

## CURRICULUM VITAE

Jan., 2014

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## Personal Information:

Born: New Jersey, - 26 May 1944

Spouse: Sandra Souder, -married 14 December, 1974

Education: Graduate: Ph.D. Physics, Princeton University (1971)  
 University: B.S. Wheaton College, Illinois (1966)

Honors: National Science Foundation Graduate Fellowship  
 Honorary Woodrow Wilson Fellow  
 Yale Junior Faculty Fellowship  
 Fellow of the American Physical Society

Membership in Professional Societies: American Physical Society

## Professional Employment:

1988 - Professor of Physics, Syracuse University  
 1983 - 1988 Associate Professor of Physics, Syracuse University  
 1982 - 1983 Visiting Associate Prof. of Physics, Harvard University  
 1980 - 1982 Associate Professor of Physics, Yale University  
 1978 - 1979 Junior Faculty Fellowship, Yale University  
 1975 - 1980 Assistant Professor of Physics, Yale University  
 1972 - 1975 Instructor in Physics, Yale University  
 1971 - 1972 Research Staff Physicist, Yale University  
 1971 - 1971 Research Associate, Princeton University

## RECENT GRANTS

- \$495,000 from the DOE for three years, starting April, 1990
- \$148,600 grant to build hodoscopes for the E142 experiment. (Work was completed in 1992).
- \$599,000 from the DOE for three years, starting April, 1993, with minor readjustments.
- \$185,583 grant to build hodoscopes for the E154 experiment. (Work was completed under budget, 1995).
- \$648,000 from the DOE for three years, starting April, 1996.
- \$666,000 from the DOE for three years, starting April, 1999.
- \$136,241 grant from SLAC to build radiation-hard calorimeter for the E158 experiment. (Work was completed in 2001).
- \$705,000 from the DOE for three years, starting April, 2002.
- \$750,000 from the DOE for three years, starting April, 2005, (minus \$15,000 for 2006 due to budget cuts).
- \$923,000 from the DOE for three years, starting April, 2008.
- \$90,000 supplement from the DOE for three years, starting April, 2010.
- \$1,259,000 from the DOE for three years, starting April, 2011. (Minus \$66,000 due to budget cuts.)
- \$1,173,000 requested from the DOE for three years, starting April, 2014.

## RECENT INVITED TALKS

1. "The SoLID program at 12 GeV." Gamma-Z Boxing: Radiative corrections to parity-violating electron scattering: JLab, December 16-17, 2013
2. Conference Summary, PAVI11, Rome, Italy, Sept 7, 2011.
3. Parity Violation in DIS as 12 GeV, PANIC, MIT, July 25, 2010.
4. "Prity Violation at JLab," Los Alamos, June 18, 2009
5. "Parity-Violation in Deep Inelastic Scattering at JLab," Mainz, Dec. 14, 2009
6. "Parity-Violating PVDIS with SoLID," "3rd International Workshop on Nucleon Structure at Large Bjorken x," JLab, Oct 13-15, 2010
7. "PREX," at "Precision Tests of the Standard Model: from Atomic Parity Violation to Parity-Violating Lepton Scattering" Workshop at ECT\*, Trento, Italy, Nov. 8-12, 2010
8. "12 GeV PVDIS with SoLID at JLab,; Second Workshop on Hadron Physics in China and Opportunities with 12 GeV at JLab, Beijing, China, July 28-31, 2010.
9. "PV Experiments and Strangeness Content of the Nucleon," CIPANP, San Diego, May 30, 2009
10. "PVDIS: 12 GeV at JLab.", PAVI09, Bar Harbor, Maine, May 23, 2009
11. "Experimental Challenges of PREX," Trento, Aug. 3, 2009.
12. "Higher Twist in PVDIS" and "Workshop Summary," Higher twist workshop, Madison, Wisconsin, June 3, 2009.
13. "PVDIS at JLab at 12 GeV," DIS08, London, England, March 2008.
14. "The 12 GeV Solenoid PVDIS Proposal." Institute for Nuclear Theory Workshop, Seattle, Nov., 2008.

15. "The Physics of Neutron Stars and the PREx Experiment at JLab," Elba Electron-Nucleon Scattering X, Italy, June, 2008.
16. "Measurement of the Strange Form Factors of the Nucleon at JLab," International Conference on Nuclear Physics, Tokyo, Japan, June, 2007.
17. "PVDIS at JLab at 12 GeV," DIS08, London, England, March 2008.
18. "The 12 GeV Solenoid PVDIS Proposal." Institute for Nuclear Theory Workshop, Seattle, Nov., 2008.
19. "The Physics of Neutron Stars and the PREx Experiment at JLab," Elba Electron-Nucleon Scattering X, Italy, June, 2008.
20. "Measurement of the Strange Form Factors of the Nucleon at JLab," International Conference on Nuclear Physics, Tokyo, Japan, June, 2007.
21. "Parity-Violating Electron Scattering on Hydrogen and Helium," APS April Meeting, Dallas, TX, April 23, 2006.
22. "DIS-Parity at 12 GeV," PAVI06, Milos, Greece, May 20, 2005.
23. "Parity Violation at 11 GeV at JLab," APS GHP06, Nashville, TN, Oct 24, 2006.
24. "Parity Violation on Pb", APS Meeting, Maui, HI, Sept 18, 2005.
25. "Search for Lepton Flavor Violation," Gordon Conference, Bates College, Maine, July 14, 2005.
26. "Parity Violation in eP Scattering at JLab," DIS05, Apr 29, 2005.
27. "Parity and the JLab 12 GeV Upgrade," JLab Users Meeting, June 22, 2005.
28. "Parity and the JLab 12 GeV Upgrade: the Program for Hall A," Hall A Users Meeting, June 24, 2005.
29. "Parity Violation in Moller Scattering: Results from SLAC E158," Seminar at the University of Illinois, May 4, 2005.
30. "Electrons and Mirror Symmetry," Colloquium at the University of Houston, Mar 1, 2005

31. From zero to  $Z_0$ , Workshop at Fermilab, Ill, May, 1994, “The MECO Experiment.” (Plenary talk)
32. JLab: the next 7 Years, JLab, Newport News, VA, “The Pb Parity Experiment.”
33. HiX2004, Marseilles, Fr, Aug. 2004, “The Physics of Parity Violation at High  $x$  and 11 GeV. (Plenary talk)
34. Photonuclear Gordon Conference, Tilton, NH, Aug. 2004, “The E158 Experiment at SLAC.” (Plenary talk)
35. Conference on the Intersections of Particle and Nuclear Physics, New York, May, 2003 “Recent E158 Results”
36. Spin2003 Seattle, Washington, Aug. 2003 “The Experiments of Vernon Hughes”
37. EURESCO Conference: Hadron Structure Viewed with Electromagnetic Probes; Santorini, Greece, “Parity Violation Workshop Summary”.
38. PAVI02, Mainz Germany “E158” Mainz, Germany, June, 2002.
39. “Moller Scattering at SLAC,” PAVI Workshop, Mainz, Germany, June, 2002.
40. “Weak Nucleon Form Factors,” Plenary talk at EMI2001, Osaka, Japan, Dec. 2001.
41. ”Moller Scattering at SLAC,” The Fundamental Symmetries Workshop, ITAMP, Harvard University, Dec. 2001.
42. ”Low Energy Moller Scattering at the NLC,” Snowmass Workshop, CO, July, 2001.
43. “Weak Nucleon Form Factors,” Plenary talk at SPIN 2000, Osaka, Japan, Oct 2000.
44. “Parity Violation and Nucleon Strangeness,” Plenary talk at the 7th International Conference in the Intersections of Particle and Nuclear Physics, Quebec City, Canada, June 2000.

45. "Parity Violation in Elastic Electron-Proton Scattering," Joint Ohio University/JLab Workshop on Strange Quarks in Hadrons, Nuclei, and Nuclear Matter, Ohio University, May, 2000.
46. "The HAPPEX Experiment," Workshop at ECT, Trento, Italy, June 2000.
47. "Parity Violation," HiX2000 workshop, Temple University, April 2000.
48. "Parity Violation, Then and Now" MIT Bates Symposium, Nov. 1999.
49. "Parity Violation at JLab," Colloquium at MIT LNS, Mar. 1999
50. PAVI/97, Ecole Normale Supérieure, Oct. 28, 1997, "Electron Scattering Experiments."
51. EPS HEP 97, Jerusalem, Israel, Aug. 20, 1997, "Final Results from SLAC E154."
52. Workshop on Future Directions in Parity-Violation, Institute for Nuclear Theory, Seattle, June 22, 1997, "JLAB Beam Properties."
53. HELION97 Workshop, Kobe, Japan, Jan. 21, 1997, "Laser Polarized Muonic  $^3\text{He}$  and Spin Dependent  $\mu^-$  Capture."
54. Syracuse University Particle Physics Seminar, Nov. 18, 1996; "New Precision Measurement of Neutron Spin-Structure Functions at SLAC."
55. RPI Nuclear Physics Seminar, Nov. 5, 1996; "New Precision Measurement of Neutron Spin-Structure Functions at SLAC."
56. Cornell Seminar, Nov. 1, 1996; "New Precision Measurement of Neutron Spin-Structure Functions at SLAC."
57. CERN PPE Seminar, Oct. 28, 1996; "New Precision Measurement of Neutron Spin-Structure Functions at SLAC."
58. SNOWMASS, July, 1996, "Comments on Spin-Dependent Structure Functions."
59. PANIC, May, 1996 "Measurement of  $g_P$  from Laser Polarized Muonic Helium."

60. California Institute of Technology, Feb., 1996, "Moller Scattering at SLAC: A Precision Electroweak Test."
61. Erice, Italy, Aug. 1995, "Parity Violation in Electron-Proton Scattering at CEBAF."
62. Workshop on Physics Beyond the Standard Model at Low and Intermediate Energies at the Institute for Nuclear Physics (University of Washington, Seattle), June-July, 1995, "Parity violation in moller scattering at SLAC: potential backgrounds."
63. Muon Physics Workshop, Rutherford Appleton Laboratory, Oxfordshire, Dec, 1994, "Laser Polarized Muonic Atoms."
64. International Conference on Hyperon Physics, Vancouver, BC, June, 1994, "Nucleon Form Factors and Strange Quarks as Determined from Electron Scattering at Bates and CEBAF."
65. CEBAF workshop, April, 1994, "Parity Violation in Deep Inelastic Scattering."
66. RPI Nuclear Physics Seminar, March, 1994, "Spin-Dependent Structure Functions of the Nucleon."
67. Saclay, France, Dec. 1993, "The Hall A Parity Experiment at CEBAF."
68. APS Division of Nuclear Physics Annual Meeting, Asilomar, CA, Oct. 1993, "Review of Nucleon Structure Functions."
69. Cornell University, High Energy Physics Seminar, June, 1993, "Spin-Dependent Structure Functions of the Nucleon."
70. CEBAF summer workshop, May, 1993, "Spin-Dependent Structure Functions of the Nucleon."
71. APS Washington Meeting, April, 1993, "Results form E142."
72. LEMS Workshop, Santa Fe, NM, April, 1993, "Laser Polarized Muonic Atoms."
73. Workshop on Muon Physics, Ascona, Switzerland, May, 1992, "Laser Polarized Muonic Atoms."

74. 9th Student's Workshop on Electromagnetic Interactions," Bosen, Germany, Sept., 1992. "Parity Violation in Electron Scattering."
75. College of William and Mary, Feb., 1992, "Laser Polarized Muonic Atoms."
76. SLAC Seminar, Sept, 1991, "Laser Tests of Chiral Symmetry - A New Experimental Approach to Muonic Atoms."
77. Workshop on Muon Physics, Heidelberg, May, 1991. "Muonic Atoms."



## PUBLICATIONS

1. “Molecular Force Fields of Octahedral  $\text{XF}_6$  Molecules”, Hyunyong Kim, Paul A. Souder, and Howard Classen. *J. Mol. Spectry* **26**, 45–66 (1968).
2. “Wire–Spark–Chamber System with On–Line Computers”, W.T. Ford, P.A. Piroue, R.S. Rimmel, A.J.S. Smith, and P.A. Souder, *Nucl. Inst. Methods* **87**, 241-245 (1970).
3. “Search for Violation of CP Invariance in  $\tau^\pm$  Decay”, W.T.Ford, P.A. Piroue, R.S. Rimmel A.J.S. Smith, and P.A. Souder, *Phys. Rev. Letters* **25**, 1370-1373 (1970).
4. “Experimental Study of  $\tau^\pm$  Decay Matrix Element”, W.T. Ford, P.A. Piroue, R.S. Rimmel, A.J.S. Smith, and P.A. Souder, *Phys. Letters* **38B**, 335-338 (1972).
5. “A “Scaled” MWPC with 0.5 mm Wire Spacing”, P.A. Souder, J.Sandweiss, and A.A. Disco, *Nucl. Instr. Methods* 109, 237-240 (1973).
6. “Muonium Formation in Noble Gases and Noble–Gas–Mixtures”, R.D. Stambaugh, D.E. Casperson, T.W. Crane, V.W. Hughes, H.F. Kaspar, P.A. Souder, P.A. Thompson, H. Orth, G. zu Putlitz, and A.B. Denison, *Phys. Rev. Letters* **33**, 568-571 (1974).
7. “Behavior of Positive Muons in Liquid Helium”, T.W. Crane, D.E. Casperson, H. Chang, V.W. Hughes, H.F. Kaspar, B. Lovett, P.A. Souder, R.D. Stambaugh, G. zu Putlitz, and J.R. Kane, *Phys. Rev. Letters* **33**, 572–574 (1974).
8. “Formation of the Muonic Helium Atom  $\alpha\mu^- e^-$ , and Observation of Its Larmor Precession”, P.A. Souder, D.E. Casperson, T.W. Crane, V.W. Hughes, D.C. Lu, H. Orth, H.W. Reist, M.H. Yam and G. zu Putlitz, *Phys. Rev. Letters* **34**, 1417–1420 (1975).
9. “Polarized Electron–Electron Scattering at GeV Energies”, P.S. Cooper, M.J. Alguard, R.D. Ehrlich, V.W. Hughes, H. Koboyakawa, J.S. Ladish, M.S. Lubell, N. Sasao, K.P. Schuler, P.A. Souder, G. Baum, W. Raith,

- K. Kondo, D.H. Coward, R. H. Miller, C.Y. Prescott, D.J. Sherden, and C.K. Sinclair, *Phys. Rev. Letters* **34**, 1589–1591 (1975).
10. “A New High Precision Measurement of the Muonium Hyperfine Structure Interval  $\Delta\nu$ ”, D.E. Casperson, T.W. Crane, V.W. Hughes, P.A. Souder, R.D. Stambaugh, P.A. Thompson, H. Orth, G. zu Putlitz, H.F. Kasper, H.W. Reist, and A.B. Denison, *Phys. Letters* **59B**, 397–400 (1975).
  11. “New Measurements of Polarization and Differential Cross Sections in  $K^+p$  Elastic Scattering in the 1.7–3 GeV/c Range”, R. Patton, W.A. Barletta, R.D. Ehrlich, A. Etkin, P.A. Souder, M.E. Zeller, M. Mishina, and D.N. Lazarus, *Phys. Rev. Letters* **34**, 975–978 (1975).
  12. “Elastic Scattering of Polarized Electrons by Polarized Protons”, M.J. Alguard, W.W. Ash, G. Baum, J. Clendenin, P.S. Cooper, D.H. Coward, R.D. Ehrlich, A. Etkin, V.W. Hughes, H. Kobayakawa, K. Kondo, M.S. Lusell, R.H. Miller, D.A. Palmer, W. Raith, N. Sasao, K.P. Schuler, D.J. Sherden, C. K. Sinclair, and P.A. Souder, *Phys. Rev. Letters* **37**, 1258-1261 (1976).
  13. “Deep Inelastic Scattering of Polarized Electrons by Polarized Protons”, M.J. Alguard, W.W. Ash, G. Baum, J. Clendenin, P.S. Cooper, D.H. Coward, R.D. Ehrlich, A. Etkin, V.W. Hughes, H. Kobayakawa, K. Kondo, N.S. Lubell, R.H. Miller, D.A. Palmer, W. Raith, N. Sasao, K.P. Schuler, D.J. Sherden, C.K. Sinclair, and P.A. Souder, *Phys. Rev. Letters* **37**, 1261–1265 (1976).
  14. “New Precise Value for the Muon Magnetic Moment and Sensitive Test of the Theory of hfs Interval in Muonium”, D.E. Casperson, T.W. Crane, A.B. Denison, P.O. Egan, V. W. Hughes, F.G. Marian, H. Orth, H.W. Reist, P.A. Souder, R.D. Stambaugh, P.A. Thompson, and G. zu Putlitz, *Phys. Rev. Letters* **38**, 956–9959 (1977); 1504.
  15. “Measurements of Polarization in  $K^-p$  Elastic Scattering at Low Energies”, R.D. Ehrlich, B. Lovett, M. Mishina, P.A. Souder, J.Snyder, M.E. Zeller, D.M. Lazarus, and I. Nakano, *Phys. Letters* **71B**, 455-459 (1977).

16. “Deep Inelastic  $e^-p$  Asymmetry Measurements and Comparison with the Bjorken Sum Rule and Models of Proton Spin Structure”, M.J. Alguard, W.W. Ash, G. Baum, M.R. Bergstrom, J.E. Clendenin, P.S. Cooper, D.H. Coward, R.D. Ehrlich, V.W. Hughes, K. Kondo, M.S. Lubell, R.H. Miller, S. Miyashita, D.A. Palmer, W. Raith, N. Sasao, K.P. Schuler, D.J. Sherden, P.A. Souder, and M.E. Zeller, *Phys. Rev. Letters* **41**, 70–73 (1978).
17. “Development of a Low-Momentum “Surface” Muon Beam for LAMPF”, H.W. Reist, D.E. Casperson, A.B. Denison, P.O. Egan, V.W. Hughes, F.G. Mariani, G. zu Putlitz, P.A. Souder, P.A. Thompson, and J. Vetter, *Nucl. Inst. Methods* **153**, 61–64 (1978).
18. “Experimental Test of Special Relativity from a High- $\gamma$  Electron  $g-2$  Measurement”, P.S. Cooper, M.J. Alguard, R.D. Ehrlich, V.W. Hughes, H. Kobayakawa, J.S. Ladish, M.S. Lubell, N. Sasao, K.P. Schuler, P.A. Souder, D.H. Coward, R.H. Miller, C.Y. Prescott, D.J. Sherden, C.K. Sinclair, G. Baum, W. Raith, and K. Kondo, *Phys. Rev. Letters* **42**, 1386–1389 (1979).
19. “Formation of the Muonic Helium Atom”, P.A. Souder, T.W. Crane, V.W. Hughes, D.C. Lu, H. Orth, H.W. Reist, M.H. Yam, and G. zu Putlitz, *Phys. Rev. A* **22**, 33–50 (1980).
20. “Measurement of Asymmetry in Spin-Dependent  $e^-p$  Resonance-Region Scattering”, G. Baum, M.R. Bergstrom, J.E. Clendenin, R.D. Ehrlich, V.W. Hughes, K. Kondo, M.S. Lubell, S. Miyashita, R.H. Miller, D.A. Palmer, W. Raith, N. Sasao, K.P. Schuler, P.A. Souder, *Phys. Rev. Letters* **45**, 2000–2003 (1980).
21. “Search for Long-Lived  $2S$  Muonic Hydrogen in  $H_2$  Gas”, P.O. Egan, S. Dhawan, V.W. Hughes, D.C. Lu, F.G. Mariani, P.A. Souder, J. Vetter, G. zu Putlitz, P.A. Thompson, and A.B. Denison, *Phys. Rev. A* **23**, 1152–1163 (1981).
22. “Observation of Muonium in Vacuum”, P.R. Bolton, A. Badertscher, P.O. Egan, C.J. Gardner, M. Gladisch, V.W. Hughes, D.C. Lu, M. Ritter, P.A. Souder, J. Vetter, G. zu Putlitz, M. Eckhause, and J. Kane, *Phys. Rev. Letters* **47**, 1441–1444 (1981).

23. “Dynamic Nuclear Polarization of Irradiated Targets”, M.L. Seely, A. Amittay, M.R. Bergstrom, S.K. Dhawan, V.W. Hughes, R.F. Oppenheim, K.P. Schuler, P.A. Souder, K. Kondo, S. Miyashita, K. Morimoto, S.J. St. Lorant, Y.-N Guo, A. Winnacker, Nucl. Instr. Methods **201**, 303–308 (1982).
24. “Precise Measurement of the Hyperfine–Structure Interval and Zeeman Effect in the Muonic Helium Atom”, C.J. Gardner, A. Badertscher, W. Beer, P.R. Bolton, P.O. Egan, M. Gladisch, M. Greene, V.W. Hughes, D.C. Lu, F.G. Mariani, P.A. Souder, H. Orth, J. Vetter, and G. zu Putlitz, Phys. Rev. Letters **48**, 1168–1170 (1982).
25. “High Precision Measurement of the Muonium Ground State Hyperfine Interval with the Muon Magnetic Moment”, F.G. Mariani, W. Beer, P.R. Bolton, P.O. Egan, G.J. Gardner, V.W. Hughes, D.C. Lu, U. Moser, P.A. Souder, J. Vetter, H. Orth, and G. zu Putlitz, Phys. Rev. Letters **49**, 993–996 (1982).
26. “New Measurement of Deep–Inelastic  $e^-p$  Asymmetries”, G. Baum, M.R. Bergstrom, P.R. Bolton, J.E. Clendenin, N.R. DeBotton, S.K. Dhawan, Y.-N. Guo, V.-R. Harsh, V.W. Hughes, K. Kondo, M.S. Lubell, Z.-A. Mao, R.H. Miller, S. Miyashita, K. Morimoto, U.F. Moser, I. Nikano, R.F. Oppenheim, D.A. Palmer, C. Panda, W. Raith, N. Sasao, K.P. Schuler, M.C. Seeley, P.A. Souder, S.J. St. Lorent, K. Takikawa, and M. Werlen, Phys. Rev. Lett. **51**, 1135–1138 (1983).
27. “Development of ‘Subsurface’ Positive Muon LAMPF”, A. Badertscher, P.O. Egan, M. Gladisch, M. Greene, V.W. Hughes, F.G. Mariani, D.C. Lu, G. Zu Putlitz, M.W. Ritter, G. Sanders, P.A. Souder, and R. Werbeck, Nucl. Instr. & Meth. **A238**, 200–205 (1985).
28. “First Observation of the Negative Muonium Ion Produced by Electron Capture in a Beam–foil Experiment”, Y. Kuang, K.P. Arnold, F. Chmely, M. Eckhause, V.W. Hughes, J.R. Kane, S. Kettell, D.H. Kim, K. Kumar, D.C. Lu, B. Ni, B. Matthias, H. Orth, G. zu Putlitz, H.R. Schaefer, P.A. Souder, and K. Woodle, Physical Review A, **35**, 3172–3175 (1987).
29. “The Bates Polarized Electron Source”, G. D. Cates, V. W. Hughes,

- R. Michaels, H. R. Schaefer, T. J. Gay, M. S. Lubell, R. Wilson, G. W. Dodson, K. A. Dow, S. B. Kowalski, K. Isakovich, K. Kumar, M. E. Schulze, P. A. Souder, and D. H. Kim, *Nucl. Instr. Meth. in Phys. Res.* **A278**, 293–317 (1989).
30. “Formation of the Negative Muonium Ion and Charge-Exchange Processes for Positive Muons Passing Through Thin Metal Foils”, Y. Kuang, K.-P. Arnold, F. Chmely, M. Eckhause, V. W. Hughes, J. R. Kane, S. Kettell, D.-H. Kim, K. Kumar, D. C. Lu, B. Matthias, B. Ni, H. Orth, G. zu Putlitz, H. R. Schaefer, P. A. Souder, K. Woodle, *Phys. Rev. A* **39**, 6109–6123 (1989).
  31. “Measurement of Parity Violation in the Elastic Scattering of Polarized Electrons from  $^{12}\text{C}$ ,” P. A. Souder, R. Holmes, D.-H. Kim, K. S. Kumar, M. E. Schulze, M. S. Lubell, J. Bellanca, M. Goodman, S. Patch, Richard Wilson, K. Isakovich, G. W. Dodson, K. A. Dow, M. Farkhondeh, S. Kowalski, G. D. Cates, S. Dhawan, T. J. Gay, V. W. Hughes, A. Magnon, R. Michaels, H. R. Schaefer, *Phys. Rev. Lett.* **65**, 694 (1990).
  32. “Operation of the LAMPF Muon Channel for Small Gas Targets,” R. Holmes, D.-H. Kim, K. S. Kumar, P. A. Souder, D. Benton, G. D. Cates, N. Newbury, C. Pillai, *Nucl. Instrum. Methods, Phys. Res., Sect A* **303**, 226 (1991).
  33. “Measurement of Tensor Polarization in Elastic Electron-Deuteron Scattering in the Momentum Range  $3.8 < q < 4.6 \text{ fm}^{-1}$ ,” I. The, Antonuk, J. Arvieux, D. H. Beck, E. J. Beise, A. Boudard, E. B. Cairns, J. M. Cameron, G. W. Dodson, K. A. Dow, M. Farkhondeh, H. W. Fielding, J. B. Flanz, M. Garcon, R. Goloskie, S. Hoibraten, J. Jourdan, S. Kowalski, C. Lapointe, W. J. McDonald, B. Ni, L. D. Pham, R. Redwine, N. Rodning, G. Roy, M. E. Schulze, P. A. Souder, J. Soukup, I. The, W. Turchinets, C. F. Williamson, K. E. Wilson, S. Wood, and W. Ziegler, *Phys. Rev. Lett.* **67**, 173 (1991).
  34. “Laser Polarized Muonic Helium,” N. R. Newbury, A. S. Barton, P. Bogorad, G. D. Cates, M. Gatzke, B. Saam, L. Han, R. Holmes, P. A. Souder, J. Xu, and D. Benton, *Phys. Rev. Lett.* **67**, 3219, (1991).

35. “Highly Polarized Muonic Helium Produced by Collisions with Laser Optically Pumped Rb ,” A. S. Barton, P. Bogorad, G. D. Cates, H. Mabuchi, H. Middleton, N. R. Newbury, R. Holmes, J. McCracken, P. A. Souder, J. Xu, and D. Tupa, *Rev. Lett.* **70**, 758, (1993).
36. “Determination of the Neutron Spin Structure Function,” P. L. Anthony *et al.*, (E142 Collaboration) *Phys. Rev. Lett.* **71**, 959 (1993).
37. “Tensor Polarization in Elastic Electron-Deuteron Scattering in the Momentum Transfer Range  $3.8 < q < 4.6 \text{ fm}^{-1}$ ,” M. Garcon, J. Antonuk, J. Arvieux, D. H. Beck, E. J. Beise, A. Boudard, E. B. Cairns, J. M. Cameron, G. W. Dodson, K. A. Dow, M. Farkhondeh, H. W. Fielding, J. B. Flanz, R. Goloskie, S. Hoibraten, J. Jourdan, S. Kowalski, C. Lapointe, W. J. McDonald, B. Ni, L. D. Pham, R. Redwine, N. Rodning, G. Roy, M. E. Schulze, P. A. Souder, J. Soukup, I. The, W. Turchinets, C. F. Williamson, K. E. Wilson, S. Wood, and W. Ziegler, *Phys. Rev. C* **49**, 2516 (1994).
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