

Dr. William Ratcliff II

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Education

2003 Rutgers University, New Brunswick, Ph.D. Physics, Thesis Advisor: Professor Sang W. Cheong

1997 University of Michigan, Ann Arbor, BSE in Engineering Physics

Research Interests

The primary focus of my research has been multiferroic materials. Recently, I have explored geometric ferroelectricity in the LuFeO₃ series of compounds in both bulk and thin film samples (see 18,20, and 21) culminating in work with collaborators in the development of superlattices with near room temperature magneto-electric effects. Our neutron scattering work was key in understanding the intrinsic magnetic ordering of the LuFeO₃ geometric ferroelectric which templates LuFe₂O₄ in the LuFeO₃-LuFe₂O₄ superlattice to dramatic effect. Currently, I am working on topological materials (see 2,3,4,5,16). Of particular interest is the interplay of magnetism with topological materials. For example in the MnBi₂Te₄ system, our measurements of the magnetic structure under applied magnetic fields has direct implications for the band structure. I am also interested in the use of AI to accelerate neutron scattering measurements and analysis.

Career/Experience

2019 - Present: Adjunct Associate Professor, Materials Science and Engineering, University of Maryland, College Park

2005-Present: Staff scientist at the NIST Center for Neutron Scattering

2003-2005: National Research Council Postdoc at the NIST Center for Neutron Research at NIST. Primary work concerned neutron scattering experiments on geometrically frustrated magnets and magnetoelectric systems. Also participated in x-ray experiments at Brookhaven and APS. Developed a GUI application for visualization of the resolution ellipsoid for inclusion in the DAVE project.

1997-2003: Worked with Sang W. Cheong in materials physics research including materials synthesis and characterization of novel magnetic systems.

Workshops Organized

2021 School on Representational Analysis and Magnetic Structure (RAMS), University of Maryland, College Park, Maryland

2018 ACNS Satellite School: 7th School on Representational Analysis and Magnetic Structure (RAMS), University of Maryland, College Park, Maryland

2018 Program Committee International Conference on Magnetism (ICM), San Francisco, CA

2017 Co-organizer of Fundamentals of Ferroelectrics Conference (FERRO), Williamsburg, WV

2015 5th School on Representational Analysis and Magnetic Structure (RAMS), University of Maryland, College Park, Maryland

2012 Workshop on Representational Analysis and Magnetic Structure Determination, BARC, Mumbai, India**

2011 The NIST/Georgetown 2nd School on Representational Analysis and Magnetic Structures Aug1-5, Georgetown, Washington, D.C.

2010 Program Committee MMM Meeting, Atlanta, GA

2007 The NIST Workshop on Representational Analysis of Complex Magnetic Structures, Gaithersburg, MD

Grants

APS Innovation Fund Data Science Education Community of Practice \$200,000 for two years (2021)

Selected Honors and Memberships

Member of American Physical Society

Fellow of American Physical Society

Associate Editor of Science Advances (2019-present)
Vice Chair APS Topical Group on Data Science (March 2020 - present)
NIST Bronze Medal (highest honorary recognition given by the institute) (2021)
Member APS committee to select APS Congressional Fellow (2020)
Member of APS Committee on Informing the Public (2021-2023)
Steering Committee APS-IDEA Program (2020-present)
Member APS March Meeting Task Force (2020)
Member of Organizing committee APS Topical Group on Data Science (2018)
Secretary APS Topical Group on Data Science (May 2019 - present)
Mentor NSF Ideas Lab (2019)
Reviewer: NSF, DOE, Swiss National Science Foundation (SNF), German Research Foundation (DFG), Cottrell Scholars, IUSSTF, Army Research Office
Elected Representative to SNS-HIFR User Group Executive Committee (2019-2021)
Chapter Leader DataKind DC (2018-present)
Elected Chair APS Committee on Minorities in Physics (2017-2018)
Member APS Committee on Minorities in Physics (2016-2018)
Elected ACA Neutron Scattering Special Interest Group Chair (2015-2016)
Elected GMAG Member at Large (2013-2016)
APS-IUSSTF U.S.-India Exchange Program (2012)
NIST Bronze Medal (highest honorary recognition given by the institute) (2012)
Minority in Research Science Trailblazer award (24th annual BEYA STEM) (2010)
NRC Postdoctoral Fellowship (2003-2005)
Member Sigma Xi
Member Neutron Scattering Society of America

Publications

H-index

40 see <https://scholar.google.com/citations?user=Xly2-LYAAAAJ&hl=en>

Citations

> 5000 see <https://scholar.google.com/citations?user=Xly2-LYAAAAJ&hl=en>

Book Chapter

Multiferroics, William Ratcliff and Jeffrey W. Lynn, Chapter 5 in Neutron Scattering - Magnetic and Quantum Phenomena, Felix Fernandez-Alonso and David L. Price, editors (Academic Press, London, 2015).

Publications

92. "Semi-supervised learning based classification of neutron diffraction data into space groups" Satvik Lolla, Haotong Ling, Ichiro Takeuchi, Aaron G. Kusne, William Ratcliff <https://arxiv.org/abs/2111.01287>
91. "Liberating a hidden antiferroelectric phase with interfacial electrostatic engineering" Julia A. Mundy, Colin A. Heikes, Bastien F. Grosso, Dan Ferenc Segedin, Zhe Wang, Yu-Tsen Shao, Cheng Dai, Berit H. Goodge, Quintin N. Meier, Christopher T. Nelson, Bhagwati Prasad, Fei Xue, Lena F. Kourkoutis, Long-Qing Chen, William D. Ratcliff, Nicola A. Spaldin, Ramamoorthy Ramesh, & Darrell G. Schlom (accepted Advances)
90. "On-the-fly Autonomous Control of Neutron Diffraction via Physics-Informed Bayesian Active Learning" Austin McDannald, Matthias Frontzek, Andrei Savici, Mathieu Doucet, Efrain Rodriguez, Kate Meuse, Jessica Opsahl-Ong, Daniel Samarov, Ichiro Takeuchi, William Ratcliff, Aaron G Kusne arXiv (submitted science Advances)
89. "Magnetic field-induced non-trivial electronic topology in FeGeTe₂" Juan Macy, Danilo Ratkovski, Purnima P Balakrishnan, Mara Strungaru, Yu-Che Chiu, Aikaterini Flessa, Alex Moon, Wenkai Zheng, Ashley Weiland, Gregory T McCandless, Julia Y Chan, Govind S Kumar, Michael Shatruk, Alexander J Grutter, Julie A Borchers, William D Ratcliff, Eun Sang Choi, Elton JG Santos, Luis Balicas arXiv preprint arXiv:2106.09861
88. "Synthesis and Characterization of Sr₂Co_{2-x}Fe_xO_{5+d} Perovskite Oxides" Sivasankara Rao Ede, Carlos Poasada, Jessa Guffie, William Ratcliff, Hui Wu, Shubo Han, and Zhiping Luo Microsc. Microanal. 27 (Suppl 1) (2021) doi:10.1017/S1431927621002919
87. "Magnetic ordering and structural distortion in a PrFeAsO single crystal studied by neutron and x-ray scattering" MG Kim, II W Ratcliff, DM Pajerowski, J-W Kim, J-Q Yan, JW Lynn, AI Goldman, A Kreyssig Phys. Rev. B 103, 174405 (2021)
86. "Intermediate Sr₂Co_{1.5}Fe_{0.5}O₆-delta Tetragonal Structure between Perovskite and Brownmillerite as a Model Catalyst with Layered Oxygen Deficiency for Enhanced Electrochemical Water Oxidation" Sivasankara Rao

Ede,Candyce Collins,Carlos Posada,Gibin George,Hui Wu,William D. Ratcliff, Yulin Lin,Jianguo Wen,Shubo Han, and Zhiping Luo ACS Catal. 2021 11, 4327 (<https://doi.org/10.1021/acscatal.1c00465>)

85. "Control of magnetoelectric coupling in the Co₂Y-type hexaferrites" Chang Bae Park, Kwang Woo Shin, Sae Hwan Chun, Jun Han Lee, Yoon Seok Oh, Steven M. Disseler, Colin A. Heikes, William D. Ratcliff, Woo-Suk Noh, Jae-Hoon Park, & Kee Hoon Kim Phys. Rev. Materials 5, 034412 (2021)
84. "Kitaev interactions in Co honeycomb antiferromagnets Na₃Co₂SbO₆ and Na₂Co₂TeO₆" M. Songvilay, J. Robert, J. A. Rodriguez-Rivera, W. D. Ratcliff, F. Damay, V. Baledent, M. Jimenez-Ruiz, P. Lejay, E. Pachoud, A. Hadj-Azzem, V. Simonet, and C. Stock Phys. Rev. B 102 224429 (2020)
83. "Evolution of the magnetic properties in simultaneously Cd and Ir-doped Ce₂RhIn₈ antiferromagnet" D. S. Christovam, G. S. Freitas, M. M. Piva, J. C. Souza, M. O. Malcolms, J. Leao, W. Ratcliff, J. W. Lynn, C. Adriano, P. G. Pagliuso Phys. Rev. B 102, 195137 (2020)
82. "Large exchange splitting in monolayer graphene magnetized by an anti-ferromagnet" Yingying Wu, Gen Yin, Lei Pan, Alexander J. Grutter, Quanjun Pan, Albert Lee, Eun Sang Choi,Mingliang Tian, Peng Deng, Qiming Shao, Shin-Hung Tsai,Qinglin He, Dustin A. Gilbert, Julie A. Borchers, William Ratcliff II, Ang Li, Xiao-dong Han, and Kang L. Wang Nature Electronics, <https://doi.org/10.1038/s41928-020-0458-0> (2020)
81. "Magnetic phase transitions and spin density distribution in the molecular multiferroic GaV₄S₈ system" Rebecca L. Dally, William D. Ratcliff II, Lunyong Zhang, Heung-Sik Kim, Markus Bleul, J.W. Kim, Kristjan Haule, David Vanderbilt, Sang-Wook CHeong, and Jeffrey W. Lynn Phys. Rev. B. 102, 014410 (2020)
80. "Termination switching of antiferromagnetic proximity effect in topological insulator" Chao-Yao Yang, Lei Pan, Alexander J. Grutter, Haiying Wang, Xiaoyu Che, Qing Lin, Yingying Wu, D. A. Gilbert, Padraig Shafer, Elke Arenholz, Hao Wu, Gen Yin, Peng Deng, J. A. Borchers, W. Ratcliff II, and Kang L. Wang Science Advances 6, eaaz8463, DOI: 10.1126/sciadv.aaz8463 (2020)
79. "Quantum oscillations from networked topological interfaces in a Weyl semimetal" I-Lin Liu, Colin Heikes, Taner Yildirim, Chris Eckberg, Tristin Metz, ShengRan, William Ratcliff II, Johnpierre Paglione, and Nicholas P. Butch Nature Quantum Materials, 5, Article number 62 (2020) <https://doi.org/10.1038/s41535-020-00264-8>
78. "Ferromagnetic van der Waals compound MnSb_{1.8}Bi_{0.2}Te₄" Yangyang Chen, Ya-Wen Chuang, Seng Huat Lee, Yanglin Zhu, Kevin Honz, Yingdong Guan, Yu Wang, Ke Wang, Zhiqiang Mao, Colin Heikes, P. Quarterman, Pawel Zajdel, Julie A. Borchers, William Ratcliff II, Jun Zhu Phys Rev. Matt. 4, 064411 (2020)

77. "Electronic and magnetic properties of stoichiometric CeAuBi₂" D. S. Christovam, G. S. Freitas, M. M. Piva1, J. C. Souza, M. O. Malcolms, J. Leao, W. Ratcliff, J. W. Lynn, C. Adriano, P. G. Pagliuso M. M. Piva, R. Tartaglia, G. S. Freitas, J. C. Souza, D. S. Christovam, S. M. Thomas, J. Leao, W. Ratcliff, J. W. Lynn, C. Lane, J.-X. Zhu, J. D. Thompson, P. F. S. Rosa, C. Adriano, E. Granado, and P. G. Pagliuso Phys. Rev B 101, 214431 (2020)
76. "Ferromagnetic van der Waals compound MnSb_{1.8}Bi_{0.2}Te₄" Yangyang Chen, Ya-Wen Chuang, Seng Huat Lee, Yanglin Zhu, Kevin Honz, Yingdong Guan, Yu Wang, Ke Wang, Zhiqiang Mao, Colin Heikes, P. Quarterman, Pawel Zajdel, Julie A. Borchers, William Ratcliff II, Jun Zhu arXiv:1910.13057
75. "Common acoustic phonon lifetimes in inorganic and hybrid lead halide perovskites" M Songvilay, N Giles-Donovan, M Bari, Z-G Ye, JL Minns, MA Green, Guangyong Xu, PM Gehring, K Schmalzl, WD Ratcliff, CM Brown, D Chernyshov, W van Beek, S Cochran, C Stock Physical Review Materials 3, 093602 (2019)
74. "Exchange Bias in Bulk alpha-Fe / gamma-Fe₇₀Mn₃₀ Nanocomposites for Permanent Magnet Applications" Ian J McDonald, Michelle Jamer, Kathryn L Krycka, Elaf Anber, Daniel Foley, Andrew Charles Lang, William Ratcliff, Don Heiman, Mitra L Taheri, Julie A Borchers, Laura H Lewis ACS Appl. Nano Mater., 2, 1940 (2019) DOI: 10.1021/acs.anm.8b02319
73. "Quantum oscillations from networked topological interfaces in a Weyl semimetal" I-Lin Liu, Colin Heikes, Taner Yildirim, Chris Eckberg, Tristin Metz, ShengRan, William Ratcliff II, Johnpierre Paglione, and Nicholas P. Butch arxiv.org/abs/1905.02277
72. "Large exchange splitting in monolayer graphene magnetized by an antiferromagnet" Yingying Wu, Gen Yin, Lei Pan, Alexander J. Grutter, Quanjun Pan, Albert Lee, Eun Sang Choi, Mingliang Tian, Peng Deng, Qiming Shao, Shin-Hung Tsai, Qinglin He, Dustin A. Gilbert, Julie A. Borchers, William Ratcliff II, Ang Li, Xiao-dong Han, and Kang L. Wang (submitted)
71. "Spin Scattering and Noncollinear Spin Structure-Induced Intrinsic Anomalous Hall effect in Antiferromagnetic Topological Insulator MnBi₂Te₄" Seng Huat Lee, Yanglin Zhu, Yu Wang, Leixin Miao, Hemian Yi, Timothy Pillsbury, Susan Kempinger, Jin Hu, Colin A. Heikes, Patrick A. Quarterman, William D. Ratcliff, Julie A. Borchers, H. Zhang, Xianglin Ke, David Graf, Nasim Alem, Cui-Zu Chang, Nitin Samarth, and Zhiqiang Mao Phys. Rev. Research 1, 012011(R) (2019)
70. "Probing Superexchange Interactions in Spin Ice Ho₂Ti₂O₇ Thin Films" Kevin Barry, Naween Anand, Biwen Zhang, Yan Xin, Arturas Vailionis, Colin Heikes, Haidong Zhou, Y. Qiu, William Ratcliff, Christianne Beekman Phys. Rev. Materials 3, 084412 (2019)
69. "Fe₂MnGe: A Hexagonal Heusler Analogue" S. Keshavarz, N. Naghibolashra, M.E. Jamer, K. Vinson, D. Mazumdar, C.L. Dennis, W. Ratcliff II, J.A. Borchers,

- A. Gupta, P. LeClair Journal of Alloys and Compounds, 771, 793 (2019)
68. "Spin Rotation induced by applied pressure in Cd-doped Ce₂RhIn₈ intermetallic compound" D. S. Christovam, C. Giles, L. Mendonca-Ferreira, J. Leao, W. Ratcliff, J. W. Lynn, S. Ramos, E. N. Hering, H. Hidaka, E. Baggio-Saitovich, Z. Fisk, P. G. Pagliuso1, C. Adriano Physical Review B 100, 165133 (2019)
67. "Mechanical control of crystal symmetry and superconductivity in Weyl semimetal MoTe₂" Colin Heikes, I-Lin Liu, Tristin Metz, Chris Eckberg, Paul Neves, Yan Wu, Linda Hung, Phil Piccoli, Huibo Cao, Juscelino Leao, Johnpierre Paglione, Taner Yildirim, Nicholas P. Butch, 1, William Ratcliff II Phys. Rev. Materials 2, 074202 (2018)
66. "reductus: a stateless Python data-reduction service with a browser front-end" Brian Maranville, William Ratcliff II, Paul Kienzle Journal of Applied Crystallography 51, 1500 (2018)
65. "Ordered Magnetism in the Decorated 3D Ising jeff = 1/2 alpha-CoV₃O₈" P. M. Sarte, A. M. Arevalo-Lopez, M. Songvilay,D. Le, T. Guidi, V. Garcia-Sakai, S. Mukhopadhyay, S. C. Capelli, W. D. Ratcliff, K. H. Hong, G. M. McNally , E. Pachoud , J. P. Attfield, and C. Stock Phys. Rev. B. 98, 224410 (2018)
64. "Lifetime-shortened acoustic phonons and static order at the Brillouin zone boundary in the organic-inorganic perovskite CH₃NH₃PbCl₃" M. Songvilay, C. Stock, Z.-G. Ye, Guangyong Xu, P. M. Gehring, W. D. Ratcliff, K. Schmalzl, F. Bourdarot, and B. Roessli Phys. Rev. Materials 2, 123601 (2018)
63. "A high-energy density antiferroelectric made by interfacial electrostatic engineering" Julia A Mundy, Colin A Heikes, Bastien F Gross, Dan Ferenc Segedin, Zhe Wang, Berit H Goodge, Quintin N Meier, Christopher T Nelson, Bhagwati Prasad, Lena F Kourkoutis, William D Ratcliff, Nicola A Spaldin, Ramamoorthy Ramesh, Darrell G Schlom arXiv:1812.09615
62. "Electric-field Induced Reversible Switching of the Magnetic Easy-axis in Co/BiFeO₃ on SrTiO₃" Tieren Gao, Xiaohang Zhang, William Ratcliff, Shingo Maruyama, Makoto Murakami, Anbusathaiah Varatharajan, Zahra Yamani, Peijie Chen, Ke Wang, Huairuo Zhang, Robert D Shull, Leonid A Bendersky, John Unguris, Ramamoorthy Ramesh, Ichiro Takeuchi, Nano Letters 17, 2825 (2017). doi: 10.1021/acs.nanolett.6b05152
61. "Successive field-induced transitions in BiFeO₃ around room temperature" Shiro Kawachi, Atsushi Miyake, Toshimitsu Ito, Sachith E Dissanayake, Masaaki Matsuda, II Ratcliff, Zhijun Xu, Yang Zhao, Shin Miyahara, Nobuo Furukawa, Masashi Tokunaga Phys. Rev. Materials 1, 024408 (2017)
60. "Structural and Magnetic Phase Transitions in Chromium Nitride Thin Films Grown by RF Nitrogen Plasma Molecular Beam Epitaxy" Khan Alam, Steven M Disseler, William D Ratcliff, Julie A Borchers, Rodrigo Ponce-Perez, Gregorio H Cocoletzi, Noboru Takeuchi, Andrew Foley, Andrea Richard, David C Ingram, Arthur R Smith Phys. Rev. B 96, 104433 (2017)

59. "Pressure tuning of collapse of helimagnetic structure in Au₂Mn" I-Lin Liu, Maria J. Pascale, Juscelino B. Leao, Craig M. Brown, William D. Ratcliff, Qingzhen Huang, and Nicholas P. Butch Phys. Rev. B 96, 184429 (2017)
58. "Tailoring Exchange Couplings in Magnetic Topological Insulator/Antiferromagnet Heterostructures" Qing Lin He, Xufeng Kou, Alexander J. Grutter, Gen Yin, Lei Pan, Xiaoyu Che, Yuxiang Liu, Tianxiao Nie, Bin Zhang, Steven M. Disseler, Brian J. Kirby, William Ratcliff II, Qiming Shao, Koichi Murata, Xiaodan Zhu, Guoqiang Yu, Yabin Fan, Mohammad Montazeri, Xiaodong Han, Julie A. Borchers & Kang L. Wang , Nature Materials 16, 94(2017). doi:10.1038/nmat4783
57. "Magnetic Structures and Dynamics of Multiferroic Systems Obtained with Neutron Scattering" W. D. Ratcliff, II, Jeffrey W. Lynn, Valery Kiryukhin, Prashant Jain, and Michael R. Fitzsimmons, Nature Partner Journals: Quantum Materials 1, 16003 (2016)
56. "Atomically engineered ferroic layers yield a room temperature magnetoelectric multiferroic" Julia A. Mundy, Charles M. Brooks, Megan E. Holtz, Jarrett A. Moyer, Hena Das, Alejandro F. Rbola, John T. Heron, James D. Clarkson, Steven M. Disseler, Zhiqi Liu, Alan Farhan, Rainer Held, Robert Hovden, Elliot Padgett, Qingyun Mao, Hanjong Paik, Rajiv Misra, Lena F. Kourkoutis, Elke Arenholz, Andreas Scholl, Julie A. Borchers, William D. Ratcliff, Ramamoorthy Ramesh, Craig J. Fennie, Peter Schiffer, David A. Muller, & Darrell G. Schlom , Nature 537, 523 (2016). doi: 10.1038/nature19343
55. "Bayesian method for the analysis of diffraction patterns using BLAND" JE Lesniewski, SM Disseler, DJ Quintana, PA Kienzle, WD Ratcliff, Journal of Applied Crystallography 49, 2201-2209 (2016)
54. "Magnetic Structure and Ordering of Multiferroic Hexagonal LuFeO₃" Steven M Disseler, Julie A Borchers, Charles M Brooks, Julia A Mundy, Jarrett A Moyer, Daniel A Hillsberry, Eric L Thies, Dmitri A Tenne, John Heron, Megan E Holtz, James D Clarkson, Gregory M Stiehl, Peter Schiffer, David A Muller, Darrell G Schlom, William D Ratcliff Physical Review Letters, 114, 217602 (2015)
53. "Multiferroicity in doped hexagonal LuFeO₃" Steven M. Disseler, Xuan Luo, Bin Gao, Yoon Seok Oh, Rongwei Hu, Yazhong Wang, Dylan Quintana, Alexander Zhang, Qingzhen Huang, June Lau, Rick Paul, Jeffrey W. Lynn, Sang-Wook Cheong, and William Ratcliff, II, Phys. Rev. B 92, 054435 (2015)
52. "One Dimensional(1D)-to-2D Crossover of Spin Correlations in the 3D Magnet ZnMn₂O₄" S. M. Disseler, Y. Chen, S. Yeo, G. Gasparovic, P. M. B. Piccoli, A. J. Schultz, Y. Qiu, Q. Huang, S-W. Cheong, and W. Ratcliff II, Scientific Reports, 5, 17771. <http://doi.org/10.1038/srep17771> (2015)
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48. "Electric-field-controlled antiferromagnetic domains in epitaxial BiFeO₃ thin films probed by neutron diffraction" W. Ratcliff II, Zahra Yamani, V. Anbusathaiah, T.R. Gao, P.A. Kienzle, H. Cao, I. Takeuchi, *Phys. Rev. B* 87, 140405 (2013)
47. "Double Focusing Thermal Triple-Axis Spectrometer at the NCNR" Lynn, J.W., Chen, Y., Chang, S., Zhao, Y., Chi, S., W. Ratcliff, II, Ueland, B.G., Erwin, R.W., *Journal of Research of the National Institute of Standards and Technology* 117, 61 (2012)
46. "Local Weak ferromagnetism in single-crystalline ferroelectric BiFeO₃", M. Ramazanoglu, M. Laver, W. Ratcliff II, S.M. Watson, W.C. Chen, A. Jackson, K. Kothapalli, Seongsu Lee, S.-W. Cheong, V. Kiryukhin *Phys. Rev. Lett.* 107, 207206 (2011)
45. "Antiferromagnetic order and superlattice structure in nonsuperconducting and superconducting Rb(y)Fe(1.6+x)Se₂ *Phys. Rev. B* 84, 094504 (2011)
44. "Giant Effect of Uniaxial Pressure on Magnetic Domain Populations in Multiferroic Bismuth Ferrite" M. Ramazanoglu, W. Ratcliff, H.T. Yi, A.A. Sirenko, SW Cheong, V. Kiryukhin, *Phys. Rev. Lett.* 107, 067203 (2011)
43. "Temperature-dependent properties of the magnetic order in single-crystal BiFeO₃" M. Ramazanoglu, W. Ratcliff II, Y.J. Choi, Seongsu Lee, S-W. Cheong, V. Kiryukhin, *Phys. Rev. B* 83, 174434 (2011)
42. "Giant Effect of Uniaxial Pressure on Magnetic Domain Populations in Multiferroic Bismuth Ferrite," Ramazanoglu, M., Ratcliff, II, W., Yi, H.T., Sirenko, A.A., Cheong, S.W., Kiryukhin, V., *Physical Review Letters* 107(6), 067203-1 (2011)
41. "Mechanism of exchange-striction of ferroelectricity in multiferroic orthorhombic HoMnO₃ single crystals" N. Lee, Y.J. Choi, M. Ramazanoglu, W. Ratcliff II, V. Kiryukhin, and S-W. Cheong, *Phys. Rev. B* 84, 020101 (2011)
40. "Neutron Diffraction Investigations of Magnetism in BiFeO₃ Epitaxial Films" William Ratcliff II, Daisuke Kan, Wangchun Chen, Shannon Watson, Songxue Chi, Ross Erwin, Garry J. McIntyre, Sylvia C. Capelli, Ichiro Takeuchi, *Advanced Functional Materials* 21, 1567 (2011)
39. "Antiferromagnetic Order and Superlattice Structure in Nonsuperconducting and Superconducting RbyFe1.6+xSe₂" Wang, M., Wang, M., Li, G.N., Huang, Q., Li, C.H., Tan, G.T., Zhang, C.L., Cao, H., Tian, W., Zhao, Y., Chen, Y.C.,

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30. "Spin-Lattice Order in Frustrated ZnCr₂O₄" S. Ji, SH Lee, C. Broholm, TY Koo, W. Ratcliff, SW Cheong, P. Zschack Phys. Rev. Lett 103, 037201 (2009)
29. "The Magnetic ground state of CaMn₂Sb₂" W. Ratcliff II, ALL Sharma, AM Gomes, JL Gonzalez, Q. Huang, J Singleton J Mag. Mag. Materials 321, 2612 (2009)
28. "Order by Static Disorder in the Ising Chain Magnet Ca₃Co_{2-x}MnxO₆" V. Kiryukhin, S. Lee, W. Ratcliff II, Q. Huang, HT Yi, YJ Choi, SW Cheong Phys Rev. Lett. 102, 187202 (2009)

27. "3:1 magnetization plateau and suppression of ferroelectric polarization in an Ising chain multiferroic" YJ Jo, S. Lee, ES Choi, HT Yi, W. Ratcliff II, YJ Choi, V. Kiryukhin, SW Cheong, L. Balicas Phys. Rev. B 79, 012407 (2009)
26. "Low energy spin waves and magnetic interactions in SrFe₂As₂" Jun Zhao, Dao Xin Yao, Shiliang Li, Tao Hong, Y. Chen, S. Chang, W. Ratcliff I I, J. W. Lynn, H. A. Mook, G. F. Chen, J. L. Luo, N. L. Wang, E. W. Carlson, Jiangping Hu, and Pengcheng Dai Phys. Rev. Lett 101, 167203 (2008)
25. "Spin and Lattice Structure of Single Crystal SrFe₂As₂" Jun Zhao, W. Ratcliff II, J-W. Lynn, G.F. Chen, J.L. Luo, N.L. Wang, Jiangping Hu, Pengcheng Dai Phys. Rev. B 78, 140504 (2008)
24. "Magnetic order close to superconductivity in the iron-based layered LaO_{1-x}F_xFeAs systems" C. dela Cruz, Q. Huang, JW Lynn, JY Li, W. Ratcliff, JL Zaretsky, HA Mook, GF Chen, JL Luo, NL Wang, PC Dai Nature 453, 899 (2008)
23. "Neel to Spin-Glass-Like Transition Versus Dilution in Geometrically Frustrated ZnCr₂-2xGa₂xO₄" S-H. Lee, W. Ratcliff, Q. Huang, T.H. Kim, S-W. Cheong PRB 77, 014405 (2008)
22. "Formation of pancakelike ising domains and giant magnetic coercivity in ferrimagnetic LuFe₂O₄" W. Wu, V. Kiryukhin, H.-J. Noh, K.-T. Ko, J.-H. Park, W. Ratcliff II, P. A. Sharma, N. Harrison, Y.J. Choi, Y. Horime, S. Lee, S. Park, H.T. Yi, C.L. Zhang, S-W. Cheong PRL 101, 137203 (2008)
21. "Electric field control of the magnetic state in BiFeO₃ single crystals" Seoungsu Lee, W. Ratcliff, SW Cheong, V. Kiryukhin APL 92, 192906 (2008)
20. "Single Ferroelectric and chiral magnetic domain of single-crystalline BiFeO₃ in an electric field" Seongsu Lee, Taekjib Choi, W. Ratcliff II, R. Erwin, S-W. Cheong, and V. Kiryukhin PRB RC 78, 100101 (2008)
19. "The pressure effect on the magnetic commensurability and ferroelectricity in multiferroic HoMn₂O₅" CR dela Cruz, B. Lorenz, W. Ratcliff, J. Lynn, MM Gospodinov, C.W. Chu Physica B 403, 1359 (2008)
18. "Observation of a continuous phase transition in a shape-memory alloy" J.C. Lahshley, S.M. Shapiro, B.L. Winn, C.P. Opeil, M.E. Manley, A. Alatas, W. Ratcliff, T. Park, R.A. Fisher, B. Mihaila, P. Riseborough, E. K. H. Salje, J.L. Smith Phys. Rev. Lett 101, 135703 (2008)
17. "Crystal distortions in geometrically frustrated ACr₂O₄ (A=Zn,Cd)", S.-H. Lee, G. Gasparovic, C. Broholm, M. Matsuda, J-H Chung, YJ Kim, H. Ueda, G. Xu, P Zschack, K. Kakurai, H. Takagi, W. Ratcliff, T-H. Kim, S-W Cheong Journal of Physics Condensed Matter 19, 145259 (2007)
16. "Evidence for strong spin-lattice coupling in multiferroic RMn₂O₅ (R=Tb, Dy, Ho) via thermal expansion anomalies", CR dela Cruz, F. Yen, B. Lorenz, S.

Park, SW Cheong, MM Gospodinov, W. Ratcliff, JW Lynn, CW Chu Journal of Applied Physics 99 08R2103 (2006)

15. "Structural Anomalies at the magnetic and ferroelectric transitions in RMn₂O₅ (R=Tb, Dy, Ho)", CR dela Cruz, F. Yen, B. Lorenz, MM Gospodinov, CW Chu, W. Ratcliff, JUW Lynn, S. Park, S-W Cheong Phys. Rev. B 73, 100406 (2006)
14. "Conformation of the HIV-1 Gag protein in solution", SAK Datta, JE Curtis, W.Ratcliff, PK Clark, RM Crist, J Lebowitz, S. Krueger, A. Rein Journal of Molecular Biology 365, 812 (2007)
13. "Structural anomalies at the magnetic and ferroelastic transitions in RMn₂O₅ (R=Tb, Dy, Ho)" C.R. dela Cruz, F. Yen, B. Lorenz, M.M. Gospodinov, C.W. Chu, W. Ratcliff, J.W. Lynn, S. Park, and S-W.Cheong. Phys. Rev. B 73, 100406 (2006)
12. "Pressure-dependent magnetic properties of geometrically frustrated ZnCr₂O₄" Y. Jo, JG Park, HC Kim, W. Ratcliff, S-W. Cheong, Phys. Rev. B. 72, 184421 (2005)
11. "Magnetic Phase Diagram of the Colossal Magneoelectric, DyMn₂O₅" W. Ratcliff II, V. Kiryukhin, M.A. Kenzelmann, S-H. Lee, J. Schefer, R. Erwin, N. Hur, S. Park, and S-W. Cheong. Phys Rev. B. (R) 72, 060407 (2005)
10. "Effects of spin-phonon coupling in the magnetic transition in strongly frustrated ZnCr₂O₄" A. B. Sushkov, H. D. Drew, O. Tchernyshyov, W. Ratcliff, S.W. Cheong, Phys. Rev. Lett. 94, 137202 (2005)
9. "Spin Singlet formation in MgTi₂O₄: evidence of a chiral dimerization pattern" M. Schmidt, W. Ratcliff II, P.G. Radaelli, K. Refson, N.M. Harrison, S.W. Cheong, Phys. Rev. Lett. 92, 056402 (2004)
8. "First-Order nature of the ferromagnetic phase transition in (La-Ca)MnO₃ near optimal doping." C.P. Adams, J.W. Lynn, V.N. Smolyaninova, A. Biswas, R.L. Green, W. Ratcliff II, S.-W. Cheong, Y.M. Mukovskii, D.A. Shulyatev, Phys. Rev. B. 70, 134414 (2004)
7. "Emergent excitations in a geometrically frustrated magnet" S.-H. Lee, C. Broholm, W. Ratcliff, G. Gasparovic, Q. Huang, T.H. Kim and S-W. Cheong. Nature 418, 856-858 (2002)
6. "Fluctuations and Freezing of Spin-Correlated Nanoclusters in a Geometrically Frustrated Magnet" W. Ratcliff II, S.-H. Lee, C. Broholm, S-W. Cheong, Q. Huang Physical Review B: Rapid Communications 65, 220406/1-220406/4 (2002)
5. "Magnetic properties of the frustrated antiferromagnetic spinel ZnCr₂O₄ and the spin glass Zn_{1-x}CdxCr₂O₄ (x=0.05,0.10)" H Martinho, NO Moreno, JA Sanjurjo, C Rettori, AJ Garcia-Adeva, DL Huber, SB Oseroff, W Ratcliff, SW Cheong, PG Pagliuso, JL Sarrao, GB Martins Phys. Rev. B. 64, 024408/1-024408/6 (2001).

4. "Studies of the three-dimensional frustrated antiferromagnetic ZnCr₂O₄" H Martinho, NO Moreno, JA Sanjurjo,C Rettori,AJ Garcia-Adeva, DL Huber,SB Oseroff,W Ratcliff,SW Cheong,PG Pagliuso,JL Sarrao,GB Martins Journal of Applied Physics 89, 7050-7052 (2001)
3. "Muon spin relaxation study of La_{1-x}CaxMnO₃" RH Heffner, JE Sonier, DE MacLaughlin, GJ Nieuwenhuys, GM Luke, YJ Uemura, W Ratcliff, SW Cheong, G Balakrishnan Phys. Rev. B. 63, 094408/1-094408/14 (2001)
2. "Local spin resonance and spin-Peierls-like phase transition in a geometrically frustrated antiferromagnet" SH Lee, C Broholm, TH Kim, W Ratcliff, SW Cheong Phys. Rev. Lett. 84, 3718-3721 (2000)
1. "Intergrain magnetoresistance via second-order tunneling in perovskite manganites" S Lee, HY Hwang, BI Shraiman, WD Ratcliff, SW Cheong Phys. Rev. Lett. 82, 4508-4511 (1999)

Selected Conference Talks/Posters

- Opening Plenary speaker, APS-IDEA workshop (2021)
 "ORNL Postdoc Career Panel", Invited, Oak Ridge National Laboratory (2021)
 "Investigations of the first intrinsic topological insulator: MnBi₂Te₄", Invited, University of Maryland, College Park (virtual) (2021)
 "Investigations of the first intrinsic topological insulator: MnBi₂Te₄", Invited, UC Santa Cruz (virtual) (2021)
 "Reinforcement Learning to optimize crystal structure determination" March Meeting of the American Physical Society, Nashville , TN (virtual) (2021)
 "Investigations of the first intrinsic topological insulator: MnBi₂Te₄", Invited, Fayetteville State University (virtual) (2020)
 "DPOLY Short course Machine Learning for Polymer Physicists: Neural Networks" March Meeting of the American Physical Society, Denver, CO (2020)
 "Red Cross Fire Risk" JSM 2020 Virtual Conference (2020)
 "Experimental Aspects of magnetic structure determinaton", Virtual Workshop on Magnetic Structures, Oak Ridge National Laboratory (virtual) (2020)
 "Neutron Investigations of the Multiferroic Skyrmion GaV₄S₈" March Meeting of the American Physical Society, Boston, MA (2019)
 "Neutron Investigations of the Multiferroic Skyrmion GaV₄S₈" Strongly Correlated Electronic Systems Conference, Okayama, Japan (2019)
 "Neutron Investigations of Thin Film Ho₂Ti₂O₇" March Meeting of the American Physical Society, Los Angeles, CA (2018)
 "Mechanical control of the band structure of MoTe₂" Telluride , Telluride, Colorado (2018)

- "Using neutron scattering to understand solid state materials" Corning Research, Sunnyvale, CA (2018) (invited)
- "Neutron Investigations of the Multiferroic Skyrmion GaV₄S₈" International Conference on Magnetism, San Francisco, CA (2018)
- "Multiferroic LuFeO₃: Adventures in Neutron Scattering" Howard University, Department of Chemistry (2018) (invited)
- "Effects of Electric Field on the magnetic structure of multiferroic (Sm,Bi)FeO₃ films" March Meeting of the American Physical Society, New Orleans, LA (2017)
- "Magnetic structures and dynamics of multiferroic systems obtained with neutron scattering", Mid-Atlantic Sectional Meeting, Newark, NJ (2017) (invited)
- "Multiferroic h-LuFeO₃--adventures in Neutron Scattering", Pittsburgh Diffraction Society, Indiana, PA (2017), (invited)
- "Neutron Investigations of thin film Ho₂Ti₂O₇", Quantum Materials Symposium 2017, Berlin, Germany (2017)
- "Bayesian Library for the Analysis of Neutron Diffraction Data" March Meeting of the American Physical Society, Baltimore, MD (2016)
- "Bayesian Library for the Analysis of Neutron Diffraction Data(BLAND)" American Conference on Neutron Scattering (2016)
- "Bayesian Library for the Analysis of Neutron Diffraction Data" American Crystallography Association, Denver (2016)
- "Atomically engineered ferroic layers yield a room temperature magnetoelectric multiferroic" Gordon Conference on Multiferroics, Lewiston, Maine (2016)
- "Atomically engineered ferroic layers yield a roomtemperature magnetoelectric multiferroic" Quantum Materials Synthesis Conference, New York Academies of Science, New York, New York (2016)
- Invited Lecturer Magnetic Structure Determination from Neutron Data, Florida State University, Tallahassee, FL(2016)
- "Neutron scattering investigations of bulk and thin film multiferroic LuFeO₃" International Conference on Magnetism, Barcelona, Spain (2015)
- "Neutron investigations of multiferroic LuFeO₃" American Crystallography Association, Philadelphia (2015)
- "The intrinsic magnetic structure and ordering of multiferroic h-LuFeO₃ Films" March Meeting of the American Physical Society, San Antonio, TX (2015)
- "Neutron Investigations of Multiferroic LuFeO₃" Gordon Research Conference, Biddeford, ME (2014)
- "Neutron diffraction investigations of BiFeO₃" Polarized Neutrons for Condensed Matter Investigations, U. Sydney, Sydney, Australia (2014) (invited)

- Invited Lecturer Magnetic Structure Determination from Neutron Data Oak Ridge National Lab, Knoxville, TN (2014)
- "Neutron Investigations of Multiferroic LuFeO₃ Thin Films" American Conference on Neutron Scattering, Knoxville, TN (2014)
- "Neutron Investigations of Multiferroic LuFe_{1-x}Mn_xO₃" March Meeting of the American Physical Society 2014 (Denver)
- "Neutron Investigations of Multiferroic LuFe_{1-x}Mn_xO₃" Magnetic North IV, Victoria, British Columbia, Canada (2014)
- "Evolution of the magnetic structure in (Sm,Bi)FeO₃ Thin Films" March Meeting of the American Physical Society 2013 (Baltimore)
- "Neutron Investigations of Multiferroic LuFeO₃" Magnetism and Magnetic Materials, Denver, Co (2013)
- "Neutron Diffraction Investigations of Electric-Field Control of Antiferromagnetic Domains in Epitaxial BiFeO₃ Thin Films" Fundamental Physics of Ferroelectrics and Related Materials, Ames, IA (2013)
- Invited Lecturer Magnetic Structure Determination from Neutron Data Oak Ridge National Lab, Oakridge, TN (2012)
- "Neutron Diffraction Investigations of Magnetism in BiFeO₃ Epitaxial Films" American Conference on Neutron Scattering 2012 (invited)
- "Investigation of Electric Field Control Antiferromagnetic Domains in Epitaxial BiFeO₃ Thin Films Using Neutron Diffraction" March Meeting of the American Physical Society 2012
- "Neutron Diffraction Investigations of Magnetism in BiFeO₃ Epitaxial Films" DAE Solid State Physics Symposium (2012) (invited), IIT Bombay
- "Neutron Diffraction Investigations of Magnetism in BiFeO₃ Epitaxial Films" MMM 2011, Desert Ridge, Arizona (invited)
- "Neutron diffraction investigations of the BiFeO₃ thin films" European Spallation Source, Lundt, Sweden 2011 (invited)
- "The Renaissance of Multiferroics" Missouri University Science Technology, Sep. 2011 (invited).
- "The Renaissance of Multiferroics" Howard University, April 2011 (invited).
- "The Magnetic Form factor of SrFe₂As₂" March Meeting of the American Physical Society 2011 (Dallas, Texas) (talk was presented by Pengcheng Dai due to budgetary constraints)
- "The Magnetic Form Factor in SrFe₂As₂" MMM 2010 (Atlanta, Georgia)
- "Neutron investigations of BiFeO₃ Films" March Meeeting of the American Physical Society 2010 (Portland, Oregon)

"Introduction to SPINAL (Spinwave Analyzer), A program for Calculating and Analyzing Spinwaves" American Conference on Neutron Scattering 2010 (Ottawa, Canada)

"BiFeO₃" Flipper, International Workshop on Single Crystal Diffraction with Polarized Neutrons, 2010 (Grenoble, France)

"BiFeO₃" Aspen Winter Conference on Fundamental Physics of Ferroelectrics, 2010 (Aspen, Colorado)

"Neutron Scattering Studies of the Fe-Based Superconductors" National Conference of Black Physicists, 2009 (Nahville) W. Ratcliff II, Jun Zhao, J.W. Lynn, G.F. Chen, J.L. Luo, N.L. Wang, Jiangping Hu, Pengcheng Dai (Invited Talk)

"Dimensional Crossover in ZnMn₂O₄" William Ratcliff , Ying Chen , Goran Gasparovic , Yiming Qiu , Qing Huang , Jeffrey Lynn , Sunmog Yeo , Sang Cheong , Paula Piccoli , Arthur Schultz. March Meeting of the American Physical Society 2008 (New Orleans, Louisiana).

Dimensional Crossover in ZnMn₂O₄ William Davis Ratcliff, Ying Chen, Yiming Qiu, S. Yeo, G. Gasparovic, Q. Huang, J. Lynn, Sang Cheong, Paula Piccoli, and Arthur Schultz ACNS 2008 (Santa Fe, New Mexico)

"BiFeO₃" PNCMI, 2008 (Mito, Japan). W. Ratcliff, Y.Chen, S. Yeo, G. Gasparovic, A. Schultz, P. Piccoli, Q. Huang, Y. Qiu, S-W. Cheong (Invited Talk)

"Elucidation on the effects of hydrostatic pressure on multiferroic, HoMn₂O₅", William Ratcliff, C.R. dela Cruz, B. Lorenz, Q. Huang, S. Park, S-W. Cheong. March Meeting of the American Physical Society 2007 (Denver).

"A New Magnet, ZnMn₂O₄" National Conference of Black Physicists, 2007 (Boston). (Invited Talk)

"The low dimensional magnet, ZnMn₂O₄" Contributed talk, March Meeting 2006 of the American Physical Society (APS), Baltimore, Maryland

"The Giant Magnetoelectric, DyMn₂O₅" Contributed talk, March Meeting 2005 of the American Physical Society (APS), Los Angeles, California

"The Giant Magnetoelectric, DyMn₂O₅" Contributed talk, American Conference on Neutron Scattering (ACNS), June 2004 College Park, Maryland

"The Magnetic Structure of ZnCr₂O₄" Contributed talk, March Meeting 2004 of the American Physical Society (APS), Montreal, Canada

"Frustration in Flatland Revisited" Poster, Boulder Summer School for Condensed Matter Physics, July 2003, Boulder Colorado

"Magnetism of Sr(Ti,Co)O₃" Poster, Gordon Research Conference on Strongly Correlated Electrons, June 2002, Maine.

"Magnetism of Sr(Ti,Co)O₃" Contributed talk, March Meeting 2002 of the American Physical Society (APS), Indianapolis, Indiana

"Site-vs-Bond disorder in the geometrically frustrated magnet, ZnCr₂O₄" Poster, SCES2001, August 2001, University of Michigan, Ann Arbor

"Site-vs-Bond disorder in the geometrically frustrated magnet, ZnCr₂O₄" Contributed talk, March Meeting 2001 of the APS, March 12-16, Seattle, Washington

"The geometrically frustrated magnet, ZnCr₂O₄" Poster, Gordon Research Conference Strongly Correlated Electrons, June 2000. New Hampshire.

Instruction Experience

- Conducted numerous summer schools at the NCNR
- Summer High School Intern Program (SHIP) mentor for high school students
- Summer Undergraduate Research Fellowship (SURF) mentor for undergraduate students
- Outreach through Adventures in Science
- Part time lecturer Physics 205 Employer Rutgers Inclusive Dates 6/1/2003-7/1/2003
- Curriculum development and teaching of 6th and 9th graders in 6th grade math and earth science at South Brunswick Upper Elementary School and 9th grade physical science at East Brunswick Churchill Middle School through the NSF GK-12 fellowship Inclusive dates 8/99-6/01
- Part time lecturer Physics 203 Employer Rutgers Inclusive Dates 6/1/99 - 7/1/99
- Part time lecturer Physics of Sound Employer Rutgers Inclusive Dates 1/1/99 - 6/1/99
- Part time lecturer, Physics 204 Employer Rutgers Inclusive Dates 1/1/99 - 6/1/99
- Part time lecturer Honors Modern Physics Employer Rutgers Inclusive Dates 9/1/98 - 1/1/99
- Part time lecturer Physics 204 Employer Rutgers Inclusive Dates 6/1/98-7/1/98
- Part time lecturer Physics 203 Employer Rutgers Inclusive Dates 7/1/98-8/1/98

Students and Postdocs

- Colin Heikes (now UMD)
- Kate Meuse (Cornell) 2021
- Jessica Opsahl-Ong (Rice University) 2021
- Joseph Rath 2019
- Abigail Wilson 2018
- Rohit Mandavia 2017
- Nathan Super 2016

- Joseph Lesniewski (graduate school Georgetown) 2014,2015
- Alex Yee 2013
- Dylan Quintana 2012
- Andrew Tracer 2011
- Joseph Redmon (now graduate school in CS at U. Washington) 2010
- Thomas Sarvey (now graduate school at Georgia Tech)
- William Flynn (now graduate school in Physics at Rutgers)
- Ed Schwartz (now staff at Carnegie Mellon)
- Man Kit Patrick Lee (intern from U. Maryland)
- Satvik Lolla(Poolesville High School) 2020,2021
- Kate Meuse(Montgomery Blair High School) 2019, 2020
- Jessica Opsahl-Ong (McClean High School) 2019,2020
- Ryan Cho (Montgomery Blair High School) 2018
- Telon Yan (Montgomery Blair High School) 2018
- Michael Yang (Thomas Jefferson High School) 2017
- Nayman Leung 2016
- Cynthia Liu (Montgomery Blair High School) 2015, 2016
- Alexander Zhang (Montgomery Blair) 2013, 2014
- Erica Peng (Thomas Wootton High School) 2013
- Esther Wang (Thomas Jefferson High School) 2012
- Priyanka Patel (Poolesville High School) 2012
- Elakian Kanakaraj (Northwest High School) 2011
- Ophir Lifshitz (Walter Johnson High School) 2010, 2011
- Alex Yee (Poolesville High School) 2010,2011
- George Curtis (high school intern)