Xuemei (May) Cheng, Ph.D.

(updated 01/07/2025)

Professor of Physics, Dean of Graduate Studies, and
Rachel C. Hale Professor in the Sciences and Mathematics
Bryn Mawr College
101 N Merion Ave.
Bryn Mawr, PA 19010-2899

Phone: (610) 526-5357
E-mail: xcheng@brynmawr.edu
Websites :
https://www.brynmawr.edu/XMCheng
https://scholar.google.com/citations?user=25WjUwIAAAAJ&hl=en

Education

Ph.D. in Physics, Johns Hopkins University 2006
Dissertation Supervisor: Prof. Chia-Ling Chien

"Magnetization reversal and magnetotransport properties of Co/Pt multilayers with perpendicular magnetic anisotropy"

M. A. in Physics,

NSF DMR-1708790 (2017-2022), $350,850 (PI)

“Collaborative Research: The effects of Dzyaloshinskii Moriya interactions on magnetization dynamics in layered thin films”

NSF STC, CMMI-1548571 (2016-2026), $478,098 (sub-awardee)

“Science and Technology Center for Engineering Mechano-Biology”

NSF MRI, DMR-1428500 (2014-2017), $412,106 (co-PI)

“

Elected Steering Committee Member, the Advanced Photon Source Users Organization, Argonne National Laboratory (2014-2017)

Co-organizer, 2018 AALAC Workshop "Digital fabrication and making at Liberal Arts Colleges", Wellesley College

Session Chair, APS March Meeting (2018, 2017, 2014), MMM (2016)

Session Chair, Joint MMM/Intermag (2024)

Panelist and Reviewer for NSF, DOE, and AAAS since 2011

Reviewer for journals: Physical Review Letters, Physical Review Applied, Applied Physics Letters, Scientific Reports, Journal of Applied Physics, Journal of Magnetism and Magnetic Materials, Applied Surface Science, Journal of Electroanalytical Chemistry, Journal of Physics and Chemistry of Solids

Reviewer for general user proposals for the Center for Nanoscale Materials of Argonne National Laboratory (2016-present)

Textbook Reviewer for Cambridge University Press

Co-organizer for "BRYN UP", a science education program with a mission of bringing science to young people through the BRYN UP YouTube channel, as well as class visits to local middle schools. (2020-current)

Organizer for an educational outreach exhibit for the Philadelphia “Science in the Park” with Bryn Mawr graduate and undergraduate students involved (Clark Park, April 2019)

Organizer for an educational outreach exhibit booth in the Philadelphia “Science Carnival” with Bryn Mawr undergraduate students involved (Penn’s Landing, April 2017)

Hannah M. Zlotznick, Adrew T. Clark, Robert L. Mauck, and Xuemei Cheng, (Patent #: US 12138366)

"Spin Memory Encryption"
Xuemei Cheng, Kristen Buchanan, and Xiao Wang

Advanced Materials, 34 (17), 2200117, (2022). https://doi.org/10.1002/adma.202200117

68. Andy T Clark #, Alexander Bennett, Emile Kraus, Katarzyna Pogoda, Andrejs C • E H U V 3 D X O - D Q P H \ . T Turner, Elise A Corbin, Xuemei Cheng
"Magnetic field tuning of mechanical properties of ultrasoft PDMS-based magnetorheological elastomers for biological applications"
Multifunct. Mater. 4, 035001, (2021). https://doi.org/10.1088/2399-7532/ac1b7e

67. Yang Wang, XiaoWang#, Andy T. Clark #, Hang Chen, Xuemei M. Cheng, John W. Freeland, and John Q. Xiao
"Probing exchange bias at the surface of a doped ferrimagnetic insulator"
Physics Review Materials, 5, 074409, (2021). https://doi.org/10.1103/PhysRevMaterials.5.074409

66. Kiet A. Tran, Emile Kraus, Andy T. Clark #, Alex Bennett, Katarzyna Pogoda, Xuemei Cheng, Andrejs C Hbers, Paul A. Janmey, and Peter A. Galie
"

58. Wanjun Jiang, Xichao Zhang, Guoqiang Yu, Wei Zhang, Xiao Wang[#], Matthias Jungfleisch, Xuemei Cheng, John Pearson, Olle Heinonen, Kang L. Wang, Yan Zhou, Axel Hoffmann, and Suzanne te Velthuis
"Direct Observation of the Skyrmion Hall Effect"
Nature Physics, 13, 162 (2017). https://doi.org/10.1038/NPHYS3883

57. Shi Cao, Kishan Sinha, Xin Zhang, Xiaozhe Zhang, Xiao Wang[#], Yuewei Yin, Alpha T. N'Diaye, Jian Wang, David J. Keavney, Tula R. Paudel, Yaohua Liu, Xuemei Cheng, Evgeny Y. Tsymbal, Peter A. Dowben, and Xiaoshan Xu
"Electronic structure and direct observation of ferrimagnetism in multiferroic hexagonal $YbFeO_3$"
Phys. Rev. B 95, 224428 (2017). https://doi.org/10.1103/PhysRevB.95.224428

56. Ty Newhouse-Illige, Yaohua Liu, Meng Xu, Danielle Reifsnyder Hickey, Anirban Kundu, Hamid Almasi, Chong Bi, Xiao Wang[#], John Freeland, David Keavney, Chenjun Sun, Yiheng Xu, Marcus Rosales, Xuemei Cheng, Shufeng Zhang, K. Andre Mkhoyan, and Weigang Wang
" Voltage controlled interlayer coupling in perpendicularly magnetized magnetic tunnel junctions "
Nature Communications, 8, 15232 (2017). https://doi.org/10.1038/ncomms15232

55. Kishan Sinha, Yubo Zhang, Xuanyuan Jiang, Hongwei Wang, Xiao Wang[#], Xiaozhe Zhang, Philip J. Ryan, Jong-Woo Kim, John Bowlan, Dmitry A Yarotski, Yuelin Li, Anthony D. DiChiara, Xuemei Cheng, Xifan Wu, Xiaoshan Xu
" Effects of biaxial strain on the improper multiferroicity in h-LuFeO3 films studied using the restrained thermal expansion method "
Phys. Rev. B, 95, 094110 (2017). https://doi.org/10.1103/PhysRevB.95.094110

54. L. Yu[#], Z. Y. Yan[#], H. C. Yang[#], X. Z. Chai[#], B. Q. Li[#], S. Moeendarbari, Y. W. Hao, D. Zhang, G. Feng, P. Han, D. A. Gilbert, Kai Liu, K. S. Buchanan, X. M. Cheng*
" Magnetization Reversal of Nickel Three-Dimensional Anti-sphere Arrays "
IEEE Magnetic Letters, 8, 1 (2017). https://doi.org/10.1109/LMAG.2016.2616325

53. Le Yu[#], Zhongying Yan[#], Zhonghou Cai, Dongtang Zhang, Ping Han, Xuemei Cheng*, and Yugang Sun*
" Quantitatively in Situ Imaging Silver Nanowire Hollowing Kinetics "
Nano Letters, 16(10), 6555 (2016). https://doi.org/10.1021/acs.nanolett.6b03218

52. Li Ma, Heng-An Zhou, Lei Wang, Xiao-Long Fan, Wei-Jia Fan, De-Sheng Xue, Ke Xia, Zhe Wang, Ru-Qian Wu, Guang-Yu Guo, Li Sun, Xiao Wang[#], Xue-Mei Cheng and Shi-Ming Zhou
" Spin Orbit Coupling Controlled Spin Pumping and Spin Hall Magnetoresistance Effects "
Advanced Electronic Materials, 2, 1 (2016). https://doi.org/10.1002/aelm.201600112

51. Xuanyuan Jiang, Haidong Lu, Yuewei Yin, Xiaozhe Zhang, Xiao Wang

"On the structural origin of the single-ion magnetic anisotropy in LuFeO

"Studies of nanomagnetism using synchrotron-based x-ray photoemission electron microscopy"
Reports on Progress in Physics, 75, 026501 (2012) (Invited Review Paper).https://doi.org/10.1088/0034-4885/75/2/026501

35. Wenbin Wang, Zheng Gai, Miaofang Chi, Jason D. Fowlkes, Jieyu Yi, Leyi Zhu, Xuemei Cheng, David J. Keavney, Paul C. Snijders, Thomas Z. Ward, Jian Shen, and Xiaoshan Xu
"Growth diagram and magnetic properties of hexagonal $LuFe_2O_4$ thin films"
Phys. Rev. B. 85, 155411 (2012). https://doi.org/10.1103/PhysRevB.85.155411

34. Ling Fei, Leyi Zhu, Xuemei Cheng*, Haiyan Wang, Stacy M. Baber, Joshua Hill, Qianglu Lin, Yun Xu, Shuguang Deng, Hongmei Luo*
"Structure and magnetotransport properties of epitaxial nanocomposite $La_{0.67}Ca_{0.33}MnO_3$:$SrTiO_3$ thin films grown by a chemical solution approach"
Appl. Phys. Lett. 100, 082403 (2012). https://doi.org/10.1063/1.3688048

33. X. M. Cheng, K. S. Buchanan, R. Divan, K.Y. Guslienko and D. J. Keavney
"Nonlinear vortex dynamics and transient domains in ferromagnetic disks "
Phys. Rev. B, 79, 172411 (2009). https://doi.org/10.1103/PhysRevB.79.172411

32. D. J. Keavney, X. M. Cheng*, and K. S. Buchanan
"Polarity reversal of a magnetic vortex core by a unipolar, nonresonant in-plane pulsed magnetic field"
Appl. Phys. Lett. 94, 172506 (2009). https://doi.org/10.1063/1.3111430

31. D. S. Gianola, C. Eberl, X. M. Cheng, and K. J. Hemker
"Stress-driven surface topography evolution in nanocrystalline Al thin films"
Advanced Materials, 20, 303 (2008). https://doi.org/10.1002/adma.200701607

30. Y. L. Iunin, Y. P. Kabanov, V. I. Nikitenko, X. M. Cheng, C. L. Chien, A. J. Shapiro, and R. D. Shull
"Magnetic field dependence of asymmetry in the magnetization reversal of ultrathin Co films and Co/Pt multilayers with perpendicular anisotropy "
Journal of magnetism and magnetic materials, 320, 2044 (2008).https://doi.org/10.1016/j.jmmm.2008.02.186

Journal of Applied Physics, 99, 08c905 (2006). https://doi.org/10.1063/1.2166608
23. L. Y. Zhu

Chinese Journal of Semiconductors, 21, 677 (2000). (Chinese)

10. Han Ping, X. M. Cheng, Masao Sakuraba, Young-Cheon Jeong, Takashi Matsurra and Junichi Murata
"The Effect of Si/Si1-yCy/Si Barriers on the Characteristics of $Si_{1-x}Ge_x$/Si Resonant Tunneling Structures"
Chinese Phys. Lett., 17 (11), 844-846 (2000). http://cpl.iphy.ac.cn/Y2000/V17/I11/0844

9. Z. Y. Lo, R. L. Jiang, Y.D. Zheng, L. Zang, Z. Z. Chen, S. M. Zhu, X. M. Cheng, X. B. Liu.
"Staircase band gap Si1-xGex/Si photodetectors"
Applied Physics Letters 77, 1548 (2000). https://doi.org/10.1063/1.1286958

8. R. L. Jiang, Z. Y. Lo, W. M. Chen, L. Zang, S. M. Zhu, X. B. Liu, X. M. Cheng, Z. Z. Chen, P. Chen, P. Han and Y. D. Zheng.
"Normal-incidence SiGe/Si photodetectors with different buffer layers"
Journal of Vacuum Science & Technology B18 (3), 1251 (2000). https://doi.org/10.1116/1.591370

7. R. L. Jiang, Z. Y. Lo, W. M. Chen, X. M. Cheng, and Y.D. Zheng
"Silicon-based $Ge_{0.85}Si_{0.15}$ heterostructure photodetectors"
Semiconductor Optoelectronics, 21(1), 27 (2000). (Chinese)

6. R. L .Jiang, Z. Y. Lo, X. M. Cheng, N. Jiang, L. Zang, and Y.D.Zheng
"$Si_{1-x}Ge_x$/Si near infrared detectors",
Journal of Optoelectronics-laser, 11(1), 17 (2000). (Chinese)

5. X.B. Liu, L. Zang, S.M. Zhu, X. M. Cheng, P. Han, Z.Y. Luo, Y.D. Zheng
"Influence of C on Ge incorporation in the growth of Ge-rich $Ge_{1-x-y}Si_xC_y$ alloys on Si (100)"
Applied Physics A 70 (4), 465 (2000). https://doi.org/10.1007/s003390051069

4. X. M. Cheng, Youdou Zheng, Xiabing Liu, Lan Zang, Zhiyun Lo, Shunming Zhu, Ping Han, and Ruolian Jiang
"Room temperature blue luminescence of thermally oxidized $Si_{1-x-y}Ge_xC_y$ thin films on Si (100) substrates"
Applied Physics Letters, 75, 3333 (1999). https://doi.org/10.1063/1.125342

12. "Imaging spin dynamics in magnetic nanostructures"
Physics Colloquium, Villanova University, November 30, 2012.

11. "Imaging spin dynamics in magnetic nanostructures"
Physics Colloquium, Nanjing Normal University, June 25, 2012, Nanjing, China.

10. "Imaging spin dynamics in magnetic nanostructures"
Physics Colloquium, Fudan University, June 21, 2012, Shanghai, China.

9. "Imaging spin dynamics in magnetic nanostructures"
Physics Colloquium, Shanghai Jiaotong University, June 19, 2012, Shanghai, China.

8. "Imaging spin dynamics in magnetic nanostructures"
Physics Colloquium, Nanjing University, June 11, 2012, Nanjing, China.

7. "Imaging spin dynamics in magnetic nanostructures"
Physics Colloquium, Central China Normal University, May 22, 2012, Wuhan, China.

6. "Imaging of spin dynamics in magnetic nanostructures"
Condensed Matter Physics seminar, August 11, 2011, Colorado State University.

5. "Time-resolved PEEM studies of nonlinear vortex dynamics"
X. M. Cheng* and D. J. Keavney, IEEE International Magnetics Conference, April 25-29, 2011, Taipei, Taiwan.

4. "Spin dynamics in magnetic nanostructures"
Mechanical Engineering Department seminar, September 30, 2010, Villanova University.

3. " Vortex dynamics in an equilater-1.3(i)-1u31(i)-1.7(cs i)-1.7(n)-3.7(an)-3.81.7(ex)-7(at)-1.6(er)-1.3(-1.3(i)-1u31(i)-1.7(i)-1

Huai, Austin Marga, Fei Yao, Ting Yu, Scott A Crooker, Xuemei Cheng, Renat Sabirianov, Junhao Lin, Yanglong Hou and Hao Zeng
"Cr_5Te_8/WSe_2 heterostructures by van der Waals epitaxy"
2022 American Physical Society March Meeting, Chicago, IL.

62. Corbyn D Mellinger, Xiao Wang, Richard Rosenberg, Xuemei Cheng, Xiaoshan Xu
"Interfacial Magnetization in Ultrathin NiCo2O4 Thin Films"
2022 American Physical Society March Meeting, Chicago, IL.

61. Ronald J. Warzoha, Adam A. Wilson, Brian F. Donovan, Andy Clark, Xuemei Cheng, Lu An, Ezra Lee, Xiaosong Liu, and Gang Feng
"Confined transducer geometries to enhance sensitivity to thermal boundary conductance in frequency-domain thermoreflectance measurements"
ASME 2021 International Technical Conference and Exhibition on Packaging and Integration of Electronic and Photonic Microsystems (InterPACK 2021), October 27 - 29, 2021, Virtual Conference, USA.

60. A.T. Clark*, X. Wang, A. Stuart, W. Jiang, S.G. te Velthuis, A. Hoffmann, K. Buchanan, and X. M. Cheng
"The Effects of Field History on Magnetic Skyrmion Formation in [Pt/Co/Ir]n Multilayers."
2021 IEEE International Magnetics Virtual Conference, April 26-30, 2021.

59. Corbyn Mellinger, Guanhua Hao, Xiao Wang, Xuemei Cheng, Rajesh Chopdekar, Amernan Pl(an7(al)-1.7(d)1.7(h17(or

Xuemei Cheng
"Magnetic vortex disks for magneto-mechanotransduction"
2019 American Physical Society March Meeting, Boston, Massachusetts.
50.

Keavney, and X. M. Cheng
"Magnetic exchange interaction between Fe3+ and R3+ ions in hexagonal RFeO3 (R = Ho, Yb) thin films "
2016 Joint MMM/InterMag, January, 2016, San Diego, California.

37. Xiao Wang*, Yaohua Liu, Zhuyun Xiao, Xiaoshan Xu, Wenbin Wang, Jian Shen, David Keavney, and X. M. Cheng
"Magnetic exchange interaction between Fe^{3+} and Ho^{3+} ions in hexagonal $HoFeO_3$ thin films "
2015 Advanced Photon Source Users Meeting, May, 2015, Argonne National Laboratory, IL. (Student Poster Winner)

36. Kishan Sinha , Xuanyuan Jiang , Xiao Wang , Anthony DiChiara , Xuemei Cheng , Yuelin Li , Xiaoshan Xu
"Time-resolved x-ray diffraction study of photoinduced strains in h-$LuFeO_3$ thin film"
2015 American Physical Society March Meeting 0 0.4( )-3..4(o)-33.7(S)-2(of)2A.8(g)-3t7(o)-3.7(n)-3.7(b)-.7(o)-3.7(n)-2.3( )-

Melikyan, and X. M. Cheng
" Time-resolved PEEM imaging of vortex dynamics in an equilateral triangular arrangement of three magnetic disks"
58th Annual Conference on Magnetism and Magnetic Materials (MMM) 13, Nov. 2013, Denver, CO.

25. E. Moon, B. Kirby, D. Keavney, P. Balachandran, R. Sichel-Tissot, C. Schlepütz, E. Karapetrova, X. M. Cheng, J. Rondinelli and S. May.
"The effects of interfacial octahedral coupling on magnetic properties in ultrathin manganite films"
58th Annual Conference on Magnetism and Magnetic Materials (MMM) 13, Nov. 2013, Denver, CO.

24. M.A. Asmat-Uceda, X.M. Cheng, X.Wang, D.J. Keavney, D.J. Clarke, O. Tchernyshyov and K.S. Buchanan.
"Micromagnetic simulations of the dynamics of three interacting magnetic vortices in a triangular arrangement"
58th Annual Conference on Magnetism and Magnetic Materials (MMM) 13, Nov. 2013, Denver, CO.

23. X. M. Cheng*, Y. Choi, C. M. Ortega, L. Sun, Y. M. Lu, J. W. Cai, and C. L. Chien
"X-ray Magnetic Circular Dichroism Study of Induced Pt Magnetic Moment in $Pt/Y_3Fe_5O_{12}$ Bilayers"
Gordon Research Conference on Spin Dynamics in Nanostructures, August 2013, Hong Kong.

22. Xiao Wang*, D. J. Keavney, D. J. Clarke, O. Tchernyshyov, M. Asmat, K. Buchanan, A. Melikyan, and X.M. Cheng
"Time-resolved PEEM imaging of vortex dynamics in an equilateral triangular arrangement of three magnetic disks"
Gordon Research Conference on Spin Dynamics in Nanostructures, August 2013, Hong Kong.

21. Bingqing Li*, Kathryn F. Murphy, Daniel S. Gianola, and X. M. Cheng
"Study of Thermal Conductivity of Si Nanowires with micro-Raman Spectroscopy"
American Physical Society March Meeting, 2013, Baltimore, MD.
(Outstanding Undergraduate Presentation Award)

20. Xilei Kuang, Zhuyun Xiao*, Eun Ju Moon, Steven May, David Keavney, Yaohua Liu, and X.M. Cheng
"X-ray Magnetic Circular Dichroism Study of La(1-x)SrxMnO3 Thin Films"
American Physical Society March Meeting, 2013, Baltimore, MD.

19. Zhuyun Xiao*, Xiao Wang, Yaohua Liu, Suzanne G.E. te Velthuis, Daniel Rosenmann, Ralu Divan, and X. M. Cheng
"Magnetization reversal of patterned disks with perpendicular magnetic anisotropy"
American Physical Society March Meeting, (poster), 2013, Baltimore, MD.

18. Jiabin Liu*, Han-Chang Yang, and Xuemei Cheng
"Magnetic Properties of Ordered Nanoporous Nickel Films"
American Physical Society March Meeting, 2012, Boston, MA.

17. Han-Cha

13. X. M. Cheng*, D. J. Keavney, and K. S. Buchanan
"Polarity reversal of a magnetic vortex core by an in-plane pulsed magnetic field "
International Conference on Magnetism and Magnetic Materials (MMM) 08, Nov. 2008, Austin, TX.

12. X. M. Cheng*

Xiao Wang, Ph.D. (2020-2022)
Eun Ju Moon, Ph.D. (2016-2017)

6. Shuoying (Elias) Yang (2014) " Temperature dependence of the Spin Hall Effect in perpendicularly magnetized magnetic materials "

5. Bingqing Li (2014) " Magnetic characterization of nickel three-dimensional antidot arrays "

4. Soraya Terrab (2013) " Development of a temperature-controlled system for nanomechanical tensile testing"

3. Han-Chang (Cathy) Yang (December 2011) "Fabrication and magnetic characterization of nanoporous nickel structures"

2. Stonyana Alexandrova (2010) "Atomic force microscopy of DNA repeats"

1. Meghan Mahoney (2010) "Spin dynamics of magnetic nanostructures"

Undergraduate Researchers Supervised

1. Meghan Mahoney ('10, 2009-2010)
2. Stonyana Alexandrova ('10, 2009-10)
3. Tonima Tasnim Ananna ('13, 2010-11)
4. Cathy Yang ('12, 2010-12)
5. Ying Pan (Fall 2010)
6. Holly Brunner ('12, Summer 2010)
7. Qian Wu ('13, 2010-11)
8. Jiabin Liu ('14:CalTech 3+2, 2010-12)
9. Ana Cordova ('12, Summer 2011)
10. Val Galstad ('12, Summer 2011-2012, NSF)
11. Elizabeth J. Wills (BMC alum, 2011- 13, NSF)
12. Soraya Terrab ('13, 2012-13)
13. Danqi Luo ('14, Spring 2013)
14. Bingqing Li ('14, 2012-14)
15. Shuoying Yang ('14, Summer 2013-14, NSF)
16. Xilei Kuang, ('14, Summer 2012, Fall 2012, NSF)
17. Zhuyun Xiao ('15, 2012-15)
18. Leqi Liu ('17, Summer 2014-2015, NSF)
19. Ji Yoon Ahn ('17, Summer 2014)
20. Yilun Tang ('17, Summer 2014-Fall 2014)
21. Alena Klindziuk ('17, Summer 2014-2017)
22. Tianyi Hu (Haverford '16, 2014-15)
23. Lindsey Marinello ('17, Spring 2015)
24. Brittney Beidelman ('17, Summer 2016-2017)
25. Cassie Wang ('18, 2015-2018)
26. Zhongying Yan ('18, Summer 2015-2018, NSF)
27. Raina Crawford ('18, Summer 2017-2018, NSF)
28. Baiyi Kong (Columbia 3+2, 2017-2018, NSF)
29. Xiran Xu ('19, Summer 2018, NSF)
30. Vidya Ramaswamy ('20, Summer 2018-2019)
31. Tong Dang ('20, Spring 2018-2020, NSF)
32. Adzo Fiagbenu, ('20, Summer 2019-20)
33. Lila Hernandez (Summer 2018-2019, NSF)
34. Ralitsa Mihaylova (Summer 2018-2019, NSF)
35. Zainab Batool (Summer 2018, NSF)
36. Georgia Nelson (2018-2020)
37. Mallory Yu (Summer 2020-2022, NSF)
38. Lily Li (Summer 2020)
39. Alex Toyryla (College of William & Mary, Summer 2020)
40. Halcyon Hu (Summer 2021-2022)
41. Yuqi Zhang (Summer 2022)
42. Thea Liang (Spring 2023-present)
43. Eva Carmona-Rogina (Spring 2023-present)
44. Xinrui Wang (Fall 2023-Spring 2024)
45. Yiling Hou (Spring 2024-present)
46. Jessica Johnson (Summer 2024)
47. Madeline A. Rehwinkel (Fall 2024-present)