curriculum vitæ of
Susan Gardner
Professor of Physics · University of Kentucky
Theoretical Physics · Nuclear and Particle Physics · Astrophysics and Cosmology

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Selected Professional Appointments

2019	University Research Professor	University of Kentucky
2015-2016	Visiting Faculty	University of California, Irvine
2015 (Sept.-Oct.)	Visiting Faculty	University of Washington, Seattle
2013 (July)	Visiting Scientist	Excellence Cluster, Technical University of Munich
2013 (June)	Visiting Scientist	Helmholtz Institute, University of Bonn
2008-2009	Visiting Scientist	Center for Particle Astrophysics / Theoretical Physics, Fermilab
2007 – present	Professor	University of Kentucky

Education

May, 1988 — **Ph.D.** in Theoretical Nuclear Physics — Massachusetts Institute of Technology
Thesis title: "Effective Hadron Theories from a Quark Model"
Advisor: Prof. E. J. Moniz

October, 1983 — **M.A.** in Chemical Physics — Columbia University

June, 1982 — **B.S.** in Physics and Chemistry (with Honors) — California Institute of Technology
Thesis title: "A Semi-classical Optical Model Potential for Quadrupole Coulomb Excitation of Heavy Ions"
Advisor: Prof. S. .E. Koonin

Selected Honors

2022	Albert D. and Elizabeth H. Kirwan Memorial Prize	University of Kentucky
2019-2020	University Research Professor	University of Kentucky
2017-2021	Chair Line	APS Topical Group on Precision Measurement and Fundamental Constants

Past Chair (2020-2021); Chair (2019-2020); Chair Elect (2018-2019); Vice Chair (2017-2018)

2013 — Fellow — American Physical Society
Nominated by the GPMFC for "pioneering work in strongly interacting physics and its interplay with weak decays and for numerous insights into important tests of CP violation and the Standard Model of particle interactions."

2011-2013	Member-at-Large, Executive Committee	APS Division of Nuclear Physics
2010-2012	Member	Nuclear Science Advisory Committee (NSAC)

Selected Synergistic Activities

Snowmass Liaison — *Snowmass 2021: DPF Community Planning Exercise*, Frontier Liaison for the Cosmic and Rare & Precision Frontiers, University of Washington, July 16-26, 2022

Co-Convener — "QCD and New Physics" (with W. Detmold, M. Gersabeck, E. Mereghetti, M. Mikhasenko, and J. Portoles) *The XVth Confinement and the Hadron Spectrum Conference*, University of Stavanger, Norway, Aug. 1-6, 2022

Co-Organiser — *Workshop on Hadronic Parity Nonconservation II* (with W. Haxton and B. Holstein), National Institute for Nuclear Theory (INT), University of Washington, Jan. 24-27, 2022

Selected Publications

1. S. Gardner and G. Muralidhara, "QCD Analysis of $\Delta S = 0$ Hadronic Parity Violation," Phys. Lett. B **833**, 137372 (2022).
2. J. Berryman, S. Gardner, and M. Zakeri, "Neutron Stars with Baryon Number Violation, Probing Dark Sectors," Symmetry **14**, 518 (2022).
3. C. Donohue, S. Gardner, and W. Korsch, "LC Circuits for the Direct Detection of Ultralight Dark Matter Candidates," arXiv: 2109.08163.
4. S. Gardner, S.D. McDermott, and B. Yanny, "The Milky Way, coming into focus: precision astrometry probes its evolution and its dark matter," Prog. Part. Nucl. Phys. **121**, 103904 (2021).
5. J. Berryman and S. Gardner, "Neutron star structure with a new force between quarks," Phys. Rev. C **104**, 045802 (2021).
6. S. Gardner and X. Yan, "Light scalars with lepton number to solve the $(g-2)_e$ anomaly," Phys. Rev. D **102**, 075016 (2020).
7. A. Hinkel, S. Gardner, and B. Yanny, "Axial Asymmetry Studies in Gaia Data Release 2 Yield the Pattern Speed of the Galactic Bar," Ap. J. Letters **899**, L14 (2020).
8. S. Gardner and J. Shi, "Patterns of CP violation from mirror symmetry breaking in the $\eta \to \pi^+\pi^-\pi^0$ Dalitz plot," Phys. Rev. D **101**, 115038 (2020).
9. S. Gardner, A. Hinkel, and B. Yanny, "Applying Noether's theorem to matter in the Milky Way: evidence for external perturbations and non-steady-state effects from Gaia Data Release 2," Ap. J. **890**, 110 (2020).
10. S. Gardner and X. Yan, "Processes that break baryon number by two units and the Majorana nature of the neutrino," Phys. Lett. **B790**, 421 (2019).

Courses Taught

Courses that I proposed and helped to add to the curriculum are marked with a *. U.K. has offered both of these courses since 2004. Note that PHY 630 is a special topics class.

1996-1997	General Physics (Algebra-Based Mechanics)	PHY 201/211
2004-2007	Optics, Relativity, and Thermal Physics	PHY 228*
2003	General University Physics (Calculus-Based Mechanics)	PHY 231
2008	Mathematical Methods of Physics	PHY 306*
2004-2005	Methods in Theoretical Physics I	MA/PHY 506
2000-1;2010-14; 2018-21	Introduction to Quantum Mechanics I	PHY 520
2012-2014;2020-22	Introduction to Quantum Mechanics II	PHY 521
2001	Fundamental Atomic Physics	PHY 554
2017,2019	Fundamental Nuclear Physics	PHY 555
2018	Fundamental Particle Physics	PHY 556
2006,2017	Quantum Field Theory I	PHY 616
1998	Nuclear Physics	PHY 629
1995	Intermediate Energy Nuclear Physics	PHY 630B
1999,2002	Physics of Hadrons	PHY 630
2007,2017	The Standard Model and Beyond	PHY 630
2009,2015	Symmetries in Subatomic Physics	PHY 630
1998-2000;2010-2011	Statistical Mechanics	PHY 632