compounds,” *Phys. Rev. Lett.* 101, 105504 (2008).
3. C. O. Dorso, C. M. Hernández, J. A. López, and **J. A. Muñoz**, “Isoscaling and the High-Temperature Limit,” *Phys. Rev. C* 78, 034613 (2008).
4. M. L. Winterrose, M. S. Lucas, A. F. Yue, I. Halevy, L. Mauger, **J. A. Muñoz**, J. Hu, M. Lerche, and B. Fultz, “Pressure-Induced Invar Behavior in Pd<sub>3</sub>Fe,” *Phys. Rev. Lett.* 102, 237202 (2009).
5. J. A. López, **J. A. Muñoz**, and C. O. Dorso “Probabilistic Aspects of Isoscaling,” *Rev. Mex. Fis. S* 56, 85 (2010).
6. O. Delaire, M. S. Lucas, A. M. dos Santos, A. Subedi, A. S. Sefat, M. A. McGuire, L. Mauger, **J. A. Muñoz**, C. Tulk, Y. Xiao, M. Somayazulu, J. Zhao, W. Sturhahn, E. E. Alp, D. J. Singh, B. C. Sales, D. Mandrus, and T. Egami, “Temperature and Pressure Dependence of the Fe-specific Phonon Density of States in Ba(Fe<sub>1-x</sub>Co<sub>x</sub>)<sub>2</sub>As<sub>2</sub>,” *Phys. Rev. B* 81, 094504 (2010).
7. M. S. Lucas, **J. A. Muñoz**, L. Mauger, C. W. Li, A. O. Sheets, Z. Turgut, J. Horwath, D. L. Abernathy, M. B. Stone, O. Delaire, Y. Xiao, and B. Fultz, “Effects of chemical composition and *B2*-order on phonons in bcc Fe-Co alloys,” *J. Appl. Phys.* 108, 023519 (2010).
8. M. S. Lucas, **J. A. Muñoz**, O. Delaire, N. D. Markovskiy, M.B. Stone, D. L. Abernathy, I. Halevy, L. Mauger, J. B. Keith, M. L. Winterrose, Y. Xiao, M. Lerche, and B. Fultz, “Effects of composition, temperature, and magnetism on phonons in bcc Fe-V alloys,” *Phys. Rev. B* 82, 144306 (2010).
9. M. S. Lucas, L. Mauger, **J. A. Muñoz**, Y. Xiao, A. O. Sheets, S. L. Semiatin, J. Howarth, and Z. Turgut, “Magnetic and Vibrational Properties of High Entropy Alloys,” *J. Appl. Phys.* 109, 07E307 (2011).
10. M. L. Winterrose, L. Mauger, I. Halevy, A. Yue, M. S. Lucas, **J. A. Muñoz**, H. Tan, Y. Xiao, P. Chow, W. Sturhahn, T. S. Toellner, E. E. Alp, and B. Fultz “Dynamics of iron atoms across the pressure-induced Invar transition in Pd<sub>3</sub>Fe,” *Phys. Rev. B* 83, 134304 (2011).
11. N. D. Markovskiy, **J. A. Muñoz**, M. S. Lucas, C. W. Li, O. Delaire, M. B. Stone, D. L. Abernathy, and B. Fultz, “Nonharmonic phonons in MgB<sub>2</sub> at elevated temperatures,” *Phys. Rev. B* 83, 174301 (2011).
12. **J. A. Muñoz**, M. S. Lucas, O. Delaire, M. L. Winterrose, L. Mauger, C. W. Li, A. O. Sheets, M. B. Stone, D. L. Abernathy, Y. Xiao, P. Chow, and B. Fultz, “Positive vibrational entropy of chemical ordering in FeV,” *Phys. Rev. Lett.* 107, 115501 (2011).
13. C. W. Li, X. Tang, **J. A. Muñoz**, J. B. Keith, S. J. Tracy, D. L. Abernathy, and B. Fultz, “The structural relationship between negative thermal expansion and quartic anharmonicity of cubic ScF<sub>3</sub>,” *Phys. Rev. Lett.* 107, 195504 (2011).
14. M. S. Lucas, G. B. Wilks, L. Mauger, **J. A. Muñoz**, O. N. Senkov, E. Michel, J. Horwath, S. L. Semiatin, M. B. Stone, D. L. Abernathy, and E. Karapetrova, “Absence of long-range chemical ordering in equimolar FeCoCrNi,” *Appl. Phys. Lett.* 100, 251907 (2012).

15. **J. A. Muñoz**, M. S. Lucas, L. Mauger, I. Halevy, J. Horwath, S. L. Semiatin, Y. Xiao, P. Chow, M. B. Stone, D. L. Abernathy, and B. Fultz, “Electronic structure and vibrational entropies of fcc Au-Fe alloys,” *Phys. Rev. B* 87, 014301 (2013).
16. M. S. Lucas, L. Mauger, **J. A. Muñoz**, I. Halevy, J. Horwath, S. L. Semiatin, M. B. Stone, D. L. Abernathy, Y. Xiao, P. Chow, and B. Fultz, “Phonon densities of states of face-centered-cubic Ni-Fe alloys,” *J. Appl. Phys.* 113, 17A308 (2013).
17. F. Körmann, A. A-H. Breidi, S. L. Dudarev, N. Dupin, G. Ghosh, T. Hickel, P. Korzhavyi, **J. A. Muñoz**, I. Ohnuma, “Lambda transitions in materials science: Recent advances in calphad and first-principles modelling,” *Phys. Stat. Sol. (b)* 251, 53 (2014).
18. D. G. Abrecht, **J. A. Muñoz**, H. L. Smith and B. Fultz, “Spin-State Effects on the Thermal Dihydrogen Release from Solid-State  $[\text{MH}(\eta^2\text{-H}_2)\text{dppe}_2]^+$  (M = Fe, Ru, Os) Organometallic Complexes for Hydrogen Storage Applications,” *J. Phys. Chem. C* 118, 1783 (2014).
19. L. Mauger, M. S. Lucas, **J. A. Muñoz**, S. J. Tracy, M. Kresch, Y. Xiao, P. Chow, and B. Fultz, “Nonharmonic phonons in  $\alpha$ -iron at high temperatures ,” *Phys. Rev. B* 90, 064303 (2014).
20. S. J. Tracy, L. Mauger, H. J. Tan, **J. A. Muñoz**, Y. M. Xiao, and B. Fultz, “Polaron-Ion correlations in  $\text{Li}_x\text{FePO}_4$  studied by x-ray nuclear resonant forward scattering at elevated pressure and temperature,” *Phys. Rev. B* 90, 094303 (2014).
21. C. W. Li, H. L. Smith, T. Lan, J. L. Niedziela, **J. A. Muñoz**, J. B. Keith, L. Mauger, D. Abernathy, and B. Fultz, “Phonon anharmonicity of monoclinic and yttrium-stabilized zirconia,” *Phys. Rev. B* 91, 144302 (2015).
22. **J. A. Muñoz** and B. Fultz, “Miscibility gap and phonon thermodynamics of Fe-Au alloys studied by inelastic neutron scattering and nuclear-resonant inelastic x-ray scattering,” *AIP Conf. Proc.* 1671, 020001 (2015).
23. T. Lan, C. W. Li, O. Hellman, **J. A. Muñoz**, H. L. Smith, D. L. Abernathy, and B. Fultz, “Phonon quarticity induced by lattice expansion, and the stabilization of rutile  $\text{TiO}_2$ ,” *Phys. Rev. B* 92 054304 (2015).
24. K. L. Lin, G. L. W. Cross, P. Gleeson, J. P. de Silva, A. Levander, **J. A. Muñoz**, C. Pawashe, A. Potie, P. L. Theofanis, J. J. Boland, and K. J. Kuhn, “Adhesion Limits and Design Criteria for Nanorelays,” *IEEE Trans. Electron Devices* 63 465 (2016).
25. F. C. Yang, **J. A. Muñoz**, O. Hellman, L. Mauger, M. S. Lucas, S. J. Tracy, M. B. Stone, D. L. Abernathy, Y. Xiao, and B. Fultz, “Thermally-driven electronic topological transition in FeTi,” *Phys. Rev. Lett.* 117, 076402 (2016).
26. L. Mauger, J. E. Herriman, O. Hellman, S. J. Tracy, M. S. Lucas, **J. A. Muñoz**, Y. Xiao, J. Li, and B. Fultz, “Phonons and Elasticity of Cementite through the Curie Temperature,” *Phys. Rev. B* 95, 024308 (2017).
27. J. A. López and **J. A. Muñoz**, “Analytical expression and neural network study of the symmetry energy,” *CERN Proc.*, 1, 29 (2019).
28. A. Rodriguez, C. R. Cuellar, L. F. Rodriguez, A. Garcia, V. S. Rao Gudimetla, V. M. Krushnarao Kotteda, V. Kumar, and **J. A. Muñoz**, “Stochastic analysis of LES atmo-

- spheric turbulence solutions with generative machine learning models.” Proceedings of the ASME 2020 Fluids Engineering Division Summer Meeting 1, T01A001 (2020).
29. L. F. Rodriguez, V. Kumar, A. Rodriguez, A. Garcia, V. M. Krushnarao Kotteda, V. S. Rao Gudimetla, and **J. A. Muñoz**, “Parameter Sensitivity and Statistical Correlation Found in Atmospheric Turbulence Studies.” Proceedings of the ASME 2020 Fluids Engineering Division Summer Meeting 2, T03A041 (2020).
  30. A. Rodriguez, V. M. Krushnarao Kotteda, L. F. Rodriguez, V. Kumar, and **J. A. Muñoz**, “Trilinos solvers scalability on a MFIX-Trilinos Framework Applied to fluidized bed simulations.” Proceedings of the ASME 2020 Fluids Engineering Division Summer Meeting 2, T04A033 (2020).
  31. J. A. López, **J. A. Muñoz**, C. O. Dorso, and G. A. Frank, “Machine learning Minkowski functionals of neutron star crusts.” J. Phys.: Conf. Ser. 1643, 012054 (2020).
  32. I. E. Ruiz-Hernandez and **J. A. Muñoz**, “Machine learning image classification for urban land use using GEOBIA, texture and landscape metrics.” Computer Vision and Pattern Recognition Conference: LatinX in AI (LXAI) Research Workshop 2021.
  33. S. Kadkhodaei and **J. A. Muñoz**, “Cluster Expansion of Alloy Theory: A Review of Historical Development and Modern Innovations.” JOM 73, 3326 (2021).
  34. A. Rodriguez, J. Terrazas, R. Adansi, V. M. Krushnarao Kotteda, **J. A. Muñoz**, and V. Kumar, “Causal inference analysis to find relationships found in boundary-layer transition.” Proceedings of the ASME 2021 Fluids Engineering Division Summer Meeting 1, T02A050 (2021).
  35. **J. A. Muñoz**, M. A. Garcia, and J. A. López, “Equilibrium constants of nuclear reactions in supernova explosions.” Int. J. Mod. Phys. E. 31, 2250018 (2022).
  36. A. De la Rocha, V. J. Meraz, A. Garcia, B. O. Khamala, Y.-H. Tang, W. A. de Jong, and **J. A. Muñoz**, “Dynamically stable  $B2$  phase of FeV at high pressure and elevated temperature via harmonic ensemble lattice dynamics.” Physical Review B. *Submitted*.

Published manuscripts generally available on [GoogleScholar](#), also by request. Pre-prints and submitted papers are available by request.

### Non-technical articles

1. **J. A. Muñoz**, “Mood disorders in graduate and undergraduate students: a personal, scientific and cultural perspective,” in *SACNAS News Magazine Winter/Spring 2015*), Volume 17, No. 2.
2. **J. A. Muñoz**, “Three Tales About How Science Can Save Lives,” in March for Science Blog.

### Patents

### Grants

1. **J. A. Muñoz**, P. Theofanis, D. Nikonov, K. Kuhn, C. Pawashe, K. Lin, and S. Kim. “Magnetic nanomechanical devices for stiction compensation.”

- Assignee: Intel Corporation.  
Filed: June 27, 2014.  
Taiwan Patent I564240 B granted on 2017-1-1.  
US Patent 9,926,193 B2 granted on 2018-3-27.  
Japan Patent 6440039 B2 granted on 2018-12-19.  
China Patent 106573770 B granted on 2019-8-6.
2. **J. A. Muñoz**, J. A. Diggs, J. D. Miller, V. Sharma.  
“Entropic classification of objects.”  
Assignee: Intel Corporation.  
Filed: April 1, 2016.  
US Patent 10,956,476 B2 granted on 2021-3-23.
  3. **J. A. Muñoz**.  
“Entropic clustering of objects.”  
Assignee: Intel Corporation.  
Filed: June 26, 2018.  
US Patent 11,238,308 B2 granted on 2022-2-01.

## Applications

1. **J. A. Muñoz**, P. Theofanis, D. Nikonov, K. Kuhn, C. Pawashe, K. Lin, and S. Kim.  
“Magnetic nanomechanical devices for stiction compensation.”  
Assignee: Intel Corporation.  
Filed: June 27, 2014.  
International Application PCT/US2014/044594 filed on 2014-6-27.  
International Publication Number WO/2015/199721 published on 2015-12-30.  
Korean Application 2017/0026346 published on 2017-3-8.  
Chinese Application 2014/80079265 published on 2017-4-19.  
European Application 2014/0896176 published on 2017-5-3. Withdrawn 2019-1-16.  
Japanese Application 2017/523558 published on 2017-8-17.  
US Application 15/301,337 published 2017-6-8.
2. **J. A. Muñoz**, J. A. Diggs, J. D. Miller, V. Sharma.  
“Entropic classification of objects.”  
Assignee: Intel Corporation.  
Filed: April 1, 2016.  
International Application PCT/US2016/025466 filed on 2016-4-1.  
International Publication Number WO 2017/171826 published on 2017-10-5.  
European Application 3436966 published on 2019-2-6.  
US Application 16/083,108 published on 2019-3-14.
3. **J. A. Muñoz**.  
“Entropic clustering of objects.”  
Assignee: Intel Corporation.  
Filed: June 26, 2018.  
US Patent Application 16/018,136 published early on 2019-2-7.  
European Application 3588379 published on 2020-1-1.



Chinese Application 2019/110647902 published on 2020-1-3.

Korean Application 2020/0001466 published on 2020-1-6.

Japanese Application 2020/004393 published on 2020-1-9.

## Talks and such

1. J. Muñoz, D. Smith, S. Fleet, K. Teesdale. “Plotting and Analyzing Data Release 1 Galaxies from the Sloan Digital Sky Survey.” Texas Section of the American Physical Society Fall 2003 Meeting, Texas Tech University, Lubbock, Texas, October 2003.
2. J. Muñoz, D. Smith, S. Fleet, K. Teesdale. “Plotting and Analyzing Data Release 1 Galaxies from the Sloan Digital Sky Survey” The University of Texas at El Paso 2004 Student Research Expo, University of Texas at El Paso, El Paso, Texas, April 2004. (Poster)
3. J. Muñoz, T. Liang, T. Witten. “Curvature Behavior in a Crescent Singularity of a Deformed Elastic Sheet.” 2004 University of Texas System Louis Stokes Alliance for Minority Participation Annual Conference, University of Texas at El Paso, El Paso, Texas, September 2004.
4. J. Muñoz, T. Liang, T. Witten. “Curvature Behavior in a Crescent Singularity of a Deformed Elastic Sheet.” Texas Section of the American Physical Society Fall 2004 Meeting, Baylor University, Waco, Texas, October 2004.
5. J. Muñoz, T. Liang, T. Witten. “Curvature Behavior in a Crescent Singularity of a Deformed Elastic Sheet” The University of Texas at El Paso 2005 Student Research Expo, University of Texas at El Paso, El Paso, Texas, April 2005. (Poster)
6. J. Muñoz, O. Delaire, B. Fultz. “Vibrational Thermodynamics and Anharmonicity in Dilute Vanadium Alloys.” Summer Seminar Day, California Institute of Technology, Pasadena, California, August 2005.
7. J. Muñoz, O. Delaire, B. Fultz. “Thermodynamics and Anharmonicity in Dilute Vanadium Alloys.” Texas Section of the American Physical Society Fall 2005 Meeting, University of Houston, Houston, Texas, October 2005.
8. J. Muñoz, O. Delaire, B. Fultz. “Calorimetry Studies of Vanadium and Dilute Vanadium Alloys.” Joint Annual Meeting of the National Society of Black Physicists and the National Society of Hispanic Physicists, San Jose, California, February 2006.
9. J. Muñoz, O. Delaire, B. Fultz. “Anharmonicity in Vanadium and Dilute Vanadium Alloys.” Undergraduate Research Fellow Monday Meeting, California Institute of Technology, Pasadena, California, July 2006.
10. J. Muñoz, O. Delaire, B. Fultz. “Heat Capacity Anharmonicity in Elemental Vanadium and  $V_{93}Co_7$ .” Texas Section of the American Physical Society Fall 2006 Meeting, University of Texas at Arlington, Arlington, Texas, October 2006.
11. J. Muñoz, J. Lopez, C. Dorso, C. Hernandez. “Probabilistic Aspects of Isoscaling.” Texas Section of the American Physical Society Fall 2006 Meeting, University of Texas at Arlington, Arlington, Texas, October 2006.
12. J. Muñoz, O. Delaire, M. Lucas, M. Kresch, B. Fultz. “Adiabatic Electron-Phonon Interaction at High Temperature in A15 Compounds.” Texas Section of the American

- Physical Society Fall 2008 Meeting, University of Texas at El Paso, El Paso, Texas, October 2008.
13. J. Muñoz, C. Dorso, C. Hernandez, J. Lopez. “Isoscaling and the High Temperature Limit.” Texas Section of the American Physical Society Fall 2008 Meeting, University of Texas at El Paso, El Paso, Texas, October 2008.
  14. “Panel discussion on getting into and staying in graduate school.” Texas Section of the American Physical Society Fall 2008 Meeting, University of Texas at El Paso, El Paso, TX, October 2008. (Invited)
  15. J. A. Muñoz, M. L. Winterrose, L. Mauger, I. Halevy, and B. Fultz. “High-Pressure behavior of ordered and disordered FePd” Stewardship Science Academic Alliances Symposium, Washington, D.C., January 2010. (Poster)
  16. J. Muñoz, M. Lucas, and B. Fultz. “Effects of Temperature and Chemical Order on phonons in Fe–V alloys.” Hume-Rothery Symposium in Honor of Didier de Fontaine at the Minerals, Metals, and Materials Society Annual Meeting, Seattle, Washington, February 2010.
  17. J. A. Muñoz, L. Mauger, I. Halevy, H. Smith, Y. Xiao, and B. Fultz. “Phonon partial densities of states of C15 rare-earth-iron compounds at elevated temperatures” Advanced Photon Source Users Meeting 2010, Argonne National Lab, Argonne, Illinois, May 2010. (Poster)
  18. J. A. Muñoz, M. S. Lucas, Chen W. Li, M. L. Winterrose, and B. Fultz. “Effect and Origin of the Change in Vibrational Entropy in the Disorder-Order Phase Transition in FeV.” American Conference on Neutron Scattering 2010, Ottawa, Ontario, Canada, June 2010.
  19. “The role of vibrational entropy in order-disorder phase transitions.” Advancing Material Applications through Understanding the Basics (Scientific Symposium), 2010 Society for the Advancement of Chicanos and Native Americans in Science National Conference, Anaheim, CA, Oct. 2010. (Invited)
  20. J. A. Muñoz, L. Mauger, and B. Fultz. “Large softening of the phonon partial densities of states of C15 rare-earth-iron compounds” Stewardship Science Academic Alliances Symposium, Washington, D.C., February 2011.
  21. J. A. Muñoz, N. Markovskiy, and B. Fultz. “Phonon density of states and high temperature thermodynamics of MgB<sub>2</sub>.” Computational thermodynamics symposium, session in honor of Brent Fultz, Minerals, Metals, and Materials Society Annual Meeting, San Diego, California, March 2011.
  22. “Interplay of phonons and electrons and its effect on the phase stability of two systems.” Caltech Center for the Science and Engineering of Materials Research Luncheon Series, Pasadena, CA, July 2011. (Invited)
  23. J. A. Muñoz. “Positive vibrational entropy of chemical ordering in FeV.” 2011 Joint Annual Conference of the National Society of Black Physicists and the National Society of Hispanic Physicists, Austin, Texas, September 2011.
  24. “Dependence of the vibrational entropy of iron binary alloys on their atomic configurations.” University of Texas at El Paso Physics Department Seminar, El Paso, TX, April 2012. (Invited)

25. J. A. Muñoz, M. S. Lucas, and B. Fultz. “Phonon stiffening due to hybridization of electronic states in Au–Fe alloys.” Computational thermodynamics and kinetics symposium, Minerals, Metals, and Materials Society Annual Meeting, San Antonio, Texas, March 2013.
26. J. A. Muñoz, L. Mauger, M. S. Lucas, and B. Fultz. “Electronic structure and high-temperature lattice dynamics of B2-ordered FeTi.” American Physical Society March Meeting, Baltimore, Maryland, March 2013. (Poster)
27. “Electronic and magnetic structure effects on the phonons of iron and iron-based systems.” University of Texas at El Paso Physics Department Seminar, El Paso, TX, Nov. 2014. (Invited)
28. “Miscibility gap and phonon thermodynamics of Fe-Au alloys studied by inelastic neutron scattering and nuclear-resonant inelastic x-ray scattering.” XI International Symposium on Radiation Physics, Juarez, Mexico, Feb. 2015. (Invited)
29. “Electronic structure and phonon thermodynamics of Fe–Au Alloys.” Hume-Rothery Award Symposium in Honor of Brent Fultz, TMS 2016 Annual Meeting, Nashville, TN, Feb. 2016.
30. “Predictive analytics based on information entropy.” Intel Analytics Summit, Intel Corporation, Santa Clara, CA, March 2016.
31. “Mimicking human identification patterns using information entropy and mathematical graphs.” Intel Data Science Center of Excellence Seminar, Intel Corporation, Webcast, April 2016. (Invited)
32. “From atomistic simulations of materials to materials informatics.” University of Texas at El Paso Physics Department Seminar, El Paso, TX, Feb. 2018.
33. “Thermodynamics-inspired unsupervised clustering of objects.” American Physical Society March Meeting 2018, Los Angeles, CA, March 2018.
34. “A strategic overview of data science.” Data science workshop organized by the Department of Mathematical Sciences at The University of Texas at El Paso, El Paso, TX, October 2018. (Invited)
35. “Demystifying neural networks.” The University of Texas at El Paso Data Science User Group, El Paso, TX, November 2018.
36. “Machine learning for materials, and materials for machine learning.” The University of Texas at El Paso Computational Science Program Graduate Seminar, El Paso, TX, February 2019.
37. “Thermally-driven electronic topological transition in FeTi.” The University of Texas at El Paso Department of Physics Undergraduate Seminar, El Paso, TX, February 2019.
38. “Evolutionary computation for turbulence-degraded space images.” The Air Force Research Laboratory, Maui, Hawaii, August 2019.
39. “Evolutionary computation for turbulence-degraded space images.” Defense Technical Advisory Committee of the Directed Energy Directorate of the US Air Force, Kirtland AFB, New Mexico, September 2019.

40. “State-dependent force constants for anharmonicity.” Computational thermodynamics and kinetics symposium, Minerals, Metals, and Materials Society Annual Meeting, San Diego, California, February 2020.
41. “Negative Gruneisen parameters at high pressure in FeTi from density functional theory.” Texas Advanced Computing Center (TACC) Symposium for Texas Researchers 2020, Austin, Texas, September 2020.
42. “Lattice Dynamics of FeTi at Simultaneous High Temperature and High Pressure from First Principles” Computational thermodynamics and kinetics symposium, Minerals, Metals, and Materials Society Annual Meeting, Virtual, March 2021.
43. “Team-based learning in lower-division mechanics and upper-division astrophysics classes offered online.” 2021 Joint Spring Meeting of the Texas Sections of American Physical Society, Virtual, April 2021.
44. “Instruction with User-Centered Design.” UTEP Support for Online Learning (SOL) Conference, Virtual, April 2021.
45. “Electronic Structure and Dynamical Stability of the B2 phase of Binary Iron and Titanium Alloys at High Pressure and Temperature.” Chicago/DOE Alliance Center (CDAC) Webinar, Virtual, July 2021.

## Teaching Experience

**PHYS 5321 Mechanics.** Lagrange’s equations, nonholonomic constraints, Hamilton’s principles, two-body central force, rigid body dynamics, Lagrangian relativistic mechanics, Hamilton and Hamilton-Jacobi equations, canonical transformations. Fall 2021.

**PHYS 3331 Thermal Physics.** Introduction to statistical mechanics and thermodynamics. Spring 2020, Spring 2021, Spring 2022.

**PHYS 2420 Introductory Mechanics.** Introductory calculus-based mechanics for scientists and engineers. Fall 2018, Spring 2019, Fall 2019, Spring 2020, Spring 2021, Fall 2021, Spring 2022.

**PHYS 3359 Astrophysics.** Stellar structure and evolution, star formation, compact objects, high-energy astrophysics and cosmology. Fall 2019 (independent study), Fall 2020.

**PHYS 3351 Analytical Mechanics I.** Newtonian mechanics of particles and rigid bodies. Spring 2020 (independent study).

**PSCI 2303 Physical Science I.** Introduction to the physical sciences for education majors. Fall 2019.

## Thesis Committees

1. Tolulope A. Ale, M. S. in Physics from UTEP. *Utilizing computational approaches to study tubulin-tubulin electrostatic interactions.* Chair: Prof. Lin Li, November 2021.
2. Shengjie Sun, M. S. in Computational Science from UTEP. *The hybridizing ions treatment (HIT) method development and computational study on SARS-CoV-2 E protein.* Chair: Prof. Lin Li, May 2021.

3. Yixin Xie, M. S. in Computational Science from UTEP. *Applying computational methods to study the interactions between SARS-CoV-2 and hACE2*. Chair: Prof. Lin Li, April 2021.
4. Jose A. Terrazas, M. S. in Computational Science from UTEP. *The Computational Fluid Dynamics Modeling of The Water Braking Phenomena for The Holloman High-Speed Test Track*. Chair: Prof. Vinod Kumar, August 2020.
5. Ogochukwu N. Ifeacho, M. S. in Mathematical Sciences from UTEP. *Numerical simulation of microemulsions with applications to drug delivery*. Chair: Prof. Natasha S. Sharma, July 2020.
6. Alexandro Arnal, M. S. in Computational Science from UTEP. *Toward automated region detection & parcellation of rat brain tissue images*. Chair: Prof. Olac Fuentes, June 2020.
7. Luis F. Rodriguez, Ph. D. in Mechanical Engineering from UTEP. *Machine learning analysis to characterize phase variations in laser propagation through deep turbulence*. Chair: Prof. Vinod Kumar, May 2020.
8. Chitra B. Karki, M.S. in Physics from UTEP. *Computational study of disease-related proteins from electrostatic point-of-view*. Chair: Prof. Lin Li, August 2019.

## Acronyms and abbreviations

**APS.** American Physical Society

**Caltech.** California Institute of Technology

**DOE.** United States Department of Energy

**IEEE.** Institute of Electrical and Electronics Engineers

**LIGO.** Laser Interferometer Gravitational-Wave Observatory

**NASA.** National Aeronautics and Space Administration

**NSA.** National Security Agency

**NSF.** United States National Science Foundation

**NSHP.** National Society of Hispanic Physicists

**NSBP.** National Society of Black Physicists

**RCSA.** Research Corporation for Science Advancement

**SACNAS.** Society for the Advancement of Chicanos and Native Americans in Science

**SPS.** Society of Physics Students

**TMS.** The Minerals, Metals & Materials Society

**UTEP.** The University of Texas at El Paso