

Joseph Graham, Ph.D.

Associate Professor and Director of the Nuclear Reactor
Associate Chair for Research
Department of Nuclear Engineering and Radiation Science
Missouri University of Science and Technology

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Education

- **The University of Texas at Austin** Austin, TX
Ph.D. in Nuclear and Radiation Engineering 2011 - 2013
 - Dissertation: A Study of the Ferroelectric Properties of Neutron Irradiated Lead Zirconate Titanate
 - Advisors: Prof. Sheldon Landsberger and Prof. Paulo Ferreira
- **The University of Texas at Austin** Austin, TX
M.S.E. in Nuclear and Radiation Engineering 2009 - 2011
 - Master's Thesis: Characterization of Neutron Flux Spectra for Radiation Effects Studies
 - Advisors: Prof. Sheldon Landsberger and Prof. Paulo Ferreira
- **McGill University** Montreal, QC
B.S. in Physics 2006 - 2009
 - Senior Thesis: Characterization of Pyrochlore Using Mössbauer Spectrometry

Work Experience

- **Missouri University of Science and Technology** Rolla, MO
Associate Professor September 2021 - Present
 - Leads experimental and computational research efforts in topics related to: materials in extreme environments, nuclear ceramics, radiation effects, particle interactions in solids, and characterization of materials.
 - Courtesy appointment in Materials Science and Engineering
- **Missouri University of Science and Technology** Rolla, MO
Assistant Professor August 2015 - August 2021
- **The University of Tennessee, Knoxville** Knoxville, TN
Postdoctoral Research Associate August 2013 - August 2015
 - Conducted experimental research on radiation effects in ceramics, performed ion beam irradiations, ion beam analysis, and microstructural characterization.

- **The University of Texas at Austin** Austin, TX
Graduate Research Assistant *August 2009 - August 2013*
 - Carried out M.S. and Ph.D. research projects at 1 MW TRIGA reactor at the Nuclear Engineering Teaching Laboratory (NETL). Experience includes: neutron irradiations for radiation effects studies in electronic materials, neutron activation analysis, and preparation of radioisotopes for radiochemical analyses.
 - **Sandia National Laboratories** Albuquerque, NM
Graduate Student Research Intern *May 2010 - August 2012*
 - Performed a portion of the experimental work for Ph.D. dissertation pertaining to the characterization of neutron radiation effects in lead zirconate titanate thin films. This included sample synthesis and post-irradiation characterization of electronic properties.
 - **Sandia National Laboratories** Albuquerque, NM
Undergraduate Student Research Intern *June 2008 - August 2008*
 - Developed a numerical model of a MEMS-based high sensitivity neutron detector.
 - **The Jet Propulsion Laboratory** Pasadena, CA
Summer Undergraduate Intern *May 2007 - August 2007*
 - Performed numerical analysis of Saturnian atmospheric radiative transfer data collected by the VIMS probe of the Cassini spacecraft.

Graduate Student Advising

- Ph.D.s in progress
 - Zhongmin Jin (expected defense, Summer 2023)
- M.S.E.s in progress
 - Narrie Loftus (expected defense, Spring 2024)
- Ph.D.s completed
 - Salah Al-Smairat, “Effects of Vacancies and Electron Temperature on the Electron Phonon Coupling in Cubic Silicon Carbide and Their Connection to the Inelastic Thermal Spike,” Fall 2021
 - Maria Camila Garcia Toro, “Modification of the Optical Response of Alpha Quartz via the Deposition of Gold Nanoparticles in Etched Ion Tracks,” Ph.D. in Nuclear Engineering, Fall 2020
 - Seth Kilby, “Development of Radiation Transport Techniques for Modelling a High Resolution Multi Energy Photon Emission Tomography System,” Ph.D. in Nuclear Engineering, Fall 2020
 - Raul Florez, “Microstructural Evolution of ZrC under Irradiation Conditions,” Ph.D. in Nuclear Engineering, Fall 2019

- Raed Alsulami, “Design and Characterization of a Strong Positron Source at the MSTR Beam Port,” Ph.D. in Nuclear Engineering, Summer 2019 (co-advised with Shoaib Usman)
- Mubarak Albarqi, “Numerical Modeling Study of a Neutron Depth Profiling (NDP) System for the Missouri S&T Reactor,” Ph.D. in Nuclear Engineering, Summer 2019
- M.S.s completed
 - James Mudd, “Characterization of Cermet Fuel for Nuclear Thermal Propulsion (NTP),” M.S. in Nuclear Engineering, Fall 2021
 - Nishant Pillai, “Analysis of Energy Economy in Muon Catalyzed Fusion Considering External X-ray Reactivation,” M.S. in Nuclear Engineering, Spring 2020
 - Bryant Kanies, “An investigation into the effects of ion tracks on alpha-quartz,” M.S. in Nuclear Engineering, Fall 2018
 - Jessica Seals, “Modulated photothermal radiometry: Detector sensitivity study and experimental setup,” M.S. in Nuclear Engineering, Fall 2018

Thesis Committees

- Ph.D. Committees
 - Adam Bratten, “Oxidation of Silicon Carbide and Graphite for High Temperature Gas-Cooled Reactor Applications,” Ph.D. in Materials Science and Engineering, Summer 2022 (advisor: Prof. Haiming Wen, MS&T)
 - Matthew Webb, “Assessment of Monte Carlo N-Particle Variance Reduction Techniques for Small Solid Angle Neutron Transport,” Ph.D. in Nuclear Engineering, Spring 2022 (advisor: Prof. William Charlton, the University of Texas at Austin)
 - Anna Dorner, “Properties and Characterization of Tantalum-Containing Zirconium Diboride Solid Solution Ceramics,” Ph.D. in Ceramics Engineering, Fall 2021 (advisor: Prof. William Farenholtz, Ceramics Engineering, MS&T)
 - Yue Zhou, “Phase Formation and Thermal Conductivity of Zirconium Carbide,” Ph.D. in Ceramics Engineering, Spring 2021 (advisor: Prof. William Farenholtz, Ceramics Engineering, MS&T)
 - Ryan Steere, “Radiation Damage in Phase Change Materials (PCMs) for Nuclear Applications,” Ph.D. in Nuclear Engineering, Fall 2020 (advisor: Prof. Joshua Schlegel, Nuclear Engineering, MS&T)
 - Andrew Hoffman, “Development and Characterization of Nanostructured Steels and High Entropy Alloys for Nuclear Applications,” Ph.D. in Nuclear Engineering, Summer 2019 (advisor: Prof. Haiming Wen, Materials Science and Engineering, MS&T)
 - Kyle Paaren, “Development of a Switchable Radioisotope Generator,” Ph.D. in Nuclear Engineering, Summer 2019 (advisor: Prof. Hyoung-Koo Lee, Nuclear Engineering, MS&T)
- M.S. Committees

- Ravi Shastri, “Simulating LC Circuits in Cylindrical Photoemission Driven Cavities Using Coupled Monte Carlo and Particle-in-Cell Codes,” M.S. in Nuclear Engineering, Spring 2023 (advisor: Prof. Ayodeji Alajo, Nuclear Engineering, MS&T)
- Sean Anderson, “The Effect of Irradiating AlN on its Dielectric Properties,” M.S. in Physics, Spring 2023 (advisor: Prof. Aleksandr Chernatynskiy, Physics, MS&T)
- Joshua Rhodes, “Fuel burnup simulation and analysis of the Missouri S&T Reactor,” M.S. in Nuclear Engineering, Spring 2018 (advisor: Prof. Ayodeji Alajo, Nuclear Engineering, MS&T)

Grants and Contracts

- Total external grant awards received: \$1.07M share out of \$3.2M total
- **Department of Energy Reactor Upgrade Infrastructure**
Principal Investigator *October 1, 2023-September 30, 2024*
 - Title: “Procurement of Spare Digital Recorders, Replacement Portal Monitor, and Pool Lighting System at the Missouri S&T Reactor”
 - Total award amount: \$36,000. PI share: \$21,600
- **Idaho National Laboratory Contract**
Principal Investigator *February 17, 2023-August 31, 2023*
 - Title: “Development of the Fuel Interrogation and Examination using Submersible Tomography Analysis (FIESTA) Mk II”
 - Total award amount: \$74,000. PI share: \$74,000
- **National Aeronautics and Space Administration**
co-Principal Investigator *January 1, 2023-December 31, 2023*
 - Title: “Development of Grooved Fuel Ring Elements for Nuclear Thermal Propulsion”
 - Total award amount: \$62,490. co-PI share: \$20,622
 - Collaborators: Jeremy Watts (PI, 21k), Gregory Hilmas (co-PI, 21k)
- **Department of Energy Reactor Upgrade Infrastructure**
Principal Investigator *October 1, 2023 - September 30, 2023*
 - Title: “Procurement of Spare Parts for Instrumentation Channels, Electronics Test Equipment, and Power Uprate Study at the Missouri S&T Reactor”
 - Total award amount: \$156,182. PI share: \$44,730
 - Collaborators: Ayodeji Alajo (co-PI, 19k), Syed Alam (co-PI, 19k), Carlos Castaño (co-PI, 19k), Joshua Schlegel (co-PI, 19k), Ethan Taber (co-PI, 19k), Shoaib Usman (co-PI, 19k)
- **National Aeronautics and Space Administration**
Principal Investigator *May 12, 2020 - December 31, 2021*

- Title: “Characterizing the Performance of Ultra-High Temperature Ceramic Fuels for Nuclear Thermal Propulsion Technology”
- Total award amount: \$99,572. PI share: \$24,893
- Collaborators: William Fahrenholtz (co-PI, 25k), Gregory Hilmas (co-PI, 25k), Haiming Wen (co-PI, 25k)

- **Nuclear Regulatory Commission**

- *co-Principal Investigator*

October 21, 2019 - October 20, 2023

- Title: “ Graduate Fellowships in Nuclear Engineering at Missouri S&T (2019-2023) ”
- Total award amount: \$400,000. co-PI share: \$60,000
- Collaborators: Hyoung-Koo Lee (PI, 160k), Joshua Schlegel (co-PI, 120k), Ayodeji Alajo (co-PI, 60k)

- **Department of Energy NEUP**

- *co-Principal Investigator*

October 1, 2018 - September 30, 2021

- Title: “Oxidation behavior of silicon carbide and graphitic materials”
- Total award amount: \$800,000. co-PI share: \$260,000
- Collaborators: Haiming Wen (PI, 400k), Haiyan Zhao (co-PI, 90k), John Stempien (co-PI, 50k)

- **Department of Energy Reactor Upgrade Infrastructure**

- *co-Principal Investigator*

October 1, 2018 - September 30, 2019

- Title: “Overhead Crane Installation and Enhancement of Distance Learning at Missouri S&T Reactor”
- Total award amount: \$249,148. co-PI share: \$24,915
- Collaborators: Ayodeji Babatunde Alajo (PI, 125k), Hyoung-Koo Lee (co-PI, 25k), Shoaib Usman (co-PI, 25k), Xin Liu (co-PI, 25k), Joshua Schlegel (co-PI, 25k)

- **Department of Energy NEUP**

- *Principal Investigator*

October 1, 2017 - September 30, 2020

- Title: “Gamma-ray Computed and Emission Tomography for Pool-Side Fuel Characterization”
- Total award amount: \$800,000. PI share: \$373,700
- Collaborators: Hyoung-Koo Lee (co-PI, 306k), Nicholas Woolstenhulme (co-PI, 120k)

- **National Science Foundation Div. of Materials Research**

- *co-Principal Investigator*

August 1, 2017 - July 31, 2021

- Title: “Intrinsic Properties of Zirconium Carbide Ceramics”
- Total award amount: \$480,000. co-PI share: \$158,400
- Collaborators: William Fahrenholtz (PI, 163k), Greg Hilmas (co-PI, 158k)

- **Nuclear Regulatory Commission**

- *co-Principal Investigator*

September, 30 2017 - September, 29 2019

- Title: “Missouri S&T Nuclear Engineering Faculty Development Program (2015-2018)”
- Total award amount: \$86,047. co-PI share: \$17,249
- Collaborators: Hyung-Koo Lee (PI, 26k), Ayodeji Alajo (co-PI, 26k), Carlos Castano (co-PI, 17k)

Awards & Honors

Best Returning Advisor, Missouri S&T Student Council	2022
Full Member, Sigma Xi	2021-present
Junior Faculty Award, Academy of Mines and Metallurgy	2020
Nuclear Fuel Cycle Innovation Award	2012
Leigh Family Endowed Graduate Fellowship, U. of Texas Austin	2011-2013
Engineering Foundation Endowed Presidential Graduate Fellowship, U. of Texas Austin	2010-2011

Publications and Talks

- Refereed National Journals: h-index 15 (Google scholar), 13 (Scopus).

*Graduate student advised by Joseph Graham

**Undergraduate research assistant supervised by Joseph Graham

†Postdoctoral Research Associate supervised by Joseph Graham

1. Miguel Crespillo, Joseph Graham, William Weber, and Fernando Agullo-Lopez, “Defect generation mechanisms in silica under intense electronic excitation by ion beams below 100 K: Interplay between radiative emissions,” *Acta Materialia* **255**, 119097 (2023). <https://doi.org/10.1016/j.actamat.2023.119097>
2. James Mudd*, Jeremy Watts, Jhonathan Rosales, Ryan Wilkerson, Brian Taylor, William Fahrenholtz, Gregory Hilmas, Joseph Graham, “Thermal Properties of HfN-MoW Surrogate Cermet Fuel for Nuclear Thermal Propulsion,” *Journal of the American Ceramics Society* **106**, 2000 (2022). <http://doi.org/10.1111/jace.18870>
3. Maria Garcia Toro*, Miguel Crespillo, Jose Olivares, and Joseph Graham, “Reinforcement of the plasmon-phonon coupling in α -quartz via deposition of gold nanoparticles in etched ion tracks,” *European Physical Journal Plus* **137**, 1181 (2022). <https://doi.org/10.1140/epjp/s13360-022-03400-4>
4. Seth Kilby*, Jack Fletcher**, Ashish Avachat†, Zhongmin Jin*, Devin Imholte, Nicolas Woolstenhulme, Hyung-Koo Lee, and Joseph Graham, “Multi-modal tomographic imaging system for poolside characterization of nuclear test fuels: design considerations and studies,” *Nuclear Instruments and Methods in Physics Research A* **1045**, 167553 (2022). <https://doi.org/10.1016/j.nima.2022.167553>

5. Zhongmin Jin*, Seth Kilby*, Ashish Avachat[†], Bryant Kanies*, Nicolas Woolstenhulme, Hyoung K. Lee, and Joseph Graham, “Accelerated Radiation Transport Modeling Techniques for Pencil Beam Computed Tomography Using Gamma Rays,” *Nuclear Instruments and Methods in Physics Research A* **1039**, 167165 (2022).
<https://doi.org/10.1016/j.nima.2022.167165>
6. Yue Zhou, William Fahrenholtz, Joseph Graham, Gregory Hilmas, “First-Principles Study of the Thermal Properties of Zr₂C and Zr₂CO,” *Journal of the American Ceramic Society* **105**, 4921 (2022). <https://doi.org/10.1111/jace.18461>
7. Joseph Graham, Miguel Crespillo, Fernando Agullo-Lopez, Yanwen Zhang, and William Weber, “Light Emission of Self-Trapped Excitons from Ion Tracks in Silica Glass: Interplay between Auger Recombination, Exciton Formation, Thermal Dissociation, and Hopping,” *Acta Materialia* **229**, 117829 (2022).
<https://doi.org/10.1016/j.actamat.2022.117829>
8. Salah Al Smairat*, Joseph Graham “The Temperature-Variable Electron-Phonon Coupling and its Role in the Inelastic Thermal Spike in 3C-SiC ,” *Nuclear Instruments and Methods in Physics Research B* **518**, 23 (2022).
<https://doi.org/10.1016/j.nimb.2022.03.005>
9. Miguel Crespillo, Joseph Graham, Fernando Agullo-Lopez, Yanwen Zhang, and William Weber, “Effect of thermochemical treatments on laser-induced luminescence spectra from strontium titanate: Comparison with swift ion-beam irradiation experiments,” *European Journal of Physics D* **75**, 314 (2021).
<https://doi.org/10.1140/epjd/s10053-021-00316-z>
10. Raul Florez*, Miguel L. Crespillo, Xiaoqing He, Tommi A. White, Gregory Hilmas, William Fahrenholtz, and Joseph Graham, “Sequential Ion-Electron Irradiation of Zirconium Carbide Ceramics: Microstructural Analysis,” *Journal of the European Ceramic Society* **41**, 48 (2021). <https://doi.org/10.1016/j.jeurceramsoc.2021.09.017>
11. Salah Al Smairat*, Joseph Graham “Vacancy-Induced Enhancement of Electron-Phonon Coupling in Cubic Silicon Carbide and its Relationship to the Two-Temperature Model,” *Journal of Applied Physics* **130**, 125902 (2021).
<https://doi.org/10.1063/5.0056244>
12. Maria Camila Garcia Toro*, Miguel Crespillo, Jose Olivares, and Joseph Graham, “Raman characterization of phonon confinement and strain effects from latent ion tracks in α -quartz,” *Journal of Raman Spectroscopy* **52**, 1185 (2021).
<https://doi.org/10.1002/jrs.6108>
13. Maria Camila Garcia Toro*, Miguel Crespillo, Jose Olivares, and Joseph Graham, “Anisotropic Nanostructure Formation by Vapor Etching of Ion Tracks in α -Quartz,” *Nuclear Instruments and Methods in Physics Research B* **498**, 52 (2021).
<https://doi.org/10.1016/j.nimb.2021.04.013>
14. Yue Zhou, William Fahrenholtz, Joseph Graham, Gregory Hilmas, “Electronic Structure and Thermal Conductivity of Zirconium Carbide with Hafnium Additions,” *Journal of the American Ceramic Society* **104** 4708 (2021).
<https://doi.org/10.1111/jace.17860>

15. Miguel Crespillo, Joseph Graham, Fernando Agullo-Lopez, Yanwen Zhang, and William Weber, "Non-radiative luminescence decay with self-trapped hole migration in Strontium Titanate: Interplay between optical and transport properties," *Applied Materials Today* **23**, 101041 (2021). <https://doi.org/10.1016/j.apmt.2021.101041>
16. Raed Alsulami*, Mubarak Albarqi*, Safwan Jaradat, Shoaib Usman and Joseph Graham, "Optimizing the moderator geometry and thickness for a reactor-based slow positron source," *Nuclear Instruments and Methods in Physics Research B* **497**, 39 (2021). <https://doi.org/10.1016/j.nimb.2021.04.005>
17. Yue Zhou, William Fahrenholtz, Joseph Graham, Gregory Hilmas, "From thermal conductive to thermal insulating: Effect of carbon vacancy content on lattice thermal conductivity of ZrC_x ," *Journal of Materials Science and Technology* **82**, 105 (2021). <https://doi.org/10.1016/j.jmst.2020.11.068>
18. Miguel Crespillo, Joseph Graham, Fernando Agullo-Lopez, Yanwen Zhang, and William Weber, "Real-Time Identification of Oxygen Vacancy Centers in $LiNbO_3$ and $SrTiO_3$ during Irradiation with High Energy Particles," *Crystals* **11**, 315 (2021). <https://doi.org/10.1016/j.jmst.2020.11.068>
19. Seth Kilby*, Jack Fletcher**, Zhongmin Jin*, Ashish Avachat†, Devin Imholte, Nicolas Woolstenhulme, Hyoung K. Lee, and Joseph Graham, "Comparison of a Semi-Analytic Variance Reduction Technique to Classical Monte Carlo Variance Reduction Techniques for High Aspect Ratio Pencil Beam Collimators for Emission Tomography Application," *Nuclear Instruments and Methods in Physics Research A* **1001**, 165236 (2021). <https://doi.org/10.1016/j.nima.2021.165236>
20. Raul Florez*, Miguel L. Crespillo, Xiaoqing He, Tommi A. White, Gregory Hilmas, William Fahrenholtz, and Joseph Graham, "Early Stage Oxidation of ZrC_x under Ion-Irradiation at Elevated Temperatures," *Corrosion Science* **169**, 108609 (2020). <https://doi.org/10.1016/j.corsci.2020.108609>
21. Raul Florez*, Miguel L. Crespillo, Xiaoqing He, Tommi A. White, Gregory Hilmas, William Fahrenholtz, and Joseph Graham, "The Ion-Irradiation Response of ZrC Ceramics at 800 °C," *Journal of the European Ceramics Society* **40**, 1791 (2020). <https://doi.org/10.1016/j.jeurceramsoc.2020.01.025>
22. Mubarak Albarqi*, Raed Alsulami* and Joseph Graham, "Automated Data Processing of Neutron Depth Profiling Spectra using an Artificial Neural Network," *Nuclear Instruments and Methods in Physics Research A* **953**, 163217 (2020). <https://doi.org/10.1016/j.nima.2019.163217>
23. Mubarak Albarqi*, Raed Alsulami* and Joseph Graham, "NIXE: Neutron Depth Profiling coupled with Particle Induced X-ray Emission," *Nuclear Instruments and Methods in Physics Research A* **953**, 163196 (2020). <https://doi.org/10.1016/j.nima.2019.163196>
24. Raed Alsulami*, Mubarak Albarqi*, Safwan Jaradat, Shoaib Usman and Joseph Graham, "Calculation and Tabulation of Efficiencies for Tungsten Foil Positron Moderators," *Journal of Applied Physics* **125**, 205304 (2019). <https://doi.org/10.1063/1.5097607>

25. Mubarak Albarqi*, Raed Alsulami*, Tayfun Akyurek and Joseph Graham, "Neutron Flux Characterization of the Beam Port of the Missouri University of Science and Technology Reactor," *Journal of Radioanalytical and Nuclear Chemistry* **321**, 109 (2019). <https://doi.org/10.1007/s10967-019-06561-2>
26. Miguel Crespillo, Joseph Graham, Fernando Agullo-Lopez, Yanwen Zhang, and William Weber, "The Blue Emission at 2.8 eV in Strontium Titanate: Evidence for a Radiative Transition of Self-trapped Excitons from Unbound States," *Materials Research Letters*, **7**, 298 (2019). <https://doi.org/10.1080/21663831.2019.1604444>
27. Seth Kilby*, Zhongmin Jin*, Ashish Avachat, Bryant Kanies*, Nicolas Woolstenhulme, Hyoung K. Lee and Joseph Graham, "A Source Biasing and Variance Reduction Technique for Monte Carlo Radiation Transport Modeling of Emission Tomography Problems," *Journal of Radioanalytical and Nuclear Chemistry* **320**, 37 (2019). <https://doi.org/10.1007/s10967-019-06457-1>
28. Miguel Crespillo, Joseph Graham, Fernando Agullo-Lopez, Yanwen Zhang, and William Weber, "Recent Advances on Carrier and Exciton Self-trapping in Strontium Titanate: Understanding the Luminescence Emissions," *Crystals* **9**, 95 (2019). <https://doi.org/10.3390/cryst9020095>
29. Miguel Crespillo, Joseph Graham, Fernando Agullo-Lopez, Yanwen Zhang, and William Weber, "Isolated Oxygen Vacancies in Strontium Titanate Shine Red: Optical Identification of Ti^{3+} Polarons," *Applied Materials Today* **12**, 131 (2018). <https://doi.org/10.1016/j.apmt.2018.04.006>
30. Joseph Graham, Yanwen Zhang, and William Weber, "Irradiation-induced defect formation and damage accumulation in single crystal CeO_2 ," *Journal of Nuclear Materials* **498**, 400 (2018). <https://doi.org/10.1016/j.jnucmat.2017.09.046>
31. Miguel Crespillo, Joseph Graham, Fernando Agullo-Lopez, Yanwen Zhang, and William Weber, "Correlation between Cr^{3+} Luminescence and Oxygen Vacancy Disorder in Strontium Titanate under MeV Ion Irradiation," *Journal of Physical Chemistry C* **121**, 19758 (2017). <https://doi.org/10.1021/acs.jpcc.7b04352>
32. Miguel Crespillo, Joseph Graham, Fernando Agullo-Lopez, Yanwen Zhang, and William Weber, "Role of oxygen vacancies on light emission mechanisms in $SrTiO_3$ induced by high-energy particles," *Journal of Physics D: Applied Physics* **50**, 155303 (2017). <https://doi.org/10.1088/1361-6463/aa627f>
33. Chien-Hung Chen, Yanwen Zhang, Yongqiang Wang, Miguel Crespillo, Cristiano Fontana, Joseph Graham, Gerd Duscher, Steven Shannon and William Weber, "Dose dependence of helium bubble formation in nano-engineered SiC at 700 deg C," *Journal of Nuclear Materials* **472**, 153 (2016). <https://doi.org/10.1016/j.jnucmat.2016.01.029>
34. Miguel Crespillo, Joseph Graham, Yanwen Zhang and William Weber, "Temperature measurements during high flux ion beam irradiations," *Review of Scientific Instruments*, **87**, 024902 (2016). <https://doi.org/10.1063/1.4941720>
35. Miguel Crespillo, Joseph Graham, Yanwen Zhang and William Weber, "In-situ luminescence monitoring of ion-induced damage evolution in SiO_2 and Al_2O_3 ," *Journal of Luminescence* **172**, 208 (2016). <https://doi.org/10.1016/j.jlumin.2015.12.016>

36. Cristiano Fontana, Chien-Hung Chen, Miguel Crespillo, Joseph Graham, Haizhou Xue, Yanwen Zhang and William Weber, "Stopping Power Measurements with the Time-of-Flight (ToF) Technique," *Nuclear Instruments and Methods in Physics Research B* **366**, 104 (2016). <https://doi.org/10.1016/j.nimb.2015.10.048>
 37. Alexandra Henriques, Joseph Graham, Sheldon Landsberger, Jon Ihlefeld, Geoff Brenneka, Donald Brown, Jennifer Forrester and Jacob Jones "Crystallographic changes in lead zirconate titanate due to neutron irradiation," *AIP Advances* **4**, 117125 (2014). <https://doi.org/10.1063/1.4902179>
 38. Yanwen Zhang, Miguel Crespillo, Haizhou Xue, Ke Jin, Chien-Hung Chen, Cristiano Fontana, Joseph Graham and William Weber "New ion beam materials laboratory for materials modification and irradiation effects research," *Nuclear Instruments and Methods in Physics Research B* **338**, 19 (2014). <https://doi.org/10.1016/j.nimb.2014.07.028>
 39. Joseph Graham, Geoff Brenneka, Paulo Ferreira, Leo Small, David Duquette, Christopher Apblett, Sheldon Landsberger and John Ihlefeld "Neutron irradiation effects on domain wall mobility and reversibility in lead zirconate titanate thin films," *Journal of Applied Physics* **113**, 124104 (2013). <https://doi.org/10.1063/1.4795869>
 40. Joseph Graham, Steven Biegalski, and Bruce Bucholtz "Preparation of radio-Sm by neutron activation for accelerator mass spectrometry," *Journal of Radioanalytical and Nuclear Chemistry* **296**, 233 (2013). <https://doi.org/10.1007/s10967-012-1953-1>
 41. Joseph Graham, Sheldon Landsberger, Paulo Ferreira, John Ihlefeld and Geoff Brenneka "Neutron Flux Characterization Techniques for Radiation Effects Studies," *Journal of Radioanalytical and Nuclear Chemistry*, **291**, 503 (2012). <https://doi.org/10.1007/s10967-011-1270-0>
 42. Alexander Navarra, Joseph Graham, Stephanie Somot, Dominic Ryan and John Finch "Mössbauer Quantification of Pyrrhotite in Relation to Self-heating," *Minerals Engineering* **23**, 652 (2010). <https://doi.org/10.1016/j.mineng.2010.03.022>
- Conference Summaries and Proceedings
 43. James Mudd*, Jeremy Watts, Jhonathan Rosales, Ryan Wilkerson, Brian Taylor, William Fahrenholtz, Gregory Hilmas, Joseph Graham,, "High Temperature Thermal and Mechanical Properties of Cermet Fuel for Nuclear Thermal Propulsion (NTP)," *American Nuclear Society Transactions* (2022) in press
 44. Seth Kilby*, and Joseph Graham, "Design and Optimization of a Pinhole Collimator for a High Resolution Emission Gamma Ray Tomography System Using a Pixelated CZT Detector," *American Nuclear Society Transactions* (2019), Vol. 121, p. 551-553
 45. Raed Alsulami*, Mubarak Albarqi*, Safwan Jaradat, Joseph Graham and Shoaib Usman, "Efficiency optimization of a positron moderator foil," *American Nuclear Society Transactions* (2019), Vol. 120, p. 232-234
 46. Mubarak Albarqi*, Raed Alsulami* and Joseph Graham, "Neural Network Coupled with MCNP for Neutron Depth Profiling," *American Nuclear Society Transactions* (2019), Vol. 120, p. 273-275

47. Mubarak Albarqi*, Raed Alsulami* and Joseph Graham, “Neutron Depth Profiling Measurement for Borophosphosilicate Glass (BPSG),” American Nuclear Society Transactions (2019), Vol. 120, p. 235-237
 48. Raed Alsulami*, Mubarak Albarqi* and Joseph Graham, “Optimizing Moderator Thickness for Reactor Based Positron Sources,” American Nuclear Society Transactions (2018), Vol. 119, p. 539
 49. Mubarak Albarqi*, Raed Alsulami* and Joseph Graham, “Design and Modeling of a Neutron Depth Profiling System for the MS&T Nuclear Reactor Beam Port,” American Nuclear Society Transactions (2018), Vol. 119, p. 542
 50. Joseph Graham, Sheldon Landsberger, Donald Millsap, Paulo Ferreira, Carl Frahme and Ron Dougherty “Curriculum Development for a Modular Short Course on Radiation Effects in Electronics,” Nuclear Education and Training (NESTet) Transactions (2013)
 51. Sheldon Landsberger, Joseph Graham and Cameron Knapp “Curriculum Development for an Introductory Short Course in Nuclear Science and Engineering,” Nuclear Education and Training (NESTet) Transactions (2013)
 52. Joseph Graham, Kenneth Dayman, Urairisa Phathanapirom, Kristen McConnell, Brian Epping and Erich Schneider “A Comparative Study of CANDLE Reactor Based U.S. Nuclear Fuel Cycles,” American Nuclear Society Transactions (2012), vol. 106, p. 224
 53. Joseph Graham, Sheldon Landsberger and Geoff Brennecka “Ferroelectric Changes in Neutron Irradiated Lead Zirconate Titanate,” American Nuclear Society Transactions, Vol. 104, Number 1, p. 241 (2011)
- Abstracted Oral Presentations
 54. (invited talk) “Cryo-Ionoluminescence in Amorphous Silica — Kinetics of Self-Trapped Excitons and Extrinsic Centers,” 26th International Conference on the Application of Accelerators in Research & Industry and the 53rd Symposium of Northeastern Accelerator Personnel (CAARI-SNEAP), Denton, TX, November 2022
 55. “Dynamics of Self-Trapped Exciton Formation, Hopping, and Recombination within an Ion Track in Silica,” 22nd International Conference on Ion Beam Modification of Materials, Lisbon, Portugal, July 2022
 56. “Modulation of the Electron-Phonon Coupling in 3C-SiC by Lattice Defects and its Ramifications on the Thermal Spike,” Materials Research Society Spring Meeting, Honolulu, HI, May 2022
 57. “Luminescence Mechanisms of Amorphous Silica Under Low-Temperature Ion-Beam Irradiation—Role of High Electronic Excitation Density and Collisional Processes on Complex Interplay Between Emitting Centers ,” Materials Research Society Spring Meeting, Honolulu, HI, May 2022
 58. “Advances in the understanding of the thermal properties of zirconium carbide and its relationship to displacement damage and impurities,” 20th International Conference on Radiation Effects in Insulators, Astana, Kazakhstan, August 2019

59. "Correlation between Cr³⁺ Luminescence and Oxygen Vacancy Disorder in SrTiO₃ under MeV Ion Irradiation," 25th International Conference on Accelerator Applications in Research and Industry (CAARI), Grapevine, TX, August 2018
 60. "Radiation Enhanced Xenon Diffusion in Yttria Stabilized Zirconia at High Temperatures," 25th International Conference on Accelerator Applications in Research and Industry (CAARI), Grapevine, TX, August 2018
 61. "Correlation between Cr³⁺ Luminescence and Oxygen Vacancy Disorder in SrTiO₃ under MeV Ion Irradiation," Materials Science and Technology, Pittsburgh, PA, October 2017
 62. "Structural, Chemical and Thermal Property Changes of Zirconium Diboride under Ion Beam Irradiation," Materials Science and Technology, Pittsburgh, PA, October 2017
 63. (invited talk) "Modification of the Thermal Properties of Zirconium Diboride by Heavy Ion Irradiation," 24th International Conference on Accelerator Applications in Research and Industry (CAARI), Ft. Worth, TX, October 2016
 64. "Characterization of Irradiation Damage in Single Crystal Ceria by Ion Channeling and Confocal Raman Spectroscopy," European Materials Research Society (EMRS) meeting, May 2015, Lille, France
 65. "Examining the effects of charge defects on domain switching in thin film PZT via controlled neutron irradiation," Electronic Materials and Applications, January 2013, Orlando, FL
 66. "A Comparative Study of CANDU Reactor Based U.S. Nuclear Fuel Cycles," American Nuclear Society Annual Meeting, June 2012, Chicago, IL
 67. "Preparation of Radio-Sm by Neutron Activation for Accelerator Mass Spectrometry," Methods and Application of Radioanalytical Chemistry IX, 2012, Kona, HI
 68. "Ferroelectric Changes in Neutron Irradiated Lead Zirconate Titanate," American Nuclear Society Annual Meeting, 2011, Hollywood, FL
 69. "Neutron Flux Characterization Techniques for Radiation Effects Studies," 13th International Conference on Modern Trends in Neutron Activation Analysis, 2011, College Station, TX
 70. "Dielectric Changes in Neutron Irradiated Lead Zirconate Titanate," National Institute of Nano Engineering Symposium, 2011, Albuquerque, NM
 71. "Hysteretic Behaviour in Irradiated Ferroelectric Ceramics," Electronic Materials and Applications, 2011, Orlando, FL
- Invited Lectures and Seminars
72. "Radiation Effects in Ceramic Materials: Advancing our Understanding of Energy Transfer Processes," Pennsylvania State University Nuclear Engineering Department Seminar, April 2023
 73. "Radiation Effects in Ceramics: Core Concepts and Applications," Keramos, Missouri S&T, November 2022

74. "Radiation Effects in Ceramics: Core Concepts and Recent Developments," Physics Colloquium, Missouri S&T, September 2022
75. "Research in Nuclear Materials and Radiation Effects at Missouri S&T," the Society of Physics Students, Missouri S&T, February 2021
76. "Radiation Effects in Materials: An Experimentalist's Tour," the Society of Physics Students, Missouri S&T, February 2020
77. "Irradiation Effects in Ceramics: Progress in Nuclear Fuel Development and Functional Materials," the University of Texas at Austin Nuclear Engineering Teaching Laboratory, December 2017

Teaching Experience

- Courses taught as an instructor at the Missouri University of Science and Technology
 - Nuclear Radiation Measurements and Spectroscopy (NE4312,5312), Spring semester 2023
 - Reactor Laboratory I (NE4428,5428), Fall semester 2022
 - Nuclear Engineering Mathematical Methods (NE4345), Fall semester 2022
 - Reactor Operations I (NE2406), Spring semester 2018-2022 and Fall semester 2018-2022
 - Interactions of Radiation in Matter (NE3103), Spring semester 2017-2022
 - Nuclear Materials (NE4241,5241 MET ENG5170), Fall semester 2016-2022
 - Advanced Radiation Interactions (NE6001), Fall semester 2017, 2019, Spring semester 2021
 - Fusion Fundamentals (NE4361), Spring semester 2017
 - Introduction to Nuclear Engineering (NE2105), Spring semester 2016
 - Nuclear Technology Applications (NE1105), Spring semester 2016
- Courses taught as a teaching assistant at the University of Texas
 - Concepts in Nuclear and Radiation Engineering, Fall semester 2010
 - Nuclear Environmental Protection, Spring semester 2011
 - Nuclear Reactor Operations and Engineering, Spring semester 2012
 - Concepts in Nuclear and Radiation Engineering, Maymester 2012, TU Delft, the Netherlands
 - Modern Trends in Nuclear and Radiation Engineering, Maymester 2013, TU Delft, the Netherlands
- Lecture Material Authorship

- Created new graduate course, Advanced Radiation Interactions, Missouri University of Science and Technology
- Created new undergraduate courses: Fusion Fundamentals, and Interactions of Radiation in Matter, Missouri University of Science and Technology
- Prepared new course materials for Reactor Operations I, Nuclear Materials I, Nuclear Engineering Mathematical Methods, and Reactor Laboratory I, Missouri University of Science and Technology
- Created a series of audio-video lectures and video labs for a modular short course on radiation effects in electronic materials, sponsored by the US Nuclear Regulatory Commission (NRC), University of Texas at Austin

Service and Affiliations

- Professional Memberships and Service
 - Member of the American Nuclear Society, 2010 to present
 - Session chair: Ion Enhanced Synthesis and Modification: Advanced Characterization, 24th International Conference on Accelerator Applications in Research and Industry (CAARI), Ft. Worth, TX
- Campus and Inter-Campus Service and Administrative Duties
 - Director of the Missouri S&T Nuclear Research Reactor, Fall 2017 to present.
 - Associate Chair of Research, Department of Nuclear Engineering and Radiation Science, Fall 2021 to present.
 - Faculty Advisor to the American Nuclear Society Student Chapter at Missouri S&T, Fall 2016 to present.
 - Member of the MS&T campus Radiation Safety Committee, Fall 2016 to present.
 - Member of the MURR Reactor Safety Subcommittee, Fall 2019 to present.
 - Member of the MURR Reactor Advisory Committee Ombudsman Panel, Spring 2019 to present.
 - Search committee member for four junior faculty searches
 - Search committee chair for three department staff positions