# Bret Edward Crawford

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## Education

**Ph.D. Physics.** Duke University, Durham, NC, September 1997
Thesis: *Parity Nonconservation in $^{106}Pd$, $^{108}Pd$ and $^{238}U$ Using Neutron-Capture and Neutron-Transmission Techniques*
Advisor: N. R. Roberson

**M.A. Physics.** Duke University, Durham, NC, May 1995

**M.S. Physics.** University of Vermont, Burlington, VT, October, 1991
Thesis: *The Invention of the Transistor*
Advisor: R. G. Arns

**B.S. Electrical Engineering.** University of South Carolina, Columbia, SC, May 1989

## Teaching Experience

**Professor.** Gettysburg College, 2015– present

**Associate Professor.** Gettysburg College, 2006–2015

**Assistant Professor.** Gettysburg College, 2001–2006

**Assistant Professor.** Dickinson College, 2000–2001

**Visiting Assistant Professor.** Gettysburg College, 1998–2000

**Laboratory Instructor.** Gettysburg College, 1997–1998

**Teaching Assistant.** Duke University, 1992–1993

**Teaching Assistant.** University of Vermont, 1989–1991

**Courses Taught:**

- ◇ Elementary Physics I (life-science majors)
- ◇ Elementary Physics II (life-science majors))
- ◇ Intermediate Physics (EnM for PHY majors)
- ◇ Classical Mechanics (Jr/Sr PHY majors)
- ◇ Electricity and Magnetism (Jr/Sr PHY majors)
- ◇ Analog and Digital Electronics
- ◇ Introductory Quantum Mechanics (Jr PHY majors)
- ◇ Experiments in Quantum Physics (Jr PHY majors)
- ◇ Contemporary Physics: How Things Work (non-majors)
- ◇ Physics of Music (non-majors)
- ◇ Solar System Astronomy (non-majors)
- ◇ Energy: Production, Use, and Environmental Impact (ES majors)
- ◇ A variety of introductory and advanced physics laboratories

## Research Experience

**Faculty Member** Gettysburg College and Dickinson College, 1998–present
Simulation and experimental work on the Neutron Spin Rotation collaboration's high-precision neutron spin-rotation apparatus, which uses transversely polarized cold neutrons to study the hadronic-weak interaction and to search for fifth forces at the National Institute of Standards and Technolgy (NIST) and the Los Alamos National Laboratory. Simulations of neutron and proton transport for measurements of the neutron lifetime using the in-beam method at NIST. Fortran coding using Monte-Carlo techniques to model the nn-scattering experiment at the YAGUAR reactor in Snezhinsk, Russia. In collaboration with faculty, staff and student colleagues at Gettysburg College, construction and use of a 250-keV proton-accelerator laboratory including the refurbishing of a 1960s era 250-PN (High Voltage Engineering) Van de Graaff proton accelerator, the installation of a high-vacuum system and beam-line tuning components, and data acquisition. Student-focused projects include studying proton irradiation damage of silicone (PDMS).

**Research Consultant** North Carolina State University and Triangle Universities Nuclear Laboratory (TUNL), 1997–1998
Involved in all aspects of the Triangle Universities Nuclear Laboratory parity-nonconservation measurement of the helicity dependence in the $\alpha_\circ$ yield for longitudinally polarized protons incident on $^{31}$P.

**Ph.D. student** Duke University and the Triangle Universities Nuclear Laboratory, 1992–1997
Involved in all aspects of the Los Alamos National Laboratory parity-nonconservation measurement of the helicity dependence of the total and capture cross sections for longitudinally polarized epithermal neutrons incident on mass 110 and 230 targets.

**Masters student** University of Vermont, 1989-1991
Fabrication of 1930s style 'transistors' to demonstrate the possibility that J. E. Lillienfeld had working transistor-like devices ten years before Bell Laboratories.

**Undergraduate research assistant** High Voltage Laboratory, University of South Carolina, 1988–1989
Designed and built a 100-kV high voltage DC power supply and participated in experiments studying the dynamics of laser ablation of thin films.

## Honors and Awards

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| *2018–2023* | Dr. Ronald J. Smith '72 Professorship in Applied Physics |
| *1989–present* | Member of Tau Beta Pi, national engineering honor society |
| *1996–1997* | Henry W. Newson Fellowship, Department of Physics, Duke University |
| *1992–1995* | Charles H. Townes Fellowship, Department of Physics, Duke University |

## Grants

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|---|---|
| *2018* | Gettysburg College Research and Professional Development Grant |
| *2015* | Gettysburg College Research and Professional Development Grant |
| *2012* | Gettysburg College Research and Professional Development Grant |
| *2006-2009* | National Science Foundation Grant PHY-0555652 titled *RUI: United States-Russia Investigation of the Neutron-Neutron Scattering Length* with Sharon Stephenson |
| *2005* | Gettysburg College Research and Professional Development Grant |
| *2003* | Gettysburg College Research and Professional Development Grant |
| *2002–2009* | Participating member in Project 2286 of the International Science and Technology Center (ISTC) titled *N-N Scattering Cross Section Measurements at a Pulsed Reactor* |
| *2002* | Gettysburg College Research and Professional Development Grant |
| *2000* | Gettysburg College Research and Professional Development Grant |

## Memberships

American Physical Society

The APS Division of Nuclear Physics

American Association of Physics Teachers

## College Service

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| *2023–present* | Bias-Reporting Working Group |
| *2022–present* | Academic Program and Policy Committee |
| *2018–present* | Physics Department Chair |
| *2017–2020* | Faculty Personnel Committee, Chair AY19-20 |
| *2013–2014* | Interim Co-Chair of the Physics Department |
| *2010–2013* | Academic Program and Policy Committee, Chair AY12-13 |
| *2010–2017* | Fellowship and Scholarship Committee |
| *2005* | Search Committee for Vice President of Information Technology |
| *2012–2018, 2006–2007, 2003* | Dual-Degree Engineering Program Liaison for the college |
| *2002–2005* | Academic Standing Committee |
| *2002–present* | Faculty Advisor to Campus Radio Station, WZBT |

## Papers (students underlined)

- "Comment on "Search for explanation of the neutron lifetime anomaly ", F. E. Wetfeldt, F. Biswas, J. Caylor, **B. Crawford**, M. S. Dewey, N. Fomin, G. L. Greene, C. C. Haddock, S. F. Hoogerheide, H. P. Mumm, J. S. Nico, W. M. Snow, and J. Zuchegno , Physical Review D, **107** 118501 (2023).
- "Experimental upper bound and theoretical expectations for parity-violating neutron spin rotation in $^4$He", H. E. Swanson, B. R. Heckel, C. D. Bass, T. D. Bass, J. M. Dawkins, J. C. Horton, D. Luo, W. M. Snow, S. B. Walbridge, **B. E. Crawford**, K. Gan, A. M. Micherdzinska, C. Huffer, D. M. Markoff, H. P. Mumm, J. S. Nico, M. Sarsour, E. I. Sharapov, and V. Zhumabedova, Physical Review C, **100** 015204 (2019).
- "A search for possible long range spin dependent interactions of the neutron from exotic vector boson exchange", C.Haddock, J.Amadio, E.Anderson, L.Barrón-Palos, **B.Crawford**, C.Crawford, D.Esposito, W.Fox, I.Francis, J.Fry, H.Gardiner, A.Holley, K.Korsak, J.Lieffers, S.Magers, M.Maldonado-Velázquez, D.Mayorov, J.S.Nico, T.Okudaira, C.Paudel, S.Santra, M.Sarsour, H.M.Shimizu, W.M.Snow, A.Sprowe, K.Steffen, H.E.Swanson, F.Tovesson, J.Vanderwerp, P.A.Yergeau, Physics Letters B, **783** (2018) 227-233.
- "Slotted rotatable target assembly and systematic error analysis for a search for long range spin dependent interactions from exotic vector boson exchange using neutron spin rotation", C.Haddock, **B.Crawford**, W.Fox, I.Francis, A.Holley, S.Magers, M.Sarsour, W.M.Snow, J.Vanderwerp, Nuclear Instruments Methods in Physics Research, Section A **885** (2018) 105–113.
- "A slow neutron polarimeter for the measurement of parity-odd neutron rotary power", W. M., Snow, E. Anderson, L. Barrón-Palos, C. D. Bass, T. D. Bass, **B. E. Crawford**, C. Crawford, J. M. Dawkins, D. Esposito, J. Fry, H. Gardiner, K. Gan, C. Haddock, B. R. Heckel, A. T. Holley, J. C. Horton, C. Huffer, J. Lieffers, D. Luo, M. Maldonado-Velázquez, D. M. Markoff, A. M. Micherdzinska, H. P. Mumm, J. S. Nico, M. Sarsour, S. Santr, E. I. Sharapov, H. E. Swanson, S. B. Walbridge, and V. Zhumabedova, Review of Scientific Instruments **86** 055101 (2015).

◇ "Experiment on direct nn scattering – The radiation-induced outgassing complication", S. L. Stephenson, **B. E. Crawford**, W. I. Furman, E. V. Lychagin, A. Yu. Muzichka, G. V. Nekhaev, E. I. Sharapov, V. N. Shvetsov, A. V. Strelkov, B. G. Levakov, A. E. Lyzhin, Yu. I. Chernukhin, C. R. Howell, G. E. Mitchell, W. Tornow, R.A. Showalter-Bucher, Nuclear Physics A **895** (2012) 33–43.

◇ "Upper bound on parity-violating neutron spin rotation in $^4$He", W. M. Snow, C. D. Bass, T. D. Bass, **B. E. Crawford**, K. Gan, B. R. Heckel, D. Luo, D. M. Markoff, A. M. Micherdzinska, H. P. Mumm, J. S. Nico, A. K. Opper, M. Sarsour, E. I. Sharapov, H. E. Swanson, S. B. Walbridge, and V. Zhumabekova, Physical Review C **83**, 022501(R) (2011) 1–5.

◇ "Background determination for the neutron-neutron scattering experiment at the reactor YAGUAR", A. Yu. Muzichka, W. I. Furman, E. V. Lychagin, A. R. Krylov, G. V. Nekhaev, E. I. Sharapov, V. N. Shvetsov, A .V. Strelkov, B. G. Levakov, A. E. Lyzhin, Yu. I. Chernukhin, Ya. Z. Kandiev, C. R. Howell, G. E. Mitchell, **B. E. Crawford**, S. L. Stephenson, and W. Tornow, *Nuclear Physics A*, **789** (2007) 30–45.

◇ "Effect of hydro-resistance training on bat velocity", K. J. Stuempfle, **B. E. Crawford**, D. F. Petrie, and M. T. Kirkpatrick, *Journal of Exercise Physiology*`online`, **7 No. 2** (2004) 63–69.

◇ "Calculations of neutron spectra after neutron-neutron scattering", **B. E. Crawford**, S. L. Stephenson, C. R. Howell, G. E. Mitchell, W. Tornow, W. I. Furman, E. V. Lychagin, A. Yu. Muzichka, G. V. Nekhaev, A. V. Strelkov, E. I. Sharapov, and V. N. Shvetsov *J. Phys. G: Nucl. Part. Phys. 30* (2004) 1269-1285.

◇ "Direct measurement of the neutron-neutron scattering cross section at the reactor YAGUAR", W. I. Furman, E. V. Lychagin, A. Yu. Muzichka, G. V. Nekhaev, Yu. V. Safronov, A. V. Strelkov, E. I. Sharapov, V. N. Shvetsov, B. G. Levakov, V. I. Litvin, A. E. Lyzhin, E. P. Magda, C. R. Howell, G. E. Mitchell, W. Tornow, **B. E. Crawford**, S. L. Stephenson, and C. D. Bowman *Journal of Physics G: Nuclear and Particle Physics*, **28** (2002) 2627–2641.

◇ "A measurement of the absolute neutron beam polarization produced by an optically pumped $^3$He neutron spin filter", D. R. Rich, J. D. Bowman, **B. E. Crawford**, P. P. J. Delheij, M. A. Espy, T. Haseyama, G. Jones, C. D. Keith, J. Knudson, M. B. Leuschner, A. Masaike, Y. Masuda, Y. Matsuda, S. I. Penttilä, V. R. Pomeroy, D. A. Smith, W. M. Snow, J. J. Szymanski, S. L. Stephenson, A. K. Thompson, and V. Yuan, *Nuclear Instruments & Methods in Physics Research, Section A,* **481** (2002) 431–453.

◇ "Parity violation in neutron resonances of palladium", D. A. Smith, J. D. Bowman, **B. E. Crawford**, C. A. Grossmann, T. Haseyama, A. Masaike, Y. Matsuda, G. E. Mitchell, S. I. Penttilä, N. R. Roberson, S. J. Seestrom, E. I. Sharapov, S. L. Stephenson, and V. W. Yuan, *Physical Review C*, **65** (2002) 035503/1–9.

◇ "Neutron Resonance spectroscopy of $^{104}$Pd, $^{105}$Pd, and $^{110}$Pd", D. A. Smith, J. D. Bowman, **B. E. Crawford**, C. A. Grossmann, T. Haseyama, A. Masaike, Y. Matsuda, G. E. Mitchell, S. I. Penttilä, N. R. Roberson, S. J. Seestrom, E. I. Sharapov, S. L. Stephenson, A. M. Sukhovoj, and V. W. Yuan, *Physical Review C*, **65** (2002) 024607/1–16.

◇ "Parity violation in neutron resonances of antimony and iodine", Y. Matsuda, J. D. Bowman, **B. E. Crawford**, P. P. J. Delheij, T. Haseyama, J. N. Knudson, L. Y. Lowie, A. Masaike, Y. Masuda, G. E. Mitchell, S. I. Penttilä, H. Postma, N. R. Roberson, S. J. Seestrom, E. I. Sharapov, S. L. Stephenson, Y. -F. Yen, and V. W. Yuan, *Physical Review C*, **64** (2001) 015501/1–7.

◇ "Parity violation in neutron resonances of $^{117}$Sn", D. A. Smith, J. D. Bowman, **B. E. Crawford**, C. A. Grossmann, T. Haseyama, Mikkel B. Johnson, A. Masaike, Y. Matsuda, G. E. Mitchell, V. A. Nazarenko, S. I. Penttilä, N. R. Roberson, S. J. Seestrom, E. I. Sharapov, L. M. Smotritsky, S. L. Stephenson, S. Tomsovic, and V. W. Yuan, *Physical Review C*, **64** (2001) 015502/1–9.

- ◇ "A spin-transport system for a longitudinally polarized epithermal neutron beam", **B. E. Crawford**, J. D. Bowman, S. I. Penttilä, N. R. Roberson, *Nuclear Instruments & Methods in Physics Research, Section A,* **474** (2001) 159–171.

- ◇ "A high-rate $^{10}$B-loaded liquid scintillation detector for parity-violation studies in neutron resonances", Yi-Fen Yen, J. D. Bowman, R. D. Bolton, **B. E. Crawford**, P. P. J. Delheij, G. W. Hart, T. Haseyama, C. M. Frankle, M. Iinuma, J. N. Knudson, A. Masaike, Y. Masuda, Y. Matsuda, G. E. Mitchell, S. I. Penttilä, N. R. Roberson, S. J. Seestrom, E. I. Sharapov, J. M. Shimizu, D. A. Smith, S. L. Stephenson, J. J. Szymanski, S. H. Yoo, V. W. Yuan, *Nuclear Instruments & Methods in Physics Research, Section A,* **447** (2000) 476–489.

- ◇ "New search for parity violation in nonresonant neutron scattering on thorium", G. E. Mitchell, J. D. Bowman, **B. E. Crawford**, P. P. J. Delheij, C. M. Frankle, M. Iinuma, J. N. Knudson, L. Y. Lowie, A. Masaike, Y. Matsuda, S. I. Penttilä, H. Postma, N. R. Roberson, S. J. Seestrom, E. I. Sharapov, S. L. Stephenson, Y. -F. Yen, and V. W. Yuan *Physical Review C* **61**, (2000) 045503/1–4.

- ◇ "Parity Violation in Neutron Resonances in $^{115}$In", S. L. Stephenson, J. D. Bowman, F. Corvi, **B. E. Crawford**, P. P. J. Delheij, C. M. Frankle, M. Iinuma, J. N. Knudson, L. Y. Lowie, A. Masaike, Y. Masuda, Y. Matsuda, G. E. Mitchell, S. I. Penttilä, H. Postma, N. R. Roberson, S. J. Seestrom, E. I. Sharapov, H. M. Shimizu, Y.-F. Yen,2 V. W. Yuan, and L. Zanini, *Physical Review C*, **61** (2000) 045501/1–11.

- ◇ "Parity Violation in $^{232}$Th Neutron Resonances above 250 eV", E. I. Sharapov, J. D. Bowman, **B. E. Crawford**, P. P. J. Delheij, C. M. Frankle, M. Iinuma, J. N. Knudson, L. Y. Lowie, J. E. Lynch, A. Masaike, Y. Matsuda, G. E. Mitchell, S. Penttilä, H. Postma, N. R. Roberson, S. J. Seestrom, S. L. Stephenson, Y.-F. Yen and V. W. Yuan, *Physical Review C,* ***61*** (2000) 025501/1–7.

- ◇ "Parity Violation in Neutron Resonances of $^{103}$Rh", D. A. Smith, J. D. Bowman, **B. E. Crawford**, C. A. Grossmann, T. Haseyama, A. Masaike, Y. Matsuda, G. E. Mitchell, S. I. Penttilä, N. R. Roberson, S. J. Seestrom, E. I. Sharapov, S. L. Stephenson and V. W. Yuan, *Physical Review C,* ***60*** (1999) 045503/1–7.

- ◇ "Neutron Resonance Spectroscopy of $^{103}$Rh from 30 eV to 2 keV", D. A. Smith, J. D. Bowman, **B. E. Crawford**, C. A. Grossmann, T. Haseyama, A. Masaike, Y. Matsuda, G. E. Mitchell, S. I. Penttilä, N. R. Roberson, S. J. Seestrom, E. I. Sharapov, S. L. Stephenson and V. W. Yuan, *Physical Review C,* ***60*** (1999) 045502/1–11.

- ◇ "Neutron Resonance Spectroscopy of $^{117}$Sn from 1 eV to 1.5 keV", D. A. Smith, J. D. Bowman, **B. E. Crawford**, C. A. Grossmann, T. Haseyama, M. B. Johnson, A. Masaike, Y. Matsuda, G. E. Mitchell, V. A. Nazarenko, S. I. Penttilä, N. R. Roberson, S. J. Seestrom, E. I. Sharapov, L. M. Smotritsky, S. L. Stephenson and V. W. Yuan, *Physical Review C,* ***59*** (1999) 2836–2843.

- ◇ "Apparatus for Parity-Violation Study Via Capture Gamma-Ray Measurements", S. J. Seestrom, C. M. Frankle, J. D. Bowman, **B. E. Crawford**, T. Haseyama, A. Masaike, Y. Matsuda, S. I. Penttilä, N. R. Roberson, E. I. Sharapov, and S. L. Stephenson, *Nuclear Instruments & Methods in Physics Research, Section A,* **433** (1999) 603–613.

- ◇ "Parity Nonconservation in Neutron Resonances in $^{133}$Cs", E. I. Sharapov, J. D. Bowman, **B. E. Crawford**, P. P. J. Delheij, T. Haseyama, J. N. Knudson, L. Y. Lowie, A. Masaike, Y. Masuda, Y. Matsuda, G. E. Mitchell, S. I. Penttilä, H. Postma, N. R. Roberson, S. J. Seestrom, S. L. Stephenson, Y.-F. Yen and V. W. Yuan, *Physical Review C,* ***59*** (1999) 1772–1779.

- ◇ "Parity Nonconservation in $^{106}$Pd and $^{108}$Pd Neutron Resonances", **B. E. Crawford**, J. D. Bowman, P. P. J. Delheij, T. Haseyama, J. N. Knudson, L. Y. Lowie, A. Masaike, Y. Matsuda, G. E. Mitchell, S. Penttilä, H. Postma, N. R. Roberson, S. J. Seestrom, E. I. Sharapov, S. L. Stephenson, and V. W. Yuan, *Physical Review C,* ***60*** (1999) 055503/1–8.

◇ "Parity Violation in Neutron Resonances in $^{107,109}$Ag", L. Y. Lowie, J. D. Bowman, F. Corvi, **B. E. Crawford**, P. P. J. Delheij, C. M. Frankle, M. Iinuma, J. N. Knudson, A. Masaike, Y. Masuda, Y. Matsuda, G. E. Mitchell, S. I. Penttilä, H. Postma, N. R. Roberson, S. J. Seestrom, E. I. Sharapov, H. M. Shimizu, S. L. Stephenson, Y.-F. Yen, V. W. Yuan, and L. Zanini, *Physical Review C,* ***59*** (1999) 1119–1130.

◇ "Search for Parity Violation in $^{93}$Nb Neutron Resonances, E. I. Sharapov, J. D. Bowman, **B. E. Crawford**, P. P. J. Delheij, C. M. Frankle, K. Fukuda, M. Iinuma, J. N. Knudson, S. J. Lokitz, L. Y. Lowie, A. Masaike, Y. Masuda, Y. Matsuda, G. E. Mitchell, S. I. Penttilä, H. Postma, N. R. Roberson, S. J. Seestrom, H. M. Shimizu, S. L. Stephenson, Y.-F. Yen, and V. W. Yuan, *Physical Review C,* ***59*** (1999) 1131–1135.

◇ "Parity Nonconservation in Neutron Resonances in $^{238}$U", **B. E. Crawford**, J. D. Bowman, P. P. J. Delheij, C. M. Frankle, M. Iinuma, J. N. Knudson, L. Y. Lowie, A. Masaike, Y. Matsuda, G. E. Mitchell, S. Penttilä, H. Postma, N. R. Roberson, S. J. Seestrom, E. I. Sharapov, S. L. Stephenson, Yi-Fen Yen and V. W. Yuan, *Physical Review C,* ***58*** (1998) 1225-1235.

◇ "Neutron Resonance Spectroscopy of $^{106}$Pd and $^{108}$Pd from 20–2000 eV", **B. E. Crawford**, J. D. Bowman, P. P. J. Delheij, T. Haseyama, J. N. Knudson, L. Y. Lowie, A. Masaike, Y. Matsuda, G. E. Mitchell, S. Penttilä, H. Postma, N. R. Roberson, S. J. Seestrom, E. I. Sharapov, S. L. Stephenson, and V. W. Yuan, *Physical Review C,* ***58*** (1998) 729–738.

◇ "Parity Nonconservation in Neutron Capture on $^{113}$Cd", S. J. Seestrom, J. D. Bowman, **B. E. Crawford**, P. P. J. Delheij, C. M. Frankle, K. Fukuda, M. Iinuma, J. N. Knudson, P. E. Koehler, L. Y. Lowie, A. Masaike, Y. Masuda, Y. Matsuda, G. E. Mitchell, S. Penttilä, Yu. P. Popov, H. Postma, N. R. Roberson, E. I. Sharapov, H. M. Shimizu, S. L. Stephenson, Yi-Fen Yen and V. W. Yuan, *Physical Review C,* ***58*** (1998) 2977–2985.

◇ "Parity Nonconservation in Neutron Resonances in $^{232}$Th", S. L. Stephenson, J. D. Bowman, **B. E. Crawford**, P. P. J. Delheij, C. M. Frankle, M. Iinuma, J. N. Knudson, L. Y. Lowie, A. Masaike, Y. Matsuda, G. E. Mitchell, S. Penttilä, H. Postma, N. R. Roberson, S. J. Seestrom, E. I. Sharapov, Yi-Fen Yen and V. W. Yuan, *Physical Review C,* ***58*** (1998) 1236–1246.

◇ "Neutron Resonance Spectroscopy of $^{107}$Ag and $^{109}$Ag", L. Y. Lowie, J. D. Bowman, **B. E. Crawford**, P. P. J. Delheij, T. Haseyama, J. N. Knudson, A. Masaike, Y. Masuda, Y. Matsuda, G. E. Mitchell, S. Penttilä, H. Postma, N. R. Roberson, S. J. Seestrom, E. I. Sharapov, S. L. Stephenson, Y.-F. Yen and V. W. Yuan, *Physical Review C,* ***56*** (1997) 90–97.

◇ "Observation of a Large Parity Non-conserving Effect in Xe", J. J. Szymanski, W. M. Snow, J. D. Bowman, B. Cain, **B. E. Crawford**, P. P. J. Delheij, R. D. Hartman, T. Haseyama , C. D. Keith, J. N. Knudson, A. Komives, M. Leuschner, L. Y. Lowie, A. Masaike, Y. Matsuda, G. E. Mitchell, S. I. Penttilä, H. Postma, D. Rich, N. R. Roberson, S. J. Seestrom, E. I. Sharapov, S. L. Stephenson, Yi-Fen Yen and V. W. Yuan, *Physical Review C,* ***53*** (1996) R2576–R2580.

◇ "Resonant Cavities in the History of Architectural Acoustics", Robert G. Arns and **Bret Crawford**, *Technology and Culture* ***36***, (1995) 104–135

◇ "Parity Violation in the Compound Nucleus", J. D. Bowman, C. M. Frankle, A. A. Green, , J. N. Knudson, S. Penttilä, S. J. Seestrom, Yi-Fen Yen, V. W. Yuan, **B. E. Crawford**, N. R. Roberson, C. R. Gould, D. G. Haase, L. Y. Lowie, G. E. Mitchell, S. L. Stephenson, P. P. J. Delheij, E. I. Sharapov, H. Postma, Y. Masuda, H. M. Shimizu, M. Iinuma, A. Masaike Y. Matsuda, K. Fukuda, *Chinese J. Phys.,* ***32***, (1994) 989–1002.

◇ "Parity Violation in Neutron-Nucleus Scattering", G. E. Mitchell, J. D. Bowman, **B. E. Crawford**, P. P. J. Delheij, C. M. Frankle, K. Fukuda, C. R. Gould, A. A. Green, D. G. Haase, M. Iinuma, J. N. Knudson, L. Y. Lowie, A. Masaike, Y. Masuda, Y. Matsuda, S. Penttilä, H. Postma, N. R. Roberson, S. J. Seestrom, E. I. Sharapov, H. M. Shimizu, S. L. Stephenson, Yi-Fen Yen and V. W. Yuan, *Nuclear Data for Science and Technology*, ed. J. K. Dickens (American Nuclear Society, La Grange Park, 1994) 208–214.

- ◇ "Parity Violation Experiments at Los Alamos", C. M. Frankle, D. Alde, J. D. Bowman, J. N. Knudson, S. Penttilä, S. J. Seestrom, Yi-Fen Yen, S. H. Yoo, V. W. Yuan, C. R. Gould, D. G. Haase, G. E. Mitchell, S. S. Paterson, **B. E. Crawford**, N. R. Roberson, Yu. P. Popov, E. I. Sharapov, A. Masaike, Y. Matsuda, S. Takahashi, Y. Masuda, H. M. Shimizu and P. P. J. Delheij, *Physics of Atomic Nuclei,* ***27*** (1993) 32.

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- ◇ "Invention of the Transistor", **Bret Crawford** and Robert G. Arns, *Bulletin of the American Physical Society*, **36** (1991) 2041.
- ◇ "Acoustic Vases", **Bret Crawford** and Robert G. Arns, *Bulletin of the American Physical Society*, **35** (1990) 1546.

## Student Senior Theses

- ◇ "Creating and Measuring Nanoscopic Gold Films: A Part of Research into Proton Energy Loss Through Gold", Daniel Tate, Gettysburg College (2022).
- ◇ "Proton Stopping Power Through Thin Fims: Exploring the Neutron Lifetime with Proton Energy Loss", Brett Travis, Gettysburg College (2022).
- ◇ "Gettysburg College Proton Accelerator", Ezequiel Linares, Gettysburg College (2020).
- ◇ "Understanding the Neutron Lifetime Experiment Through Simulation", Jose Negron, Gettysburg College (2019).
- ◇ "Van de Graaff Voltage Regulation via PID Control", Ryan Gonzalez, Gettysburg College (2018).
- ◇ "Speed Optimization of Neutron Spin Transport Code", Sam Infanger, Gettysburg College (2018).
- ◇ "Neutron Spin Transport Simulations of Exotic Fifth Force Experiment", Peter Yergeau, Gettysburg College (2017).
- ◇ "Neutron Transport Simulations for NIST Neutron Lifetime Experiment", Fangchen Li, Gettysburg College (2016).
- ◇ "Radiation in the Food Chain", Ben Machtinger, Gettysburg College (2015).
- ◇ "Fifth Force: Target Chamber Simulation", Scott Magers, Gettysburg College (2015).
- ◇ "Radiation in Soil", Asnika Bajracharya, Gettysburg College (2013).
- ◇ "Vocal Tract Resonance and Clarinet Timbre: A Study on Impedance Measurement", Brian Denu, Gettysburg College (2012).
- ◇ "Energy Calibrations, Thin Targets, and Rutherford Scattering Experiments with the Gettysburg College Proton Accelerator", Matthew Murray, Gettysburg College (2010).
- ◇ "The Violin", Andrew P. Maturo, Gettysburg College (2010).

- ◇ "Electronic Feedback Circuit for Stabilization of Gettysburg College Proton Accelerator Beam Energy", Jeff Morgan, Gettysburg College (2006).
- ◇ "The Gettysburg 250-keV proton Accelerator: Lab Updates, Calibrations, and Rutherford Scattering", Matthew Recore, Gettysburg College (2006).
- ◇ "Myers Briggs Type Indicator Application to occupations in Science, Engineering and Technology", Nathan Diehl, Gettysburg College (2006).
- ◇ "Friction Analysis of Nitriding as an Alternative metal Treatment to Chrome Plating for use on Aerospace Components", Mark Johnson, Gettysburg College (2004).
- ◇ "The neutron-neutron Interaction: Monte-Carlo Analysis of Proposed $a_{nn}$ Experiment at Snezhinsk", James Greece, Dickinson College (2001).
- ◇ "Incorporating Doppler Broadening In Monte-Carlo Simulations of (n,$\gamma$) Reactions", Rakesh Mathur, Gettysburg College (2000).