William Ratcliff II

Physicist, NIST

NIST
100 Bureau Drive
Mailstop 6102
Bldg 235, Room E151
Gaithersburg, MD 20899
Date of Birth: 03/16/1976

Phone: 301-975-4316
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email: ylem@nist.gov

Education

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

University of Michigan
BSE in Engineering Physics May, 1997

Relevant Job Skills

Computer Languages: C, IDL, Matlab, Maple, Python
Familiarity with: C++, html, Mathematica, Fortran, Javascript, Django

Neutron Scattering
Expertise: Single crystal and powder diffraction for solution of magnetic and crystallographic structures, Inelastic Neutron Scattering (triple-axis)
Familiarity: Small Angle Neutron Scattering and Reflectivity

Research Experience

Fall05-Present Staff scientist at the NIST Center for Neutron Scattering at NIST.

Fall03-2005 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. Also developed a GUI application for visualization of the resolution ellipsoid for inclusion in the DAVE project at NIST.

Sum97-Fall 03 Worked with Sang W. Cheong in materials physics research including materials synthesis and characterization of novel magnetic systems.

Sum 95-97 Worked with Fred Adams & Patricia Knezek on the search for an Initial Mass Function. Work involved reduction of infrared

CCD data using the IRAF package. (University of Michigan)

Sum 94 Worked with Tony Tyson in the making of gravitational lensing simulations for use in scientific visualization. The project included the making of a video. (Bell Labs)

Wint /Spring 94 Worked with Herbert Winful in simulating the propagation of light through a fiber (untwisted). (University of Michigan)

(More detail available upon request)

Workshops Organized

Workshop on Representational Analysis and Magnetic Structure Determination Dec. (2012), BARC, Mumbai, India

The NIST/Georgetown 2nd School on Representational Analysis and Magnetic Structures Aug1-5 (2011) Georgetown, Washington, DC

The NIST Workshop on Representational Analysis of Complex Magnetic Structures July 23-26 (2007) Gaithersburg, MD

Program Committee 2010 MMM Meeting, Atlanta, GA

Publications

"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)

"Antiferromagnetic order and superlattice structure in nonsuperconducting and superconducting Rb(y)Fe(1.6+x)Se2, Phys. Rev. B 84, 094504 (2011).

"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).

"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)

"Mechanism of exchange-striction of ferroelectricity in multiferroic orthorhombic HoMnO3 single crystals"
N. Lee, Y.J. Choi, M. Ramazanoglu, W. Ratcliff II, V. Kiryukhkin, and S-W. Cheong, Phys. Rev. B 84, 020101 (2011)

"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)

"Nitrogen contamination in elastic neutron scattering"
Songxue Chi, Jeffrey W. Lynn, Ying Chen, William Ratcliff II, Benjamin G. Ueland, Nicholas P. Butch, Shanta R. Saha, Kevin Kirshenbaum, Johnpierre Paglione, Measurement Science and Technology 22, 047001 (2011)

"Incommensurate Magnetism in FeAs Strips: Neutron Scattering from CaFe4As3"
Yusuke Nambu, Liang L. hao, Emilia Morosan, Kyoo Kim, Gabriel Kotliar, Pawel Zajdel, Mark A. Green, William Ratcliff, Jose A. Rodrigueze-Ruvera, Collin Broholm, Phys. Rev. Lett 106, 037201 (2011).

"Interplay of Fe and Nd magnetism in NdFeAsO single crystals"
W. Tian, W. Ratcliff II, M. G. Kim, J.-Q. Yan, P.A. Kienzle, Q. Huang, B. Jensen, K.W. Dennis, R.W. McCallum, T.A. Lograsso, R.J. McQueeney, A.I. Goldman, J.W. Lynn, A. Kreyssig, Phys. Rev. B 82, 060514 (2010).

"Cd Doping Effects in the heavy-fermion compounds Ce2Min8 (M=Rh and Ir)"
C. Adriano, C. Giles, E.M. Bittar, L.N. Coelho, F. De Bergevin, C. Mazzoli, L. Paolasini, W. Ratcliff, R. Bindel, J.W. Lynn, Z. Fisk, P.G. Pagliuso, Phys. Rev. B 81, 245115 (2010).

"Magnetic from factor of SrFe2As2: Neutron diffraction measurements"
W. Ratcliff II, P.A. Kienzle, Jeffrey W. Lynn, Shiliang Li, Pengcheng Dai, G.F. Chen, N.L. Wang, Phys. Rev B. 81, 140502 (2010).

"Evolution of the bulk properties, structure, magnetic order, and superconductivity with Ni doping in CaFe(2-x)NixAs2"
N. Kumar, SX Chi, Y. Chen, KG Rana, AK Nigam, A. Thamizhavel, W. Ratcliff, SK Dar, JW Lynn
Phys. Rev. B 80, 144524 (2009).

"Crossover from incommensurate to commensurate magnetic orderings in CoCr2O4"
LJ Chang, DJ Huang, WH Li, SW Cheong, W. Ratcliff, JW Lynn
J. Phys. Cond. Matt. 21, 456008 (2009).

"Short Range Incommensurate magnetic order near the superconducting phase boundary in Fe(1+delta)Te(1-x)Sex"
J.S. Wen, GY Xu, ZJ Xu, ZW Lin, Q. Li, W. Ratcliff, G. Gu, JM Tranquada
Phys. Rev. B 80, 104506 (2009).

"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).

"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).

"Order by Static Disorder in the Ising Chain Magnet Ca3Co2-xMnxO6"
V. Kiryukhin, S. Lee, W. Ratcliff II, Q. Huang, HT Yi, YJ Choi, SW Cheong
Phys Rev. Lett. 102, 187202 (2009).

"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).

"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).

"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).

"Magnetic order close to superconductivity in the iron-based layered LaO1-xFxFeAs 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).

"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)

"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)

"Electric field control of the magnetic state in BiFeO3 single crystals"
Seoungsu Lee, W. Ratcliff, SW Cheong, V. Kiryukhin
APL 92, 192906 (2008)

“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)

“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)

“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)

“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).

“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.

“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.

“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.

"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).

“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).

“Magnetic Phase Diagram of the Colossal Magneoelectric, $DyMn_2O_5$”
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).

"Effects of spin-phonon coupling in the magnetic transition in strongly frustrated $ZnCr_2O_4$"
A. B. Sushkov, H. D. Drew, O. Tchernyshyov, W. Ratcliff, S.W. Cheong, Phys. Rev. Lett. 94, 137202 (2005).

"Spin Singlet formation in $MgTi_2O_4$: 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).

"First-Order nature of the ferromagnetic phase transition in (La-Ca)MnO_3 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).

"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).

"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).

"Magnetic properties of the frustrated antiferromagnetic spinel ZnCr2O4 and the spin glass Zn1-xCdxCr2O4 (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).

"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).

"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).

"Muon spin relaxation study of La1-xCaxMnO3"
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).

"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).

"Percolation and Clusters within $SrCo_xTi_{1-x}O_3$"
W. Ratcliff II, Y. Horibe, P.A. Sharma, S. Guha, S-W. Cheong
(in preparation)

"Dimensional Crossover in the Low Dimensional Magnetic, ZnMn2O4", W. Ratcliff, Y.Chen, S. Yeo, G. Gasparovic, A. Schultz, P. Piccoli, Q. Huang, Y. Qiu, S-W. Cheong
(in progress for PRL)

Conference Talks/Posters

"The Multiferroic Renaissance"
BARC, Mumbai, India, December 2012 (invited)

"Neutron Diffraction Investigations of Magnetism in BiFeO3 thin films"
DAE Solid State Physics Symposium, Indian Institute of Technology, Mumbai, December 2012 (invited)

Invited Lecturer Magnetic Structure Determination from Neutron Diffraction Data Oak Ridge National Lab, Oakridge, TN (2012)

"Neutron Diffraction Investigations of Magnetism in BiFeO3 thin films"
American Conference on Neutron Scattering 2012 (invited)

"Investigations of Electric Field Control of Antiferromagnetic Domains in Epitaxial BiFe3 Thin films Using Neutron Diffraction"
March Meeting of the American Physical Society 2012

"Neutron Diffraction Investigations of Magnetism in BiFeO3 thin films"
MMM 2011, Desert Ridge, Arizona (invited)

"Neutron Diffraction Investigations of Magnetism in BiFeO3 thin films"
ESS, 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, $DyMn_2O_5$"
Contributed talk, March Meeting 2005 of the American Physical Society (APS), Los Angeles, California

"The Giant Magnetoelectric, $DyMn_2O_5$"
Contributed talk, American Conference on Neutron Scattering (ACNS), June 2004 College Park, Maryland

"The Magnetic Structure of $ZnCr_2O_4$"
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 $Sr(Ti,Co)O_3$"
Poster, Gordon Research Conference on Strongly Correlated Electrons, June 2002, Maine.

"Magnetism of $Sr(Ti,Co)O_3$"
Contributed talk, March Meeting 2002 of the American Physical Society (APS), Indianapolis, Indiana

"Site-vs-Bond disorder in the geometrically frustrated magnet, $ZnCr_2O_4$"
Poster, SCES2001, August 2001, University of Michigan, Ann Arbor

"Site-vs-Bond disorder in the geometrically frustrated magnet, $ZnCr_2O_4$"
Contributed talk, March Meeting 2001 of the APS, March 12-16, Seattle, Washington

"The geometrically frustrated magnet, $ZnCr_2O_4$"
Poster, Gordon Research Conference Strongly Correlated Electrons, June 2000. New Hampshire.

Recent Scholarships, Professional memberships, awards, etc
NIST Bronze Medal (highest honorary recognition given by the institute, 2012)
APS-IUSSTF U.S.-India Exchange Program, 2012
Minority in Research Science Trailblazer award (24^{th} annual BEYA STEM, 2010)

NRC Postdoctoral Fellowship
NSF GK-12 Fellowship
GAANN Fellowship
Grants in Aid of Research Award (Sigma Xi)
Sigma Pi Sigma (Physics Honor Society)
Eta Kappa Nu (Electrical Engineering and Computer Engineering Honor Soc.)
Golden Key National Honor Society
Sigma Xi
American Physical Society

Instruction Experience

Part time lecturer Physics 205
Employer Rutgers
Inclusive Dates 6/1/2003-7/1/2003

Curriculum development and teaching of 6^{th} and 9^{th} graders
in 6^{th} grade math and earth science at South Brunswick Upper Elementary School and
9^{th} 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

References

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Dr. Seung-hun Lee
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Professor Valery Kiryukhin
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