

Jordan McDonnell

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Education

- 2007–2012 **Ph.D. in Physics**, *University of Tennessee*, Knoxville, TN.
Thesis: *Microscopic Description of Nuclear Fission at Finite Temperature*
- 2004–2007 **B.A. in Physics**, *Franklin and Marshall College*, Lancaster, PA, *Summa cum laude*.

Experience

- 2020–present **Nuclear Data Analyst**, *Oak Ridge National Laboratory*, Oak Ridge, TN.
My primary duties as a nuclear data analyst include nuclear data evaluation, code development for the SAMMY data analysis software, and code development for the SCALE software in support of the Nuclear Criticality Safety Program.
- 2014–2019 **Assistant Professor of Physics**, *Francis Marion University*, Florence, SC.
As an assistant professor, my primary duty was teaching undergraduate courses. My courses ranged from introductory physical science, to upper-level nuclear physics and computational methods. I performed research in computational nuclear density functional theory, incorporating high-performance computing methods. Additionally, I served as the system administrator for the Physics Department's high-performance computing cluster.
- 2012–2014 **Post-doctoral Research Associate**, *Lawrence Livermore National Laboratory*, Livermore, CA.
My primary duty was to pursue both independent and collaborative research in support of the mission of the Nuclear Theory and Modeling Group. My main work concerned calculating predictions and uncertainties for nuclear properties with nuclear density functional theory, leveraging high-performance computing.
- 2012 **Post-doctoral Research Associate**, *University of Tennessee*, Knoxville, TN.
In this position, I extended my thesis research in order to prepare work on the fission isomers of thorium and uranium isotopes, as well as the asymmetric fission of mercury isotopes, for publication.
- 2008–2012 **Graduate Research Assistant**, *University of Tennessee*, Knoxville, TN.
My primary duty was to conduct research leading to a Ph.D. thesis in the field of nuclear physics theory. In my thesis project, I leveraged high-performance computing to calculate spontaneous fission half lives for actinides using nuclear density functional theory.
- 2007–2008 **Graduate Teaching Assistant**, *University of Tennessee*, Knoxville, TN.
In this position, I taught lab sections and recitation sections for an introductory physics class.

Technical Skills

- Proficient with Python, C, C++, and Fortran.
- Proficient with high-performance computing and parallel computing methods, including MPI, OpenMP, CUDA, and OpenACC.
- Proficient with Linux operating system, including system administration tasks and job management via SLURM.
- Proficient with preparing written documents with LaTeX and Microsoft Word.
- Proficient with Microsoft Office software.

Memberships and Honors

Associate Editor for PICUP (Partnership for Integration of Computation into Undergraduate Physics)

Stewardship Science Graduate Fellowship

Sigma Pi Sigma

American Association of Physics Teachers

2007 Vanderbilt Prize for Undergraduate Research in Physics and Astronomy

Publications

- G.S. Adkins and J. McDonnell. "Orbital Precession due to Central Force Perturbations", *Phys. Rev. D* **75**, 082001 (2007).
- G.S. Adkins, J. McDonnell, and R.N. Fell. "Cosmological Perturbations on Local Systems", *Phys. Rev. D* **75**, 064011 (2007).
- J.D. McDonnell, W. Nazarewicz, J.A. Sheikh, "Thermal Fission Pathways in ^{232}Th ", in *Proceedings of 4th International Workshop on Fission and Fission Product Spectroscopy*, AIP Conf. Proc. Vol. 1175 (AIP, Melville, NY, 2009), pp. 371-374.
- N. Schunck, J. Dobaczewski, J. McDonnell, J. More, W. Nazarewicz, J. Sarich, and M.V. Stoitsov. "One-quasiparticle states in the nuclear energy density functional theory", *Phys. Rev. C* **81**, 024316 (2010).
- W. Nazarewicz and J. McDonnell. "Towards Predictive Theory of Fission", *Stewardship Science Academic Alliances Annual 2011 DOE/NA-0016*, p.18 (2011).
- N. Schunck, J. Dobaczewski, J. McDonnell, W. Satula, J. A. Sheikh, A. Staczszak, M. Stoitsov, P. Toivanen. "Solution of the Skyrme-Hartree-Fock-Bogolyubov equations in the Cartesian deformed harmonic-oscillator basis. (VII) hfodd (v2.49t): a new version of the program", *Comput. Phys. Commun.* **183**, 166 (2012).
- M. Kortelainen, J. McDonnell, W. Nazarewicz, P.-G. Reinhard, J. Sarich, N. Schunck, M.V. Stoitsov, S.M. Wild. "Nuclear energy density optimization. II. Large deformations", *Phys. Rev. C* **85**, 024304 (2012).
- J. McDonnell, N. Schunck, and W. Nazarewicz. "Microscopic Description of Nuclear Fission: Fission Barrier Heights of Even-Even Actinides", in *Fission and Properties of Neutron-Rich Nuclei – Proceedings of the Fifth International Conference on ICFN5* (World Scientific, 2013), pp. 597-604.
- J.D. McDonnell, W. Nazarewicz, J.A. Sheikh. "Third minima in thorium and uranium isotopes in the self-consistent theory", *Phys. Rev. C* **87**, 054327 (2013).
- M. Kortelainen, J. McDonnell, W. Nazarewicz, E. Olsen, P.-G. Reinhard, J. Sarich, N. Schunck,

- S.M. Wild, D. Davesne, J. Erler, A. Pastore. "Nuclear energy density optimization: Shell structure", *Phys. Rev. C* **89**, 054314 (2014).
- J.D. McDonnell, W. Nazarewicz, J.A. Sheikh, A. Staszczak, M. Warda. "Excitation energy dependence of fission in the mercury region", *Phys. Rev. C* **90**, 021302(R) (2014).
 - J.D. McDonnell, D. Higdon, W. Nazarewicz, J. Sarich, N. Schunck, S.M. Wild. "Uncertainty Quantification for Nuclear Density Functional Theory", *Phys. Rev. Lett.* **114**, 122501 (2015).
 - D. Higdon, J.D. McDonnell, N. Schunck, J. Sarich and S.M. Wild. "A Bayesian approach for parameter estimation and prediction using a computationally intensive model", *J. Phys. G: Nucl. Part. Phys.* **42**, 034009 (2015).
 - N. Schunck, J.D. McDonnell, J. Sarich, S.M. Wild and D. Higdon. "Error analysis in nuclear density functional theory", *J. Phys. G: Nucl. Part. Phys.* **42**, 034024 (2015).
 - J.D. McDonnell. "Porting a nuclear DFT code to GPU with OpenACC", (*in progress*).

Peer-Reviewed Educational Resources:

- "Calculating the magnetic field with the Biot-Savart Law", Published in the PICUP Collection, July 2016.
- "Equipotentials and Electric Field Lines: Collections of Point Charges and the Method of Images", Published in the PICUP Collection, July 2016.
- "Motion of a Charged Particle in a Magnetic Field", Published in the PICUP Collection, July 2016.
- "Separation of Variables in Cartesian Coordinates", Published in the PICUP Collection, July 2016.
- "Separation of Variables in Spherical Coordinates", Published in the PICUP Collection, July 2016.

Conferences, Workshops, and Presentations:

- "Time-Dependent Uniform Magnetic Fields and Non-Adiabatic Heating", poster, 48th Annual Meeting of the APS Division of Plasma Physics, Philadelphia, PA, October 31, 2006.
- "Visualization and Analysis of Nuclear Quasi-Particle States", poster, CNS-EFES08 Summer School, Tokyo, Japan, Aug. 28, 2008.
- "Nuclear Fission at Finite Temperature", poster, 4th International Conference on Fission and Fission Product Spectroscopy, Cadarache, France, May 13-16, 2009.
- "Nuclear Fission at Finite Temperature", poster, National Nuclear Physics Summer School, East Lansing, MI, June 28-July 10, 2009.
- "Microscopic Study of Fission in Two Collective Coordinates", 4th LACM-EFES-JUSTIPEN Workshop, Oak Ridge, TN, March 15, 2010.
- "Thermal Fission Barriers for Thorium-232 in Two Collective Coordinates", poster, Stewardship Science Graduate Fellowship Annual Conference, Washington, D.C., June 21, 2010.
- "Analyzing Powers for ${}^3\text{H}(d,n){}^4\text{He}$ from ab initio NCSM+RGM: A Study of the Deuterium-Tritium Fusion Reaction", Summer Student Presentation for Stewardship Science Graduate Fellowship Practicum, Lawrence Livermore National Laboratory, Livermore, CA, August 6, 2010.
- "Third Minima in Actinide Nuclei", poster, Stewardship Science Center External Review, Oak Ridge, TN, December 2, 2010.
- "Microscopic Description of Fission Process", Stewardship Science Academic Alliance Symposium, Washington, D.C., February 14-17, 2011.
- "Understanding Nuclear Reactions", poster, Stewardship Science Graduate Fellowship Annual Meeting, Washington, D.C., July 20 - 22, 2011.
- "Fission Barriers in Actinide Nuclei", 5th LACM-EFES-JUSTIPEN Workshop, Oak Ridge, TN, March 15-17, 2011.

- “Fission of Actinide Nuclei”, Fall Meeting of the American Physical Society Division of Nuclear Physics, East Lansing, MI, October 26-29, 2011.
- “Fission of Actinide Nuclei”, FUSTIPEN Topical Meeting on ‘Theory of Nuclear Fission’ at GANIL, Caen, France, January 4-6, 2012.
- “Nuclear Fission from a Microscopic Theory”, NUCLEI Kick-off Meeting, Seattle, WA, January 16-19, 2013.
- “A Microscopic Theory for Nuclear Fission”, NUCLEI Collaboration Meeting, Bloomington, IN, June 21-24, 2013.
- “A Microscopic Theory for Nuclear Fission”, Fission Workshop at the Institute for Nuclear Theory, Seattle, WA, October 9, 2013.
- “Confidence at the Edge of Nuclear Stability”, colloquium, Michigan State University, East Lansing, MI, April 8, 2014.
- “Towards a Fundamental Theory of Nuclear Fission”, colloquium, Franklin and Marshall College, Lancaster, PA, April 15, 2014.
- “Towards a Fundamental Understanding of Nuclear Fission”, colloquium, Francis Marion University, Florence, SC, September 4, 2014.
- “A Day of Reckoning: A Survey of the Methods of Computational Physics”, colloquium, Pee-Dee Regional Mathematics Tournament, Francis Marion University, Florence, SC, December 8, 2015.
- PICUP Developers Workshop (serving as materials developer), River Falls, WI, June 2016.
- NUCLEI Collaboration Meeting, Knoxville, TN, June 2018.
- PICUP Faculty Development Workshop (serving as coordinator), River Falls, WI, July 2018.
- “Integrating Computation into Upper-Level Physics Courses”, workshop, Southeast Atlantic Coast Section of the American Association of Physics Teachers Meeting, Clemson, SC, October 2018.
- “HPC Methods from Nuclear Physics”, presentation, Oak Ridge National Laboratory, April 2019.