Chen-Yu Liu

Curriculum Vitae

Indiana University
Department of Physics
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Academic Positions:

2017–present	Professor, Indiana University
2012–2017	Associate Professor, Indiana University
2005–2012	Assistant Professor, Indiana University
2002–2005	Director's Funded Post-Doctoral Fellow, Los Alamos National Laboratory
1997–2002	Graduate Student, Princeton University, New Jersey 1997–2002: Research Assistant 2000: Teaching Assistant
1995–1997	Research Assistant, Physics Department, National Taiwan University, Taipei

Education:

1997–2002	Ph.D., Physics, Princeton University, Princeton, NJ Doctoral dissertation: "Superthermal Ultra-cold Neutron Sources" Advisor: Prof. Albert R. Young
1994–1997	B.S., Physics, National Taiwan University, Taipei, Taiwan

Collaboration/Experiment Participation:

2014–present	LANL neutron electric dipole moment (EDM) experiment
2009–present	UCNτ, Neutron lifetime in a Magneto-Gravitational Trap (co-spokesperson, 2011-present)
2002–present	SNS neutron EDM experiment
2002–present	Solid-State electron EDM experiment & 5^{th} force searches
2005–2011	Solid-O_2 UCN Source
1997–present	UCNA, measurement of the β asymmetry of the Neutron β-decay

Awards & Honors:

2017–2018	Collaborative Fellowship Award, Institute for Advanced Study, Indiana University.

2016–2017	Rosen Scholar, Los Alamos Neutron Science Center, Los Alamos.
2012	Shell Science Seminar (invited speaker), National Conference on Science Education, National Science Teachers Association (NSTA).
2009	"Outstanding Contributions to Teaching", selected by IU undergraduate physics students.
2008	Joseph and Sophia Konopinski Prize, awarded in recognition of excellence in teaching of physics, Indiana University.
2008	Trustees Teaching Excellence Recognition Award, Indiana University.
2007–08	Sloan Research Fellow, grant to pursue excellence in research, Alfred P. Sloan Foundation.
2006	Ralph E. Powe Junior Faculty Enhancement Award, Oak Ridge Associated Universities.
2003	19^{th} Louis Rosen Prize, outstanding thesis completed at LANSCE, Los Alamos Neutron Science Center (LANSCE) User Group.
2002–03	Director's Funded Post-Doctoral Fellow, Los Alamos National Laboratory.
1994–1997	6^{th} Dr. Paul C. W. Chu Material Science Scholarship, CTCI Foundation.

Grants:

2017–2018	"Collaborative Fellowship Award," PI ($10K), Institute for Advanced Study, Indiana University.
2016–2017	"Rosen Scholar—Ultra Cold Neutron Research," PI ($236,757), Los Alamos Neutron Science Center.
2015–2018	"A Measurement of the Neutron Lifetime in a Magneto-Gravitational Bottle," PI ($150K), NIST Precision Measurement Grant.
2016–2019	"Experimental Nuclear Physics and Fundamental Interactions at Indiana University," Co-PI ($5.38M), National Science Foundation (PHY-1614545).
2013–2014	"Precision Measurement of the Neutron beta-decay Lifetime," Faculty Research Support Program, PI ($50K), Indiana University.
2013–2016	"Experimental Nuclear Physics and Fundamental Interactions at Indiana University," Co-PI ($3.79M), National Science Foundation (PHY-1306942).
2011–2013	"Studies in Nuclear Physics and Fundamental Interactions at Indiana University," Co-PI ($4.18M), National Science Foundation (PHY-1068712).
2008–2010	"Studies in Nuclear Physics and Fundamental Interactions at Indiana University," Co-PI ($2.44M), National Science Foundation (PHY-0969490).
2008–present	"Neutron Electric Dipole Experiment at SNS," Co-PI ($879K), National Science Foundation, funds will be released after the DOE-CD2 review.
2009–2010	"Investigation of Superconducting Quantum Interference (SQUID) Operation in an HV Environment for the Neutron EDM experiment," PI ($66K), Los Alamos National Lab / DOE Office of Science.

2008–2009 "Development of a Novel Ultracold Neutron Source," Faculty Research Support Program, PI ($75K), Indiana University.

2007–2008 Sloan Research Fellowship ($45K), Alfred P. Sloan Foundation.

2005–2008 "Studies in Experimental Nuclear Physics at Indian University," Co-PI($6M), National Science Foundation.

2006 Ralph E. Powe Junior Faculty Enhancement Award ($10K), Oak Ridge Associated Universities.

Teaching Experiences:

Course Instructor Indiana University

- **P640, P641** Subatomic Physics I, II: Spring 2016 (enrollment: 7), Fall 2015 (9), Spring 2012 (10), Spring 2011 (9), Fall 2010 (8)
- **P451/P551** Experiments in Modern Physics: Fall 2009 (9), Spring 2009 (8), Spring 2008 (6), Spring 2007 (7)
- **P441, P442** Classical Mechanics I, II: Fall 2017 (enrollment: 39), Spring 2018 (14)
- **P301** Physics III, Fall 2008 (22), Fall 2007 (25)
- **P221, P222** General Physics I, II: Spring 2015 (75), Spring 2014 (102), Fall 2013 (134), Spring 2010 (46)
- **P221H, P222H** General Physics I, II Honors: Spring 2013 (35), Fall 2012 (55)
- **P202** General Physics II: Spring 2009 (241), Spring 2006 (248), Fall 2005 (167)

Postdoc Supervisor Indiana University

- Adam Holley (2012-2014), now a tenure-track assistant professor at Tennessee Technological Univeristy
- Chris Lavelle (2007-2010), now a permanent staff scientist in the Johns Hopkins University Applied Physics Laboratory
- Goverdhan Reddy (2007-2009), now an assistant professor in the Department of Pure and Applied Physics, Guru Ghasidas University (Central University), Bilaspur, India

Graduate Student Advisor Indiana University

Ph.D. completed

- Even Adamek (2011-2017), Ph.D. 2017, now a postdoc at the University of Tennessee, Knoxville.
- Daniel Salvat (2009-2015), Ph.D. 2015, now a postdoc at University of Washington.
- Maciej Karcz (2007-2014), Ph.D. 2014, now a production engineer at Intel.
- Young Jin Kim (2006-2011), Ph.D. 2011, now a research scientist at Los Alamos National Laboratory.
- Yunchang Shin (2005-2008), Ph.D. 2008, now a research scientist at Korea Advanced Institute of Science and Technology (Kaist), South Korea.

Ph.D. in progress

- Nathan Callahan (2012–present)
- Francisco Gonzalez (2015–present)
- Douglas Wong (2016–present)

Ph.D. Defense Committee Physics Department, Indiana University

- 2017: Evan Adamek (February, chair)
- 2016: Manual Lara (July); Hairong Li (July); Ke Li (June); John Penwell (May)
- 2015: Jeffrey Eldred (December); Jason Fry (July); Patrick McChesney (May); Daniel Salvat (March, chair); Liu Ao (February)
- 2014: Kun Fang (September); Maciej Karcz (July, chair); Zhaowen Tang (March)
- 2013: Chad Gillis (December)
- 2011: Young Jin Kim (August, chair); YiChao Jin (August)
- 2010: George Noid (December); Jeffery Kolski (December)
- 2008: Yunchang Shin (July, chair); Fei Wang

Undergraduate Student Mentor Indiana University

- 20 students: Krishna Sai Godavarthi (2018-present), Aditya Phadnis (2016-present); Thomasina O'Connor (2015-present), Bihan Shan (2015-2016), Jenna Stoffel (Cox Research Scholar, 2014-2015), Griffin Page (2014), Bailey Slaughter (2012-2014), Christopher Pease (2011), Mak Hozo (Cox Research Scholar, 2011-2012), Sonya Sawtelle (2010-2011, now Yale graduate school), Chris Cude (2010-2013, now NCSU physics graduate school), Thomas Nevitt (2010-2012), Alex Jacobs (2009), Tyler Mikev (2009), Greg Manus (2008-2011), Daniel Salvat (2008-2009), Craig Huffer (2006-2008), Patrick McChesney (2006-2008), John Ulman (2006); Ming-Du Kang (Manchester College, REU, 2006).

Student Honors:

2016	Nathan Callahan, Department of Energy Office of Science Graduate Fellowship.
2015	Evan Adamek, IUB COAS travel grant.
2015	Jenna Stoffel, Conference Experience for Undergraduates (CEU) travel grant to attend DNP2015.
2015	Daniel Salvat, Outstanding Graduate Student in Experimental Research, Physics Department, IUB.
2014	Griffin Pace, CEU travel grant to attend DNP2014.
2012	Yun Chang Shin, Japan Society for the Promotion of Science (JSPS) Postdoctoral Fellowship for Overseas Researchers.
2011	Young Jin Kim, Outstanding Graduate Student in Experimental Research, Physics Department, IUB.
2011	Young Jin Kim, McCormick Science Grant, College of Arts & Science, Indiana University.
2010	Chris Cude, CEU travel grant to attend DNP2010.
2010	Greg Manus, CEU travel grant to attend DNP2010.
2010	Young Jin Kim, First prize in the best poster, International Nuclear Physics Conference (INPC2010), Vancouver, Canada.
2010-2013	Daniel Salvat, Department of Energy Office of Science Graduate Fellowship.

2008	Patrick McChesney, CEU travel grant to attend DNP2008.
2007	Craig Huffer, CEU travel grant to attend DNP2007.

Professional Service:

2017–2018	NSF Proposal Review; DOE Proposal Review.
2016–present	LANSCE User Group Executive Committee (UCN representative), the chair-elect.
2016	Technical Review Committee on the Möller Experiment, JLab.
2015–2016	Local Program Committee, International SPIN Conference 2016.
2015–2017	Program committee, Division of Nuclear Physics, American Society of Physicists (APS).
2015	Lecturer, Fundamental Neutron Physics Summer School (Knoxville, TN).
2014	Planning committee, "Fundamental Symmetries and Neutrinos" town meeting to discuss and draft the US Nuclear Physics Long Range Plan.
2014	Organizing committee, Neutron Lifetime Workshop (Amherst, Sep. 2014).
2011–2017	Co-spokesperson for the UCNτ experiment.
2012	Lecturer, TRIUMF summer institute (Vancouver, Canada).
2012	Organizing committee, Neutron Lifetime Workshop (Santa Fe, Nov. 2012).
2012	Co-convenor for the topic on "Low Energy Precision Frontier" in the 11^{th} Conference on the Intersections of Particle and Nuclear Physics (CIPANP2012).
2010–2013	Executive committee, Member-at-large, Topical Group on Precision Measurement and Fundamental Constants, APS.
2010	International Advisory Committee, 2^{nd} International Ulaanbaatar Conference on Nuclear Physics and Applications (July 26-30, 2010, Ulaanbaatar Mongolia).
2009–present	Member of the communication committee, SNS neutron EDM experiment.
2009	Lecturer in the 2^{nd} Fundamental Neutron Physics Summer School, NIST.
2008–present	Organizer of the IU nuclear physics seminars.
2007	Co-organizer, mini-symposium on Fundamental Neutron Physics in the Division of Nuclear Physics meeting.
2006	Lecturer in the Nuclear Physics Summer School, Bloomington.

Professional Associations:

2009–present	Oversea Chinese Physics Association
1998–present	American Physical Society (APS)
1998–present	Division of Nuclear Physics, APS

Outreach:

2014–present	Faculty mentor in the CEWiT-REUW: research experience for undergraduate women program sponsored by the Center of Excellence for Women in Technology, IUB.
2011	Led Physics Club students to perform 3 public physics demo shows at the WonderLab, Bloomington.
2010–2011	Science review for "A Moment of Science", National Public Radio (NPR) broadcast.
2010–2011	Faculty advisor of the IU Physics Club.
2005–2011	Organized and led IUCF facility tours for general publics, high school participants in the Science Olympiad (2006) and IU undergraduate students in P301 courses.
2005–2016	Faculty advisor for the Taiwanese Student Association (TWSA) at IU, Bloomington.
2008	Designed competition and served as a judge in the Indiana State Science Olympiad.
2008	Physics demonstrations for the "Science Night" at Edgewood Primary School, Ellettsville.
2007	Math & physical science judge in the 9^{th} annual "Women in Science Research Day", Indiana University.
2007	"Graduate Women in Science" selection committee for the IU diversity-building graduate fellowships. This college-level committee reviews minority and women applicants for science fellowship, awarded to incoming graduate students.
2006	Grand awards judge in the Intel International Science and Engineering Fair (ISEF), Indianapolis.
2006	Student Mentor in the Research Experience for Undergraduates (REU) program, IUCF.

Publications:

1. "Search for the neutron decay n $\rightarrow$ X+ γ where X is a dark matter particle," Z. Tang, M. Blatnik, L. J. Broussard, J. H. Choi, S. M. Clayton, C. Cude-Woods, S. Currie, D. E. Fellers, E. M. Fries, P. Geltenbort, F. Gonzalez, K. P. Hickerson, T. M . Ito, C.-Y. Liu, S. W. T. MacDonald, M. Makela, C. L. Morris, C. M. O'Shaughnessy, R. W. Pattie Jr., B. Plaster, D. J. Salvat, A. Saunders, Z. Wang, A. R. Young, and B. A. Zeck, accepted by Phys. Rev. Lett, June 2018.

2. "Search for dark matter decay of the free neutron from the UCNA experiment: $n \rightarrow \chi + e + e^-$," X. Sun, E. Adamek, B. Allgeier, M. Blatnik, T. J. Bowles, L. J. Broussard, M. A.-P. Brown, R. Carr, S. Clayton, C. Cude-Woods, S. Currie, E. B. Dees, X. Ding, B. W. Filippone, A. Garca, P. Geltenbort, S. Hasan, K. P. Hickerson, J. Hoagland, R. Hong, G. E. Hogan, A. T. Holley, T. M. Ito, A. Knecht, C.-Y. Liu, J. Liu, M. Makela4, R. Mammei11, J. W. Martin, D. Melconian, M. P. Mendenhall, S. D. Moore, C. L. Morris, S. Nepal, N. Nouri, R. W. Pattie, Jr., A. Prez Galvn, D. G. Phillips, II, R. Picker, M. L. Pitt, B. Plaster, J. C. Ramsey, R.

Rios, D. J. Salvat, A. Saunders, W. Sondheim, S. Sjue, S. Slutsky, C. Swank, G. Swift, E. Tatar, R. B. Vogelaar, B. VornDick, Z. Wang, W. Wei, J. Wexler, T. Womack, C. Wrede, A. R. Young, and B. A. Zeck (UCNA Collaboration) Phys. Rev. C 97, 052501(R) Published 21 May 2018.

3. "A modern measurement of the neutron lifetime using an asymmetric magneto- gravitational trap and in-situ detection," R. W. Pattie Jr., N. B. Callahan, C. Cude-Woods, E. R. Adamek, L. J. Broussard, S. M. Clayton, S. A. Currie, E. B. Dees, X. Ding, E. M. Engel, D. E. Fellers, W. Fox, K. P. Hickerson, M. A. Hoffbauer, A. T. Holley, A. Komives, C.-Y. Liu, S. W. T. MacDonald, M. Makela, C. L. Morris, J. D. Ortiz, J. Ramsey, D. J. Salvat, A. Saunders, S. J. Seestrom, E. I. Sharapov, S. K. Sjue, Z. Tang, J. Vanderwerp, B. Vogelaar, P. L. Walstrom, Z. Wang, W. Wei, H. L. Weaver, J. W. Wexler, T. L. Womack, A. R. Young, B. A. Zeck, *Science*. 2018 May 11;360(6389):627-632.

4. "New result for the neutron β-asymmetry parameter A0 from UCNA," M. A.-P. Brown, E.B. Dees, E. Adamek, B. Allgeier, M. Blatnik, T.J. Bowles, L.J. Broussard, R. Carr, S. Clayton, C. Cude-Woods, S. Currie, X. Ding, B.W. Filippone, A. Garcia, P. Geltenbort, S. Hasan, K.P. Hickerson, J. Hoagland, R. Hong, G.E. Hogan, A.T. Holley, T.M. Ito, A. Knecht, C.-Y. Liu, J. Liu, M. Makela, J.W. Martin, D. Melconian, M.P. Mendenhall, S.D. Moore, C.L. Morris, S. Nepal, N. Nouri, R.W. Pattie, Jr., A. Perez-Galvan, D.G. Phillips II, R. Picker, M.L. Pitt, B. Plaster, J.C. Ramsey, R. Rios, D.J. Salvat, A. Saunders, W. Sondheim, S.J. Seestrom, S. Sjue, S. Slutsky, X. Sun, C. Swank, G. Swift, E. Tatar, R.B. Vogelaar, B. VornDick, Z. Wang, J. Wexler, T. Womack, C. Wrede, A.R. Young, B.A. Zeck, *Phys. Rev. C* 97, 035505 (2018).

5. "Performance of the upgraded ultracold neutron source at Los Alamos National Laboratory and its implication for a possible neutron electric dipole moment experiment," T. M. Ito, E. R. Adamek, N. B. Callahan, J. H. Choi, S. M. Clayton, C. Cude-Woods, S. Currie, X. Ding, D. E. Fellers, P. Geltenbort, S. K. Lamoreaux, C. Y. Liu, S. MacDonald, M. Makela, C. L. Morris, R. W. Pattie Jr., J. C. Ramsey, D. J. Salvat, A. Saunders, E. I. Sharapov, S. Sjue, A. P. Sprow, Z. Tang, H. L. Weaver, W. Wei, A. R. Young,, *Phys. Rev. C* 97, 012501(R)(2018).

6. "First direct constraints on Fierz interference in free neutron β decay," K. P. Hickerson, X. Sun, Y. Bagdasarova, D. Bravo-Berguno, L. J. Broussard, M. A.-P. Brown, R. Carr, S. Currie, X. Ding, B. W. Filippone, A. Garca, P. Geltenbort, J. Hoagland, A. T. Holley, R. Hong, T. M. Ito, A. Knecht, C.-Y. Liu, J. L. Liu, M. Makela, R. R. Mammei, J. W. Martin, D. Melconian, M. P. Mendenhall, S. D. Moore, C. L. Morris, R. W. Pattie, Jr., A. Pèrez Galván, R. Picker, M. L. Pitt, B. Plaster, J. C. Ramsey, R. Rios, A. Saunders, S. J. Seestrom, E. I. Sharapov, W. E. Sondheim, E. Tatar, R. B. Vogelaar, B. VornDick, C. Wrede, A. R. Young, B. A. Zeck, *Phys. Rev. C* 96, 042501(R) (2017).

7. "A new method for measuring the neutron lifetime using an in situ neutron detector," Christopher Morris, E. Adamek, Leah Broussard, N. Calahan, Steven Clayton, C. Cude-Wood, Scott Currie, Xinjian ding, Walt Fox, K. P. Hickerson, Mark Hoffbauer, A. T. Holley, A. Komives, Chen-Yu Liu, Mark Makela, R. W. Pattie Jr., John Ramsey, D. J. Salvat, A Saunders, Susan Seestrom, E. I. Sharapov, Sky Sjue, Zhaowen Tang, J. Vanderwerp, B. Vogelaar, Peter Walstrom, ZHEHUI WANG, Wanchun Wei, J. W. Wexler, T. L. Womack, Albert Young, and B. A. Zeck, *Review of Scientific Instruments* 88, 053508 (2017).

8. "Evaluation of commercial nickel-phosphorus coating for ultracold neutron guides using a pinhole bottling method," R.W. Pattie Jr, E.R. Adamek, T. Brenner, A. Brandt, L.J. Brous-

sard, N.B. Callahan, S.M. Clayton, C. Cude-Woods, S.A. Currie, P. Geltenbort, T.M. Ito, T. Lauer, C.Y. Liu, J. Majewski, M. Makela, Y. Masuda, C.L. Morris, J.C. Ramsey, D. Salvat, A. Saunders, J. Schroenegger, S. Seestrom, Z. Tang, W. Wei, Z. Wang, E. Watkins, A.R. Young, *Nucl. Instrum. Meth.* A872 (2017) 64-73.

9. "Detection system for neutron decay correlations in the {UCNB} and Nab experiments," L.J. Broussard *et al.* (UCNA Collaboration), *Nucl. Instrum. Meth. A* **849**, 83 (2017).

10. "Total cross sections for ultracold neutrons scattered from gases," S. J. Seestrom *et al.* (UCNτ Collaboration), *Phys. Rev. C* **95**, 015501 (2017).

11. "Neutron-Antineutron Oscillations: Theoretical Status and Experimental Prospects," D. G. Phillips II *et al.*, *Phys. Rept.* **612**, 1-45 (2016). arXiv:1410.1100 [hep-ex]

12. "Upscattering of Ultracold Neutrons from Gases," S. J. Seestrom *et al.* (UCNτ Collaboration), *Phys. Rev.* C **92**, 065501 (2015).

13. "A multilayer surface detector for ultracold neutrons," Z. Wang, C. L. Morris, N. B. Callahan et al., *Nucl. Instrum. Meth. A* **798**, 30 (2015).

14. "Search for exotic short-range interactions using paramagnetic insulators," P.-H. Chu, E. Weisman, C.-Y. Liu, and J. C. Long, *Phys. Rev. D* **91** 102006 (2015).

15. "New Experimental Limit on the Electric Dipole Moment of the Electron in a Paramagnetic Insulator," Y. J. Kim, C.-Y. Liu, S.K. Lamoreaux, G. Visser, B. Kunkler, A.V. Matlashov, T.G. Reddy, *Phys. Rev. D* **91** 102004 (2015).

16. "Determination of the Free Neutron Lifetime," J. D. Bowman *et al.*, arXiv:1410.5311 [nucl-ex], 2014 Nuclear Physics Long Range Plan position paper.

17. "Beta decay measurements with ultracold neutrons: A review of recent measurements and the research programat Los Alamos National Laboratory, A. R. Young, S. Clayton, B. W. Filippone, P. Geltenbort, T. M. Ito, C.-Y. Liu, M. Makela, C. L. Morris, B. Plaster, A. Saunders, S. J. Seestrom, and R. B. Vogelaar, *J. Phys. G: Nucl. Part. Phys.* 41, 114007 (2014).

18. "Storage of ultracold neutrons in the UCNτ magneto-gravitational trap," D. J. Salvat *et al.*, *Phys. Rev. C* **89**, 052501 (2014).

19. "Phase space evolution in neutron traps for measurements of the neutron beta-decay lifetime," C.-Y. Liu, D. Salvat, E. Adamek, Proceedings of "Next Generation Experiments to Measure the Neutron Lifetime," World Scientific Conference (2014), p.37–57.

20. "Measurements of ultracold neutron upscattering and absorption in polyethylene and vanadium," E. I. Sharapov *et al.*, *Phys. Rev. C* **88**, 037601 (2013).

21. "Toward a new polyethylene scattering law determined using inelastic neutron scattering," C. M. Lavelle, C.-Y. Liu, M. Stone, D. V. Baxter, A. Young, *Nucl. Instrum. Meth. A* **711**, 166 (2013).

22. "Investigating solid α-$^{15}N_2$ as a new source of ultra-cold neutrons," D. Salvat, E. Gutsmiedl, C.-Y. Liu, P. Geltenbort, A. Orecchini, S. Paul and H. Schober, *EPL* **103**, 12001 (2013).

23. "The Upscattering of Ultracold Neutrons from the polymer $[C_6H_{12}]_n$," E. I. Sharapov, C. L. Morris, M. Makela, A. Saunders, Evan R. Adamek, L. J. Broussard, C. B. Cude-Woods, Deion E Fellers, Peter Geltenbort, M. Hartl, S. I. Hasan, K. P. Hickerson, G. Hogan, A. T. Holley, C. M. Lavelle, Chen-Yu Liu, M. P. Mendenhall, J. Ortiz, R. W. Pattie Jr., J. Ramsey, D. J. Salvat, S. J. Seestrom, E. Shaw, Sky Sjue, W. E. Sondheim, B. VornDick, Z. Wang, T. L. Womack, A. R. Young, Bryan A. Zeck, D. G. Phillips, *Phys. Rev. C* **88**, 064605 (2013). arXiv: 1308.2710

24. "Performance of the Los Alamos National Laboratory spallation-driven solid-deuterium ultracold neutron source," A. Saunders *et al.*, *Rev. Sci. Instrum.* **84**, 013304 (2013).

25. "Precision Measurement of the neutron beta-decay Asymmetry," M. P. Mendenhall et al. (UCNA Collaboration), *Phys. Rev. C* **87**, 032501 (R) (2013).

26. "A Boron-Coated Ionization Chamber for Ultra-Cold Neutron Detection," D. J. Salvat, E. R. Adamek, C.-Y. Liu *et al.*, *Nucl. Instr. Meth. A* **691**, 109 (2012).

27. "A High-Field Adiabatic Fast Passage Ultracold Neutron Spin Flipper for the UCNA Experiment," A. Holley, L. J. Broussard, J. Davis, et. al, *Rev. Sci. Instrum.* **83**, 073505 (2012).

28. "Effect of an electric field on superfluid helium scintillation produced by alpha sources," T. M. Ito *et al.*, *Phys. Rev.* A **85**, 042718 (2012).

29. "A high dynamic range data acquisition system for a solid-state electron Electric Dipole Moment experiment," Y. J. Kim, B. Kunkler, C.-Y. Liu, and G. Visser, *Rev. Sci. Instrum.* **83**, 013502 (2012).

30. "Fundamental Physics at the Intensity Frontier," J. L. Hewett *et al.*, The Proceedings of the 2011 workshop on Fundamental Physics at the Intensity Frontier, arXiv:1205.2671 [hep-ex] (2012).

31. "Production of ultracold neutrons from cryogenic $^2H_2$, O_2 and C^2H_4 converters," F. Atchison *et al.*, *Eur. Phys. Lett.* **95**, 12001 (2011).

32. "Experimental search for the electron Electric Dipole Moment using solid state techniques," Y. J. Kim, C.-Y. Liu, S.K. Lamoreaux, G. Visser, B. Kunkler, T.G. Reddy, *J. Phys.: Conf. Ser.* **312**, 102009 (2011).

33. "Determination of the Axial-Vector Weak Coupling Constant with Ultracold Neutrons," (UCNA collaboration) J. Liu, *et. al.*, *Phys. Rev. Lett.* **105**, 181803 (2010).

34. "Ultracold-neutron Production in a Pulsed-neutron Beam," C. M. Lavelle, C-Y. Liu, W. Fox, G. Manus, P.M. McChesney, D.J. Salvat, Y. Shin, M. Makela, C. Morris, A. Saunders, A. Couture, A.R. Young, *Phys. Rev. C* **82**, 015502 (2010).

35. "Microscopic Model for the Neutron Dynamic Structure Factor of Solid Methane in Phase II," Y. Shin, W. M. Snow, C.-Y. Liu, C. M. Lavelle, and D. V.Baxter, *Nucl. Instr. Meth. A*, **620**, 382 (2010).

36. "First Measurement of the Neutron beta-asymmetry with Ultracold Neutrons," (UCNA collaboration) R. W. Pattie *et al.*, *Phys. Rev. Lett*, **102**, 012301 (2009).

37. "Erratum: Cold neutron energy dependent production of ultracold neutrons in solid deuterium [Phys. Rev. Lett. **99**, 262502 (2007)]," F. Atchison *et al.*, *Phys. Rev. Lett.*, **101**, 189902 (2008).

38. "Cold Neutron Energy Dependent Production of Ultracold Neutrons in Solid Deuterium, F. Atchison *et al.*, *Phys. Rev. Lett*, **99**, 262502 (2007).

39. "Dressed Spin of Helium-3," A. Esler, J.C. Peng, D. Chandler, D. Howell, S.K. Lamoreaux, C.Y. Liu, J.R. Torgerson, *Phys. Rev. C*, **76**, 051302 (R), (2007).

40. "Solid Oxygen as a Superthermal Ultra-cold Neutron Source," **C.-Y. Liu** and A. R. Young, submitted to *Phys. Rev. B*, 2006. Calculations were revised and the new manuscript is resubmitted to *Phys. Rev. B*, 2011.

41. "Temperature Dependent Neutron Scattering Cross Sections for Polyethylene," R. E. Hill and **C.-Y. Liu**, *Nucl. Instr. Meth. A* **538**, 686 (2005).

42. " A New Search for a Permanent Electric Dipole Moment of the Electron in a Solid State System," **C.-Y. Liu** and S. K. Lamoreaux,*Mod. Phys. Lett. A* **19**, 1235 (2004).

43. "A New Source of Ultracold Neutrons" **C.-Y. Liu**, Steve K. Lamoreaux, Thomas J. Bowles, and Christopher Morris, *Los Alamos Science–Celebrating 60 Years* (Los Alamos, NM, 2003) p. 202

44. "Demonstration of a Solid Deuterium Source of Ultracold Neutrons," UCN collaboration, A. Saunders, *et al.*, *Phys. Lett. B*, **593**, 55 (2003).

45. "An Apparatus to Control and Monitor the Para-D_2 Concentration in a Solid Deuterium, Superthermal Source of Ultra-cold Neutrons," **C.-Y. Liu** *et al.*, *Nucl. Instr. Meth. A* **508**, 257 (2003); arXiv:nucl-ex/0307008.

46. "Measurements of Ultra-cold Neutron Lifetimes in Solid Deuterium," (UCN collaboration), C. L. Morris *et al.*, *Phys. Rev. Lett.* **89**, 272501 (2002).

47. "A Measurement of the Neutron Beta-Asymmetry using Ultra-Cold Neutrons," (UCN collaboration) A. Young *et al.*, *Fundamental Physics with Pulsed Neutron Beams* (World Scientific, Singapore, 2000).

48. "Status of the New Los Alamos UCN Source," (UCN collaboration) K. Kirch *et al.*, *CAARI Conference Proceedings* (Denton, TX, 2000).

49. "Performance of the Prototype LANL Solid Deuterium Ultra-cold Neutron Source," (UCN collaboration) R. E. Hill *et al.*, *Nucl. Instr. Meth. A* **440**, 674 (2000).

50. "UCN Upscattering Rates in a Molecular Deuterium Crystal," **C.-Y. Liu**, A. R. Young, and S. K. Lamoreaux, *Phys. Rev. B* **62**, No 6, R3581(2000).

Invited Talks:

1. "A Modern Precision Neutron Lifetime Measurement using a Magneto-Gravitational Trap," Physics Colloquium, Jefferson Laboratory (Newport News, Feb. 7, 2018).

2. "Unresolved Problems in Neutron Decay," Physics Colloquium, Indiana University (Bloomington, IN, Jan. 10, 2018).

3. "A Modern Precision Neutron Lifetime Measurement using a Magneto-Gravitational Trap," Nuclear Physics Seminar, Argonne National Laboratory (Chicago, Dec. 18, 2017).

4. "Precision Neutron Lifetime Measurement using a Magneto-Gravitational Trap," invited talk, SouthEast Section American Physics Society (SESAPS) meeting Milledgeville, Georgia, Nov. 18, 2017.

5. "Unresolved Problems in Neutron Decay," Physics Colloquium, Caltech (Pasadena, CA, Nov. 16, 2017).

6. "Precision Neutron Lifetime Measurement using a Magneto-Gravitational Trap," invited talk, Institute of Nuclear Theory (INT) Workshop on Neutron-Antineutron Oscillations: Appearance, Disappearance, and Baryogenesis, October 23 - 27, 2017.

7. "Precision Neutron Lifetime Measurement using a Magneto-Gravitational Trap," Nuclear Physics Seminar, Nortre Dame University (Oct. 2, 2017).

8. "Precision Neutron Lifetime Measurement using a Magneto-Gravitational Trap," invited talk, EXA2017, ÖAW, Vienna, September 14, 2017.

9. "Searching for the Electric Dipole Moment of the Neutron: the Holy Grail of Precision Measurements," the lead plenary talk at the international SPIN conference, Urbana Champaign, IL, September 26–30, 2016.

10. "Physics of Neutron Beta-decay," invited talk at the Kavli Institute of Theoretical Physics (KITP) Nuclear Physics Conference on "Symmetry Tests in Nuclei and Atoms", Santa Barbara, CA, September 19–23, 2016.

11. "Contemporary Issues in Fundamental Neutron Physics: the Electric Dipole Moment and the Lifetime," invited talk in the Jefferson Laboratory Users meeting, Newport News, VA, June 20–22, 2016.

12. "UCNtau: A Precision Measurement of the Neutron Lifetime using a Magneto-Gravitational Trap," invited talk at International Workshop: Probing Fundamental Symmetries and Interactions with UCN, Mainz, Germany, April 10–15, 2016.

13. "UCNtau: A Precision Measurement of the Neutron Lifetime," Nuclear Physics Seminar, Yale University (New Haven, CT, Dec. 2, 2015).

14. "Precision Measurements on Neutron Lifetime: Much Ado about 1 second," Physics Colloquium, University of Tennessee (Knoxville, TN, Nov. 23, 2015).

15. "UCNtau: A Precision Measurement of the Neutron Lifetime," invited talk at the APS Division of Nuclear Physics meeting, Santa Fe, NM, Oct. 29, 2015.

16. "Overview of the Neutron Lifetime Experiments," invited talk at the INT Workshop–Intersections of BSM Phenomenoloty and QCD for New Physics Searches, Seattle, October 2, 2015.

17. "The Next Generation Bottle Experiment to Measure the Free Neutron Lifetime", Amherst Center for Fundamental Interactions (Sep 19-21, Amherst, MA, 2014).

18. "Neutron Trapping using a Magneto-Gravitational Trap", APS April Meeting (April 5-8, Savannah, Georgia, 2014).

19. "A New Technique for Measuring the Neutron Lifetime: a lot can happen over one second", Physics Colloquium, IUPUI (Indianapolis, Feb. 6, 2014).

20. "A New Technique for Measuring the Neutron Lifetime: a lot can happen over one second", Physics Colloquium, Indiana University (Bloomington, Jan. 22, 2014).

21. "The UCNτ Apparatus and Recent Results", DOE meeting with the program directors (Germantown, DC, Jan. 28, 2014).

22. "Neutron Lifetime: What's the deal?", Physics Colloquium, Argonne National Laboratory (Chicago, Nov. 1, 2013).

23. "Neutron Lifetime: What's the deal?", Nuclear Physics Seminar, Ohio University (Athens, Ohio, Oct 16, 2012).

24. "Ultracold Neutron Production using Cryogenic Solids", American Conference on Neutron Scattering (Washington DC, June 25, 2012).

25. "Cold and Ultracold Neutron Source Development", Project X workshop (Fermilab, June 18, 2012).

26. "Review of the Low Energy Precision Frontier parallel sessions", Plenary talk, CIPANP 2012 (St. Petersburg, Florida, June 1, 2012).

27. "Symmetries in Fundamental Physics", Shell Science Seminar, National Teachers Association (Indianapolis, March 2012).

28. "Ultracold Neutrons for Low-Energy Particle Physics Experiments", Konopinski Colloquium, Physics Department, Indiana University (Bloomington, September 7, 2011).

29. "Ultracold Neutrons: a laboratory for low-energy particle physics", Physics Seminar, Oak Ridge National Laboratory (Tennessee, March 10, 2011).

30. "Ultracold Neutrons: a laboratory for low-energy particle physics", XXXIV Symposium on Nuclear Physics, (Cocoyoc, Morelos, Mexico, Jan. 4-7, 2011).

31. "First Experimental Limit on the Electric Dipole Moment of the Electron using GGG Paramagnetic Insulator", Physics Division Seminar, Argonne National Laboratory (Chicago, December 20, 2010).

32. "UCN and SNS neutron EDM", Workshop on Precision Tests of the Standard Model: from Atomic Parity VIolation to Parity-Violating Lepton Scattering, European Center for Theoretical Studies in Nuclear Physics and Related Areas (Trento, Italy, Nov. 8-12, 2010).

33. "Ultracold Neutrons: producing ideal tools for low-energy particle physics experiments", UBC2010, 2^{nd} International Ulaanbaatar Conference on Nuclear Physics and Applications (Ulaanbaatar, Mongolia, July 26-30, 2010).

34. "Ultracold Neutrons: producing ideal tools for low-energy particle physics experiments", Physics Colloquium, TRIUMF (Vancouver, June 17, 2010).

35. "First Experimental Limit on the Electric Dipole Moment of the Electron using GGG Paramagnetic Insulator", International Workshop on Particle's EDM and Implications (Shanghai, China, June 14-16, 2010).

36. "Coherent Neutron Scattering and Its Implications to UCN Production", UCN2010 (Osaka, Japan, Apr. 8-9, 2010).

37. "New Approaches to Ultracold Neutron Production", Workshop on Research Opportunities with Ultracold Neutrons in the US (Santa Fe, NM, Nov 6-7, 2009).

38. "Investigation of New Approaches to Ultra-cold Neutron Production at IUCF", 3rd Joint Meeting of the APS Division of Nuclear Physics and the Physical Society of Japan (Waikoloa, Hawaii, Oct 13, 2009).

39. "Search for the Electric Dipole Moment of the Electron using Solid-state Techniques", The 6th Joint Meeting of Chinese Physicists Worldwide International Conference on Physics Education and Frontier Physics, OCPA6 (Lanzhou, China, August 3-7, 2009).

40. "Cold Neutron and Ultracold Neutron Sources", 2^{nd} Summer School on Fundamental Neutron Physics, NIST (Gaithersburg, VA, June 22-26, 2009).

41. "Searches for the Electric Dipole Moment of the Neutron and the Electron at sub-Kelvin Temperatures", The 4th International Symposium on Symmetries in Sub-atomic Physics, National Taiwan University (Taipei, June 2-5, 2009).

42. "Understanding Physics of Ultra-cold Neutron Production in Oxygen: a nuclear physicist's struggle to master inelastic magnetic scattering", Physics Colloquium, North Carolina State University (Raleigh, NC, April 27, 2009).

43. "Ultracold Neutrons: producting ideal tools for low-energy particle physics experiments", Physics Colloquium, University of Rhode Island (Kingston, RI, April 3, 2009).

44. "Experimental Results of Ultracold Neutron Production from Solid Oxygen", Nuclear Physics Seminar, IUCF (Bloomington, IN, December 5, 2008).

45. "Understanding Ultra-cold Neutron Production in Oxygen – A Nuclear Physicist's Struggle to Master Inelastic Magnetic Scattering" LANSCE Seminar (Los Alamos, NM October 1, 2008).

46. "Solid Oxygen as an Intense Ultracold Neutron Source", NP08, the 4th International Workshop on Nuclear and Particle Physics at J-PARC (Mito, Ibaraki, Japan, March 5-7, 2008).

47. "Hunting for Evidence of Time Reversal Symmetry Violation: A Search for the Electric Dipole Moment of the Electron," Nuclear physics seminar, MIT (Boston, Massachusetts, Feb 6, 2008).

48. "Hunting for Evidence of Time Reversal Symmetry Violation: A Search for the Electric Dipole Moment of the Electron," Physics Colloquium, Amherst College (Amherst, Massachusetts, November 1, 2007).

49. "An Overview of the Fundamental Neutron Physics," Keynote Speaker in the Fundamental Neutron Physics mini-Symposium, DNP07 (Newport News, Virginia, October 12 2007).

50. "Solid Oxygen based UCN source," Ultracold Neutron Workshop, TRIUMF (Canada, September 13 2007)

51. "Search for a Permanent Electric Dipole Moment of the Electron using a Paramagnetic Insulator," Gordon Research Conference, Salve Regina University, (Newport, Rhode Isand, July 18, 2007).

52. "Neutron Physics in a Contemporary Perspective, Subatomic Physics Seminar, Los Alamos National Laboratory (Los Alamos, New Mexico, May 10, 2007).

53. "Solid State EDM," EDM & CP Violation Workshop (Institute of Nuclear Theory, Seattle, Washington, March 2007).

54. "Is Time Reversal Symmetry Conserved? A Search for the Electric Dipole Moment of the Electron," Physics Colloquium, Ball State University (Muncie, Indiana, October 2006).

55. "Ultra Cold Neutrons," 18^{th} National Nuclear Physics Summer School (Bloomington, Indiana, July 2006).

56. "A Search for a Permanent Electric Dipole Moment of the Electron in a Solid State System," Kellog Nuclear Physics Seminar, Caltech (Pasadena, California, June 2006).

57. "Ultra-cold Neutron Source for Fundamental Physics" Medium Energy Physics Seminar, University of Illinois (Urbana Champaign, Illinois, April 2006).

58. "A Search for a Permanent Electric Dipole Moment of the Electron in a Solid State System," Nuclear Physics Seminar, University of Maryland (College Park, Maryland, November 2005).

59. "A Search for a Permanent Electric Dipole Moment of the Electron in a Solid State System," Colloquium, Illinois Institute of Technology (Chicago, Illinois, October 2005).

60. "A New Search for a Permanent Electric Dipole Moment of the Electron in a Solid Paramagnetic System," Plenary Talk, The 13th International Conference on Supersymmetry and Unification of Fundamental Interactions (Durham, United Kingdom, July 18-23 2005).

61. "Progress Report on a New Search for a Permanent Electric Dipole Moment of the Electron in a Solid System," Nuclear Physics seminar, Paul Scherrer Institut (Villigen, Switzerland, July 2005).

62. "A New Search for a Permanent Electric Dipole Moment of the Electron in a Solid State System," Medium Energy Physics Seminar, University of Illinois at Urbana-Champaign (Urbana, IL, April 2004).

63. "Experimental Particle Physics at Milli-Kelvin Temperatures – Ultra-cold Neutrons and the Electron Electric Dipole Moment," Nuclear physics seminar, Indiana university (Bloomington, IN, Feb. 2004).

64. "A Search for Electric Dipole Moment," Physics seminar at the National Center for Theoretical Sciences (Hsinchu, Taiwan, Nov. 2003).

65. "An Electric Dipole Moment Search to Test the CP Violation," 2003 International Symposium on Cosmology and Particle Astrophysics (The Center for Academic Excellence on Cosmology and Particle Astrophysics, Taipei, Taiwan, Nov. 2003).

66. "Superthermal Ultra-cold Neutron Sources: A Current Overview and Future Prospects," Physics/Theory colloquium (Los Alamos National Laboratory, Los Alamos, NM, Feb. 2003).

67. "A Solid Deuterium UCN Source at LANSCE," n$\bar{n}$ conference (Bloomington, IN, Sep. 2002).

68. "Solid Deuterium UCN Source," Atomic physics seminar at Kyoto University (Kyoto, Japan, May 2001).

69. "Superthermal Ultra-cold Neutron Sources: A Current Project and Future Possibilities," Nuclear seminar at the Indiana University (Bloomington, IN, Feb. 2001).

70. "Solid Deuterium UCN Source," UCN workshop (Los Alamos, NM, Sep. 2000).

Contributed Talks

1. "A Plan for a Ten-fold Improvement of the Neutron Electric Dipole Moment with the LANL UCN Source," DNP meeting (Vancouver, Oct. 13-16, 2016)

2. "Systematic Effects of Trapping UCN in the UCNτ Experiment," DNP meeting (Newport News, Oct. 23-26, 2013).

3. "Towards a 0.1 s Measurement of the Neutron Lifetime in a Magneto-Gravitational Trap," NSAC meeting (Chicago, August 10-11, 2012).

4. "Magnetic or Not? UCN Production in Solid Oxygen," 7^{th} International Workshop on Ultra Cold and Cold Neutron Physics and Sources (St. Petersburg, Russia, June 8-14, 2009).

5. "Progress Report on a search on electric dipole moment of electron in a solid state system," 5^{th} International Conference on Ultra Cold & Cold Neutrons – Physics & Source (Peterhof, Russia, July 13-18, 2005).

6. "Solid Oxygen as an Intense UltraCold Neutron Source," 5^{th} International Conference on Ultra Cold & Cold Neutrons – Physics & Source (Peterhof, Russia, July 13-18, 2005).

7. "Search for a Permanent Electric Dipole Moment (EDM) of the Electron using a Paramagnetic Crystal," Symposium 2003 (Los Alamos, NM, Aug. 2003).

8. "Solid Oxygen as a Source of Ultra-Cold Neutrons," The APS April Meeting (Albuquerque, NM, Apr. 2002).

9. "An Apparatus to Store, Polarize and Spin-Flip Ultra-Cold Neutrons," The APS April Meeting (Albuquerque, NM, Apr. 2002).

10. "Implementation of an Intense UCN Source Coupled to a Spallation Target at LANSCE," International Nuclear Physics Conference (Berkeley, CA, Aug. 2001).

11. "Physics of Superthermal Sources," The Third International UCN Workshop (Pushkin, Russia, June 2001).

12. "A Solid Ortho Deuterium Ultra-cold Neutron Source," The APS April Meeting (Washington, D.C., April 28-May 1, 2001).

13. "An Apparatus to Convert Para to Ortho Deuterium and Measure the Para Concentration," Division of Nuclear Physics Fall Meeting 2000 (Williamsburg, VA, Oct. 4-7, 2000).

14. "Anomalous Up-scattering of UCN by Para Impurities in a Deuterium Superthermal UCN Source at LANSCE," The APS April Meeting (Long Beach, CA, April 29-May 2, 2000).

15. "Overview of a Solid Deuterium Superthermal UCN Source at LANSCE," The Second International UCN Workshop (Pushkin, Russia, June 1999).

16. "A Solid Deuterium Superthermal Source of Ultra-Cold Neutrons Coupled to Spallation Targets at LANSCE," Division of Nuclear Physics Fall Meeting 1998 (Santa Fe, NM, Oct. 1998).