

Brian Saam

Professor of Physics
Department of Physics & Astronomy

University of Utah
115 South 1400 East, Room 201
Salt Lake City, UT 84112-0830
phone: 801-585-5832
saam@physics.utah.edu
<http://www.physics.utah.edu/~saam>
<http://www.physics.utah.edu/~hpgas>

PERSONAL

Date of Birth: June 18, 1966
Place of Birth: Detroit, Michigan, USA
Citizenship: United States

EDUCATION

Princeton University, Princeton, NJ
Ph.D. in Physics 1995 (M.A. in Physics 1991)
Thesis: *Pulse-NMR Studies of Spin Relaxation Relevant to Laser-Polarized Noble Gases* (advisors: W. Happer & G.D. Cates)

University of Michigan, Ann Arbor, MI
B.S. in Physics (with Honors) and in German Studies 1989
Senior Thesis: *Measurement of the Cross Section $^{22}\text{Ne}(p,n)^{22}\text{Na}$* (advisors A. Rich and J.C. Van House)

Albert Ludwigs Universität Freiburg, Freiburg, Germany
Junior-Year Abroad Program 1986 – 1987

ACADEMIC POSITIONS

University of Utah, Salt Lake City, UT
1999 – present

- Full Professor, Dept. of Physics & Astronomy** 2009 – present
- Adjunct Associate Professor, Dept. of Bioengineering** 2006 – present
- Associate Dean, College of Science** 2008 – 2011
 - 4 departments; 150 regular faculty
 - Responsible for development, alumni relations, research administration
 - Shared responsibility for outreach programs
 - Administrative Manager of college staff
- Interim Chair, Dept. of Physics** 2007
- Associate Chair, Dept. of Physics** 2005 – 2008
 - Assist Chair with strategic planning
 - Responsible for departmental teaching assignments
 - Supervisor of administrative staff
- Associate Professor (tenured), Dept. of Physics** 2003 – 2009
- Assistant Professor, Dept. of Physics** 1999 – 2003
- Adjunct Assistant Professor, Dept. of Bioengineering** 1999 - 2006

Washington University, St. Louis, MO
1996 – 1999

- Research Asst. Professor, Dept. of Physics** 1998 – 1999
- Post-doctoral Research Asst., Dept. of Physics (M.S. Conradi)** 1996 – 1998

Princeton University, Princeton, NJ
1995 – 1996

- Post-doctoral Research Asst., Dept. of Physics (W. Happer)** 1996 – 1998

**GRANTS &
CONTRACTS**

U.S. National Science Foundation (MRSEC) 2011-2017

Next Generation Materials in Plasmonics and Organic Spintronics
\$18.5M (PIs: Virkar, Nahata, Saam)

U.S. National Science Foundation (AMO) 2009-2012

Hyperpolarized Xenon: Physics and Applications
\$252K (PI: Saam)

Chevron, Inc. 2007-2009

MRI of Oil Shale
\$252K (PI: Saam)

University of Queensland (Australia) 2010

Travel Award for International Collaborative Research
\$2K

University of Utah (University Research Committee) 2010

Magnetic Resonance Imaging with Hyperpolarized Noble Gases: A
Collaboration with the University of Queensland
\$6K

National Heart Lung and Blood Institute (NHLBI) 2004-2009

Bioengineering Research Partnership (BRP):
3-D Imaging and Computer Modeling of the Respiratory Tract
\$393K (Utah PIs: Saam and G. Laicher)

U.S. National Science Foundation (AMO-CAREER) 2002-2008

Physics and Applications of Hyperpolarized Gases
\$545K (PI: Saam)

University of Utah Research Foundation 2007-2009

Funding Incentive Seed Grant:
Study of Xe-Protein Interactions Using Hyperpolarized ^{129}Xe
\$30K (PI: Saam)

U.S. Dept. of Energy (via Pacific NW National Laboratory) 2005-2007

Construction of a ^{129}Xe NMR Polarizer
\$82K (PI: Saam)

U.S. Dept. of Energy (via Pacific NW National Laboratory) 2003-2004

Hyperpolarized ^3He Gas Generation, Storage and Delivery
\$27K (PI: Saam)

U.S. National Science Foundation (Maj. Res. Instrum.) 2002-2004

Acquisition of a Wide-Bore 600 MHz NMR Spectrometer
\$520K (PI: R.J. Pugmire)

University of Utah Research Foundation 2002-2003

Research Instrumentation Fund:
Upgrade of a Small-Animal NMR Facility
\$77K (PI: Saam)

University of Utah Research Foundation 2002-2003

Funding Incentive Seed Grant:

Flow Characterization in Respiratory Tract Phantoms Using Hyperpolarized ^3He MRI

\$33K (PI: Saam)

Amersham Health, LLC 2001-2003

Wall Magnetism in ^3He Spin-Exchange Cells: Causes and Implications for the Production of HP ^3He

\$60K (PI: Saam)

The Whitaker Foundation 1998-2001

MRI of Lung Ventilatory Function with Hyperpolarized ^3He

\$194K (PI: Saam)

U.S. PATENTS

Provisional: Non-cryogenic Storage Cell for Hyperpolarized ^{129}Xe
Co-inventor 2009

5,860,295: Cryogenic Accumulator for Spin-Polarized Xenon-129
Co-inventor 1999

5,642,625: High Volume Hyperpolarizer for Spin-Polarized Noble Gas
Co-inventor 1997

5,545,396: MRI Using Hyperpolarized Noble Gases
Co-inventor 1996

PROFESSIONAL ORGANIZATIONS

American Physical Society (DAMOP, DCP)

International Society for Magnetic Resonance in Medicine (ISMRM)

- Program Director, Hyperpolarized Noble Gas MR Study Group 2003 – 2005

American Association for the Advancement of Science

AWARDS & HONORS

University of Utah Distinguished Teaching Award 2009

College Board Advanced Placement “Best Practices” for instruction of Introductory Calculus-based Physics 2006

Thomas Alva Edison patent Award, Research Council of New Jersey 2000

US NSF/ERC Fellowship (Center for Emerging Cardiovascular Technologies) 1994 – 1995

US NSF Graduate Fellow 1989 – 1992

University of Michigan Williams Award (best senior thesis in physics) 1989

University of Michigan Slater Merit Scholar 1984 – 1987

Phi Beta Kappa 1988

Sigma Pi Sigma 1988

National Merit Scholarship 1984

**SYNERGISTIC
ACTIVITIES**

PI on Major Center-of-Excellence Grant (Utah MRSEC) 2011 - 2017

One of three responsible PIs (including director) for new center, which has \$18.5M in funding for 2011-2017. Twenty investigators spread across several departments and colleges. Director with administrative and oversight responsibilities of one of two major research thrusts (Interdisciplinary Research Groups) in Organic Spintronics.

Visit to Jazan University, Saudi Arabia 2012

Purpose of this trip was to explore possibilities of exchange and collaboration between Jazan University and the University of Utah, particularly in light of the new Utah MRSEC; gave both scientific and publicly oriented presentations.

Undergraduate Research Involvement 1999 – present

Thirteen undergraduates have worked in my laboratory. Four of these came from the ACCESS program run by our College of Science (This provides a \$3,500 stipend and placement in a science or engineering research laboratory during the second semester of the first year for first-year female science students.) Four undergraduates have appeared as co-authors on publications.

Undergraduate Teaching 1999 – present

Twelve years of teaching experience at the undergraduate level, six of these teaching large-lecture calculus-based introductory physics. Participation in national study on best practices for AP courses by the Center for Educational Policy Research: My courses were identified by a panel of national experts as best-practices courses, from among those analyzed in a wide range of institutions. The College Board then convened a commission in Physics to develop new AP course descriptions, new AP exam specifications, and professional development guidelines for AP teachers, utilizing the study's findings.

Lumina Foundation Study of the Tuning Process in Physics 2009 – 2013

Lead participant for the University of Utah on committee convened with representatives from physics departments of all state public institutions. The purpose is to investigate the role that the "Tuning Process," first introduced in Europe, might have in articulating degree programs and orienting curricula toward outcome- and competency-based assessments. The committee met once per month from April 2009 to January 2010 and produced a report for the Lumina Foundation for Education. The foundation is currently supporting the next phase of the study: implementation in the various departments.

Development Work as Associate Dean 2008 – 2011

Was responsible for overseeing development activities and institution of an alumni association for the college. This included private fund-raising for two new buildings for the college.

**INVITED
CONFERENCE
TALKS**

Hyperpolarized Solid ^{129}Xe as a Probe for Chaos in Quantum Many-Body Systems. Fifth International Conference on Xenon NMR in Materials (XeMAT 2012), Dublin, Ireland; *June 2012*

Noble-Gas Knight Shifts in the Presence of Optically Polarized Alkali-Metal Vapors, 57th New Mexico Regional NMR Meeting, Albuquerque, NM; *May 2011*

Universal Long-Time Behavior of Nuclear Spin Decays in Solid Hyperpolarized Xenon. 50th Experimental NMR Conference, Pacific Grove, CA; *March 2009*

Hyperpolarized Gases: From Atomic Physics to Seeing Lungs Breathe. Four Corners Section Meeting of the APS, Tempe, AZ; *October 2003*

Effects of high fields on T_1 of optical pumping cells. HELION 02: International Workshop on Polarized ^3He Beams and Gas Targets and their Applications, Oppenheim, Germany; *September 2002*

Using Hyperpolarized ^3He to Detect Surface Ferromagnetism. 44th Rocky Mountain Conference on Analytical Chemistry (NMR), Denver, CO; *July 2002*

^3He : Visualization of Lung Air Spaces and Beyond, ISMRM Workshop on Limits of Detection in NMR, Berkeley, CA; *June 2001*

Hyperpolarized Gases: From Atomic Physics to Seeing Lungs Breathe, American Association of Physics Teachers, Winter Meeting, San Diego, CA; *January 2001*

Imaging the Lung with Hyperpolarized Gases, 37th New Mexico Regional NMR Meeting, Albuquerque, NM; *November 2000*

The Technological Adolescence of Hyperpolarized Gas MRI: Current and Future Directions, Gordon Research Conference on *In Vivo* Magnetic Resonance, Andover, NH; *August 2000*

Hyperpolarized Gases: Hot Topics for Cold Spins, Gordon Research Conference on Magnetic Resonance, Henniker, NH; *July 1999*

Hyperpolarized ^3He as a Contrast Material for Rapid MRI of the Lung, International Symposium on Ultrafast Magnetic Resonance in Medicine, Kyoto, Japan; *January 1999*

**COLLOQUIA &
SEMINARS**

Hyperpolarized Noble Gases: MR Imaging and Beyond. Colloquium, Department of Physics, Pennsylvania State University, State College, PA; *March 2010*

NMR Frequency Shifts in Hyperpolarized ^{129}Xe : Applications to Spin-Exchange Physics and to Biology. Seminar, St. Louis NMR Discussion Group, Washington University, St. Louis, MO; *March 2010*

NMR of laser-polarized xenon: From xenon dimers to protein structure to quantum chaos. Colloquium, Arizona State University, Dept. of Physics, Tempe, AZ; *November 2008*

Laser Polarized ^{129}Xe : Some New Developments. Seminar, University of California, Berkeley, Department of Chemistry, Berkeley, CA; *February 2008*

Hyperpolarized Gases: From Atomic Physics to Imaging Lungs. Colloquium, Colorado School of Mines, Department of Physics, Golden, CO; *April 2007*

Hyperpolarized Gases: Atomic Physics, Molecular Chemistry, and Imaging Lungs. Colloquium, Montana State Univ. Dept. of Physics, Bozeman, MT; *October 2006*

Hyperpolarized Noble Gases: Recent Progress in Production and Applications. Colloquium, Triangle University Nuclear Lab., Durham, NC; *October 2005*

Hyperpolarized Gases: From Atomic Physics to Seeing Lungs Breathe. Colloquium, Utah Valley State College, Orem, UT; *March 2004*

Hyperpolarized Gases: From Atomic Physics to Seeing Lungs Breathe. Colloquium, Utah State University, Logan, UT; *January 2004*

Hyperpolarized Gases: From Atomic Physics to Seeing Lungs Breathe. Colloquium, Idaho State University, Pocatello, ID; *March 2003*

^3He Spin Relaxation Due to Magnetized Glass. Seminar, University of Wisconsin, Madison, WI; *October 2002*

Hyperpolarized Gases: From Atomic Physics to Seeing Lungs Breathe, Colloquium, Dept. of Physics, Hamilton College, Clinton, NY; *March 2001*

Hyperpolarized Gases: From Atomic Physics to Seeing Lungs Breathe, Colloquium, Dept. of Physics, Weber State University, Ogden, UT; *February 2001*

Hyperpolarized Gases: From Atomic Physics to Seeing Lungs Breathe, Colloquium, Dept. of Physics, Arizona State Univ., Tempe, AZ; *November 2000*

Hyperpolarized Gases: From Atomic Physics to Seeing Lungs Breathe, Colloquium, California State University, Fresno, CA; *October 2000*

Lung Imaging with Hyperpolarized Noble Gases: Diffusion Effects and Dynamic Ventilatory Function, Theoretical Biophysics Seminar, Beckman Institute, University of Illinois, Urbana, IL; *February 1998*

PUBLICATIONS

R. Glenn, M. E. Limes, B. Pankovich, B. Saam, M. E. Raikh, Magnetic resonance in slowly modulated longitudinal field: Modified shape of the Rabi oscillations, Phys. Rev. B (2013 in review).
<http://arxiv.org/abs/1212.5957>

R. Glenn, M.E. Limes, B. Saam, C. Boehme, and M.E. Raikh, Analytical study of spin-dependent transition rates within pairs of dipolar and strongly exchange coupled spins with ($S = 1/2$) during magnetic resonant excitation, Phys. Rev. B (2013 in review).
<http://arxiv.org/abs/1210.0948>

M.E. Limes, J. Wang, W.J. Baker, S.-Y. Lee, B. Saam, and C. Boehme, Numerical study of spin-dependent transition rates within pairs of dipolar and strongly

exchange coupled spins with ($S = 1/2$) during magnetic resonant excitation, Phys. Rev. B (2013 in review).

<http://arxiv.org/abs/1210.0950>

T.R. Gentile, M.E. Hayden, P.J. Nacher, A.K. Petukhov, B. Saam, and T.G. Walker, “Comment on ‘Enhanced polarization and mechanisms in optically pumped hyperpolarized ^3He in the presence of ^4He ’,” Phys. Rev. A (2013 in review).

B.V. Fine, T.A. Elsayed, E.G. Sorte, and B. Saam, “Asymptotic and intermediate long-time behavior of nuclear free induction decays in polycrystalline solids and powders,” Phys. Rev. B **86**, 054439 (2012).

<http://dx.doi.org/10.1103/PhysRevB.86.054439>

E.G. Sorte, B.V. Fine, and B. Saam, “Phase Relationship Between the Long-time Beats of Free-Induction Decays and Spin Echoes in Solids,” Phys. Rev. B **85**, 174425 (2012).

<http://dx.doi.org/10.1103/PhysRevB.85.174425>

B. Saam, A.K. Petukhov, J. Chastagnier, T.R. Gentile, R. Golub, and C.M. Swank, “Comment on ‘Pressure dependence of wall relaxation in polarized ^3He gaseous cells’,” Phys. Rev. A **85**, 047401 (2012).

<http://dx.doi.org/10.1103/PhysRevA.85.047401>

Z.L. Ma, E.G. Sorte, and B. Saam, “Collisional ^3He and ^{129}Xe frequency shifts in Rb–noble-gas mixtures,” Phys. Rev. Lett. **196**, 193005 (2011).

<http://dx.doi.org/10.1103/PhysRevLett.106.193005>

E.G. Sorte, B.V. Fine, and B. Saam, “Long-Time Behavior of Nuclear Spin Decays in Various Lattices,” Phys. Rev. B **83**, 064302 (2011).

<http://dx.doi.org/10.1103/PhysRevB.83.064302>

G. Schrank, Z. Ma, A. Schoeck, and B. Saam, “Characterization of a Low-Pressure, High-Capacity ^{129}Xe Flow-Through Polarizer,” Phys. Rev. A **80**, 063424 (2009).

<http://dx.doi.org/10.1103/PhysRevA.80.063424>

B.C. Anger, G. Schrank, A. Schoeck, K.A. Butler, M.S. Solum, B.N. Berry-Pusey, R.J. Pugmire, and B. Saam, Gas-phase spin relaxation of ^{129}Xe , Phys. Rev. A **78**, 043406 (2008).

<http://dx.doi.org/10.1103/PhysRevA.78.043406>

S.W. Morgan, B.V. Fine, and B. Saam, Universal long-time behavior of nuclear-spin decays in a solid, Phys. Rev. Lett., **101**, 067601 (2008).

<http://dx.doi.org/10.1103/PhysRevLett.101.067601>

C.F.M. Clewett, S.W. Morgan, B. Saam, and T. Pietrass, Optically Polarized ^{129}Xe NMR Investigation of Carbon Nanotubes, Phys. Rev. B **78**, 235402 (2008).

<http://dx.doi.org/10.1103/PhysRevB.78.235402>

B.N. Berry-Pusey, B.C. Anger, G. Laicher, and B. Saam, Nuclear spin relaxation of ^{129}Xe due to persistent xenon dimers, Phys. Rev. A **74**, 063408 (2006).

<http://dx.doi.org/10.1103/PhysRevA.74.063408>

M.S. Conradi, B.T. Saam, D.A. Yablonskiy, and J.C. Woods, Hyperpolarized ^3He and Perfluorocarbon Gas Diffusion MRI of Lungs, *Progress in Nuclear Magnetic Resonance Spectroscopy* **48**, 63-83 (2006).

<http://dx.doi.org/10.1016/j.pnmrs.2005.12.001>

T. Su, G.L. Samuelson, S.W. Morgan, G. Laicher, and B. Saam, Liquid T. L. Su, Hyperpolarized ^{129}Xe Produced by Phase Exchange in a Convection Cell, *Appl. Phys. Lett.* **85**, 2429-2431 (2004).

<http://dx.doi.org/10.1063/1.1793350>

R.E. Jacob, J. Teter, B. Saam, W.C. Chen, and T.R. Gentile, Low-field Orientation Dependence of ^3He Relaxation in Spin-Exchange Cells, *Phys. Rev. A* **69**, 021401(R) (2004).

<http://dx.doi.org/10.1103/PhysRevA.69.021401>

R.E. Jacob, B. Driehuys, and B. Saam, Fundamental mechanisms of ^3He relaxation on glass, *Chem. Phys. Lett.* **370**, 261-267 (2003).

[http://dx.doi.org/10.1016/S0009-2614\(03\)00110-6](http://dx.doi.org/10.1016/S0009-2614(03)00110-6)

R.E. Jacob, S.W. Morgan, and B. Saam, ^3He spin exchange cells for magnetic resonance imaging, *J. Appl. Phys.* **92**, 1588-1597 (2002).

<http://dx.doi.org/10.1063/1.1487438>

H.E. Möller, X.J. Chen, B. Saam, K.D. Hagspiel, G.A. Johnson, T.A. Altes, E.E. de Lange, and H.-U. Kauczor, Magnetic Resonance Imaging of the Lungs Using Hyperpolarized Noble Gases, *Magn. Reson. Med.*, **47**, 1029-1051 (2002).

<http://dx.doi.org/10.1002/mrm.10173>

R.E. Jacob, S.W. Morgan, B. Saam, and J.C. Leawoods, Wall Relaxation of ^3He in Spin-Exchange Cells, *Phys. Rev. Lett.* **87**, 143004 (2001).

<http://dx.doi.org/10.1103/PhysRevLett.87.143004>

J.C. Leawoods, D.A. Yablonskiy, B. Saam, D.S. Gierada, and M.S. Conradi, Hyperpolarized ^3He Gas MR Imaging, *Concepts Magn. Reson.* **13**, 277-293 (2001).

<http://dx.doi.org/10.1002/cmr.1014>

J.C. Leawoods, B. Saam, and M.S. Conradi, Polarization transfer using hyperpolarized, supercritical xenon, *Chem. Phys. Lett.* **327**, 359-364 (2000).

[http://dx.doi.org/10.1016/S0009-2614\(00\)00908-8](http://dx.doi.org/10.1016/S0009-2614(00)00908-8)

B. Saam, D.A. Yablonskiy, V.D. Kodibagkar, J.C. Leawoods, D.S. Gierada, J.D. Cooper, S.S. Lefrak, and M.S. Conradi, MR Imaging of Diffusion of ^3He Gas in Healthy and Diseased Lungs, *Magn. Reson. Med.* **44**, 174-179 (2000).

[http://dx.doi.org/10.1002/1522-2594\(200008\)44:2<174::AID-MRM2>3.0.CO;2-4](http://dx.doi.org/10.1002/1522-2594(200008)44:2<174::AID-MRM2>3.0.CO;2-4)

D.S. Gierada, B. Saam, D.A. Yablonskiy, J.D. Cooper, S.S. Lefrak, and M.S. Conradi, Dynamic Echo Planar MR Imaging of Lung Ventilation with Hyperpolarized ^3He in Normal Subjects and Patients with Severe Emphysema,

NMR in Biomed. **13**, 176-181 (2000).

[http://dx.doi.org/10.1002/1099-1492\(200006\)13:4<176::AID-NBM640>3.0.CO;2-I](http://dx.doi.org/10.1002/1099-1492(200006)13:4<176::AID-NBM640>3.0.CO;2-I)

B. Saam, D.A. Yablonskiy, D.S. Gierada, and M.S. Conradi, Rapid Imaging of Hyperpolarized Gas Using EPI, *Magn. Res. Med.* **42**, 507-514 (1999).

[http://dx.doi.org/10.1002/\(SICI\)1522-2594\(199909\)42:3<507::AID-MRM13>3.0.CO;2-U](http://dx.doi.org/10.1002/(SICI)1522-2594(199909)42:3<507::AID-MRM13>3.0.CO;2-U)

B. Saam and M.S. Conradi, Protection circuitry for high power diode laser arrays, *Rev. Sci. Instrum.* **69**, 2230-2232 (1998).

<http://dx.doi.org/10.1063/1.1148925>

B. Saam and M.S. Conradi, Low Frequency NMR Polarimeter for Hyperpolarized Gases, *J. Magn. Reson.* **134**, 67-71 (1998).

<http://dx.doi.org/10.1006/jmre.1998.1515>

G.A. Johnson, G.D. Cates, X.J. Chen, G.P. Cofer, B. Driehuys, W. Happer, L.W. Hedlund, B. Saam, M.D. Shattuck, J. Swartz, Dynamics of Magnetization in Hyperpolarized Gas MRI of the Lung, *Magn. Res. Med.* **38**, 66-71 (1997).

<http://dx.doi.org/10.1002/mrm.1910380111>

B.R. Patyal, J-H. Gao, R.F. Williams, J. Roby, B. Saam, B.A. Rockwell, R.J. Thomas, D.J. Stolarski, and P.T. Fox, Longitudinal Relaxation and Diffusion Measurements Using Magnetic Resonance Signals from Laser-Hyperpolarized ^{129}Xe Nuclei, *J. Magn. Res.* **126**, 58-65 (1997).

<http://dx.doi.org/10.1006/jmre.1997.1159>

J.P. Mugler, B. Driehuys, J.R. Brookeman, G.D. Cates, S.S. Berr, R.G. Bryant, T.M. Daniel, E.E. de Lange, J.H. Downs, C.J. Erickson, W. Happer, D.P. Hinton, N.F. Kassel, T. Maier, C.D. Phillips, B.T. Saam, K.L. Sauer, and M.E. Wagshul, MR Imaging and Spectroscopy Using Hyperpolarized ^{129}Xe Gas: Preliminary Human Results, *Magn. Res. Med.* **37**, 809-815 (1997).

<http://dx.doi.org/10.1002/mrm.1910370602>

B. Saam, N. Drukker, W. Happer, Edge enhancement observed with hyperpolarized ^3He , *Chem. Phys. Lett.* **263**, 481-487 (1996).

[http://dx.doi.org/10.1016/S0009-2614\(96\)01238-9](http://dx.doi.org/10.1016/S0009-2614(96)01238-9)

J.R. MacFall, H.C. Charles, R.D. Black, H. Middleton, J. Swartz, B. Saam, B. Driehuys, C. Erickson, W. Happer, G.D. Cates, G.A. Johnson, C.E. Ravin, Human Lung Air Spaces: Potential for MR Imaging with Hyperpolarized ^3He , *Radiology* **200**, 553-558 (1996).

B. Saam, Magnetic Resonance Imaging with Laser-Polarized Noble Gases, *Nature Med.* **2**, 358-359 (1996).

<http://dx.doi.org/10.1038/nm0396-358>

B. Saam, W. Happer, and H. Middleton, Nuclear relaxation of ^3He in the presence of O_2 , *Phys. Rev. A* **52**, 862-865 (1995).

<http://dx.doi.org/10.1103/PhysRevA.52.862>

H. Middleton, R.D. Black, B. Saam, G.D. Cates, G.P. Cofer, R. Guenther, W. Happer, L.W. Hedlund, G.A. Johnson, K. Juvan, J. Swartz, MR Imaging with Hyperpolarized ^3He Gas, *Magn. Res. Med.* **33**, 271-275 (1995).

<http://dx.doi.org/10.1002/mrm.1910330219>

M.S. Albert, G.D. Cates, B. Driehuys, W. Happer, B. Saam, C.S. Springer Jr, and A. Wishnia, Biological magnetic resonance imaging using laser-polarized ^{129}Xe , *Nature* **370**, 199-201 (1994).

<http://dx.doi.org/10.1038/370199a0>

A.S. Barton, N.R. Newbury, G.D. Cates, B. Driehuys, H. Middleton, and B. Saam, Self-calibrating measurement of polarization-dependent frequency shifts from $\text{Rb-}^3\text{He}$ collisions, *Phys. Rev. A* **49**, 2766-2770 (1994).

<http://dx.doi.org/10.1103/PhysRevA.49.2766>

B. Driehuys, G.D. Cates, W. Happer, H. Mabuchi, B. Saam, M.S. Albert, and A. Wishnia, Spin transfer between laser-polarized ^{129}Xe nuclei and surface protons, *Phys. Lett. A* **184**, 88-92 (1993).

[http://dx.doi.org/10.1016/0375-9601\(93\)90352-Z](http://dx.doi.org/10.1016/0375-9601(93)90352-Z)

N.R. Newbury, A.S. Barton, P. Bogorad, G.D. Cates, M. Gatzke, H. Mabuchi, and B. Saam, Polarization-dependent frequency shifts from $\text{Rb-}^3\text{He}$ collisions, *Phys. Rev. A* **48**, 558-568 (1993).

<http://dx.doi.org/10.1103/PhysRevA.48.558>

M.A. Gatzke, G.D. Cates, B. Driehuys, D. Fox, W. Happer, and B. Saam, Extraordinarily Slow Nuclear Spin Relaxation in Frozen Laser-Polarized ^{129}Xe , *Phys. Rev. Lett.* **70**, 690-693 (1993).

<http://dx.doi.org/10.1103/PhysRevLett.70.690>

G.D. Cates, R.J. Fitzgerald, A.S. Barton, P. Bogorad, M. Gatzke, N.R. Newbury, and B. Saam, $\text{Rb-}^{129}\text{Xe}$ spin-exchange rates due to binary and three-body collisions at high Xe pressures, *Phys. Rev. A* **45**, 4631-4639 (1992).

<http://dx.doi.org/10.1103/PhysRevA.45.4631>

N.R. Newbury, A.S. Barton, P. Bogorad, G.D. Cates, M. Gatzke, B. Saam, L. Han, R. Holmes, P.A. Souder, J. Xu, and D. Benton, Laser Polarized Muonic Helium, *Phys. Rev. Lett.* **67**, 3219-3222 (1991).

<http://dx.doi.org/10.1103/PhysRevLett.67.3219>

B. Saam, M. Skalsey, and J. Van House, Measurement of the cross section $^{22}\text{Ne}(p,n)^{22}\text{Na}$, *Phys. Rev. C* **40**, R1563-R1566 (1989).

<http://dx.doi.org/10.1103/PhysRevC.40.R1563>

**PROCEEDINGS &
ABSTRACTS**

Organic Semiconducting Polymers for Applications to Organic Spintronics,” Experimental NMR Conference (ENC), Pacific Grove, CA. *14-19 April 2013.*

M. E. Limes, R. Glenn, R. Pankovich, Z. Ma, M. E. Raikh, B. Saam Z.L. Ma, E.G. Sorte, and B. Saam, “Low-Frequency Modulation of the Longitudinal Field: Modified Rabi Envelopes,” Experimental NMR Conference (ENC), Pacific Grove, CA. *14-19 April 2013.*

E.G. Sorte, B.V. Fine, and B. Saam, “Solid State NMR Study of Microscopic Chaos in Dipolar-broadened Solids,” 54th Rocky Mtn. Conf. Analyt. Chem., Copper Mountain, CO, abstract 480 (poster); *July 2012.*

M.E. Limes, Z.L. Ma, and B. Saam, “Numerical Study of Spin-Dependent Electronic Transition Rates Between Two Dipolar and Exchange Coupled Paramagnetic ($S = 1/2$) States During Coherent Excitation by Magnetic Resonance,” 54th Rocky Mtn. Conf. Analyt. Chem., Copper Mountain, CO, abstract 220 (poster); *July 2012.*

M.E. Limes, Z.L. Ma, and B. Saam, “Longitudinal Relaxation of Solid ^{129}Xe ,” 54th Rocky Mtn. Conf. Analyt. Chem., Copper Mountain, CO, abstract 479 (poster); *July 2012.*

M.E. Limes, Z.L. Ma, E.G. Sorte, *et al.*, “Crystallite Morphology and Longitudinal Relaxation in Solid ^{129}Xe , contributed poster to the International Conference on Xenon NMR in Materials (XeMAT 2012), Dublin, Ireland; *June 2012*

Z.L. Ma and B. Saam, “Calibration of Knight shifts used to measure ^{129}Xe polarization in a low-pressure flow-through optical pumping cell,” Bull. Amer. Phys. Soc. **57**, No. 5, p. TBD (contributed poster; abstract D1-00046; DAMOP, Anaheim, CA); *June 2012*
<http://meetings.aps.org/Meeting/DAMOP12/Event/171341>

M. Limes, Z.L. Ma, and B. Saam, “Altered States of Solid Xenon,” Bull. Amer. Phys. Soc. **57**, No. 5, p. TBD (contributed poster; abstract Q1-00154; DAMOP, Anaheim, CA); *June 2012*
<http://meetings.aps.org/Meeting/DAMOP12/Event/172140>

E.G. Sorte, B.V. Fine, and B. Saam, “Evidence for Chaotic Behavior in Transverse Nuclear Spin Decays,” Experimental NMR Conference (ENC), Pacific Grove, CA. *10-15 April 2011*

Z.L. Ma, E.G. Sorte, and B. Saam, “Gas-phase Knight Shifts in Rb–noble-gas mixtures,” Experimental NMR Conference (ENC), Pacific Grove, CA. *10-15 April 2011*

E.G. Sorte, B.V. Fine, and B. Saam, “Universal Behavior of Nuclear Spin Decays.” 56th NMR-Squared Meeting (biannual western regional NMR conference), University of New Mexico, Albuquerque, NM; *November 2010*

Z.L. Ma, E.G. Sorte, and B. Saam, “Noble-gas Knight Shifts in Alkali-Metal Vapors.” 56th NMR-Squared Meeting (biannual western regional NMR

conference), University of New Mexico, Albuquerque, NM; *November 2010*

E.G. Sorte, B.V. Fine, and B. Saam, “Long-time Behavior of Nuclear Spin Decays on Various Lattices,” Bull. Amer. Phys. Soc. **55**, No. 9 (abstract D3.00004; Four Corners Section, Ogden, UT); *October 2010*

<http://meetings.aps.org/link/BAPS.2010.4CF.D3.4>

- Award winner for outstanding talk by a graduate student.

M. Limes and B. Saam, “Relaxation rates of low-field gas-phase ^{129}Xe storage cells,” Bull. Amer. Phys. Soc. **55**, No. 9 (abstract H6.00004; Four Corners Section, Ogden, UT); *October 2010*

<http://meetings.aps.org/link/BAPS.2010.4CF.H6.4>

E. Sorte and B. Saam, “Universal Long-time Relaxation Behavior of a Nuclear Spin Lattice,” Bull. Amer. Phys. Soc. **54**, No. 14 (abstract K5.00001; Four Corners Section, Golden, CO); *October 2009*

<http://meetings.aps.org/link/BAPS.2009.4CF.K5.1>

Z. Ma, G. Schrank, B. Saam, and D.P. Goldenberg, “Characterization of Manufactured Binding Sites in BPTI Using Laser Polarized ^{129}Xe ,” Bull. Amer. Phys. Soc. **54**, No. 14 (abstract C2.00006; Four Corners Section, Golden, CO); *October 2009*

<http://meetings.aps.org/link/BAPS.2009.4CF.C2.6>

G. Schrank, Z. Ma, and B. Saam, “Chemical Shift of Laser Polarized ^{129}Xe in BPTI Solution,” Tenth Intl. Conf. on Magnetic Resonance Microscopy (ICMRM), West Yellowstone, MT; *September 2009*

G. Schrank, Z. Ma, A. Schoeck, and B. Saam, “Characterizing a High Capacity ^{129}Xe Flow-Through Polarizer Using Both ^{129}Xe and ^{85}Rb Polarimetry,” Fourth International Conference on Xenon NMR in Materials (XeMat IV), Oulu, Finland; *June 2009*

B. Saam, G. Schrank, Z. Ma, A. Schoeck, “Characterization of a Low Pressure, High Capacity ^{129}Xe Flow-Through Polarizer,” Bull. Amer. Phys. Soc. **54**, No. 7, p. 15 (abstract B4-2; DAMOP, Charlottesville, VA); *May 2009*.

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B. Saam, S.W. Morgan, B.V. Fine, “Universal Long-Time Behavior of Nuclear Spin Decays in Solid Hyperpolarized Xenon,” Bull. Amer. Phys. Soc. **54**, No. 7, p. 17 (abstract B4-11; DAMOP, Charlottesville, VA); *May 2009*

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B.C Anger, M.S. Solum, R.J. Pugmire, and B. Saam, “Intrinsic Gas-Phase Spin Relaxation of ^{129}Xe ,” Bull. Amer. Phys. Soc. **53**, No. 7 (abstract R1-140; DAMOP, State College, PA); *May 2008*.

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B. Saam, B.N. Berry-Pusey, B.C. Anger, and G. Laicher, “Nuclear spin relaxation of ^{129}Xe due to persistent xenon dimers,” Bull. Amer. Phys. Soc. **52**, No. 1 (abstract N32.00005, March Meeting, Denver, CO); *March 2007*

<http://meetings.aps.org/link/BAPS.2007.MAR.N32.5>

B.C. Anger, R.E. Jacob, K.R. Minard, and B. Saam, “Rapid Production of Hyperpolarized ^3He Gas for MRI,” Bull. Amer. Phys. Soc. **52**, No. 1 (abstract

H19.00006, March Meeting, Denver, CO); *March 2007*
<http://meetings.aps.org/link/BAPS.2007.MAR.H19.6>

S.W. Morgan and B. Saam, "Eigenvalues of the time evolution operator governing nuclear spin behavior in solids," Bull. Amer. Phys. Soc. **52**, No. 1 (abstract S22.00004, March Meeting, Denver, CO): *March 2007*
<http://meetings.aps.org/link/BAPS.2007.MAR.S22.4>

S.W. Morgan and B. Saam, "Transverse Relaxation in Solid Xenon: Lowe Beats and Long-Time Behavior," Third International Conference on Xenon NMR in Materials (XeMat III), Ottawa, Canada; *June 2006*

B. Berry, G. Laicher, B.C. Anger, and B. Saam, "¹²⁹Xe-Xe molecular spin relaxation at high magnetic fields," Third International Conference on Xenon NMR in Materials (XeMat III), Ottawa, Canada; *June 2006*

B. Saam, R.E. Jacob, B.C. Anger, and K.R. Minard, "Rapid Production of Hyperpolarized ³He for MRI" in Proc. Int. Soc. Magn. Reson. Med., 14th Scientific Meeting, Seattle, WA, p. 1295; *May 2006*

B. Saam, T. Su, S.W. Morgan, G.L. Samuelson, and G. Laicher, "Production of Liquid Hyperpolarized Xenon by Phase Exchange", Bull. Amer. Phys. Soc. **49**, No. 3, p. 24 (abstract C4.9; DAMOP, Tucson, AZ); *May 2004*

S.W. Morgan, T. Su, G.L. Samuelson, G. Laicher, and B. Saam, "Liquid Hyperpolarized Xenon Production by Phase Exchange" in Proc. Int. Soc. Magn. Reson. Med., Twelfth Scientific Meeting, Kyoto, Japan, p. 1691; *June 2004*.

- Winner, first-place poster, "EM Fields, Coils, and Hardware" category.

J. Teter, R.E. Jacob, B. Saam, W.C. Chen, and T.R. Gentile, "Low-field orientation dependence of ³He relaxation in spin-exchange cells, Bull. Amer. Phys. Soc. **48**, No. 9 (abstract S5.003; Four Corners Section, Tempe, AZ); *October 2003*.

- Winner, outstanding presentation by a graduate student.

G.L. Samuelson, T. Su, and B. Saam, "Spin relaxation of gas- and solid-phase ¹²⁹Xe," Bull. Amer. Phys. Soc. **48**, No. 3, p. 70 (abstract G5.7; DAMOP, Boulder, CO); *May 2003*.

J. Teter, R.E. Jacob, B. Saam, W.C. Chen, and T.R. Gentile, "Cell-orientation dependence of ³He relaxation," Bull. Amer. Phys. Soc. **48**, No. 3, p. 106 (abstract J1-168; DAMOP, Boulder, CO); *May 2003*

R.E. Jacob, B. Saam and B. Driehuys, "Fundamental mechanisms of ³He relaxation on glass," Bull. Amer. Phys. Soc. **48**, No. 3, p. 106 (abstract J1-170; DAMOP, Boulder, CO); *May 2003*

R.E. Jacob and B. Saam, "Field dependence of ³He relaxation in Rb-coated glass," Bull. Amer. Phys. Soc. **48**, No. 3, p. 106 (abstract J1.169; DAMOP, Boulder, CO); *May 2003*

R.E. Jacob, B. Driehuys, and B. Saam, "Fundamental Mechanisms of ³He Relaxation on Glass," Bull. Amer. Phys. Soc. **47**, No. 9, (abstract no. BB.007; Four Corners Section, Salt Lake City, UT); *October 2002*

G. Samuelson, T. Su, and B.Saam, "Relaxation Mechanisms in Hyperpolarized Polycrystalline ^{129}Xe ," Bull. Amer. Phys. Soc. **47**, No. 9, (abstract no. BB.008; Four Corners Section, Salt Lake City, UT); *October 2002*

G.L. Samuelson, T. Su, and B. Saam, "Spin relaxation of gas- and solid-phase ^{129}Xe ," Bull. Amer. Phys. Soc. **47**, No. 3, p. 112 (abstract P6.86; DAMOP, Williamsburg, VA); *May 2002*.

R.E. Jacob, B. Saam, B.C. Anger, "Spin relaxation of gas- and solid-phase ^{129}Xe ," Bull. Amer. Phys. Soc. **47**, No. 3, p. 111 (abstract P6.85; DAMOP, Williamsburg, VA); *May 2002*.

B.C. Anger, R.E. Jacob, S.W. Morgan, and B.Saam, " T_1 Hysteresis in ^3He Spin Exchange Cells," Bull. Amer. Phys. Soc. **46**, No. 9, p. 24 (Four Corners Section, Albuquerque, NM); *November 2001*.

- Award for outstanding presentation by an undergraduate student.

R.E. Jacob, S.W. Morgan, J.C. Leawoods, and B.Saam, " ^3He Spin Relaxation Due to Magnetic Sites in Rb-Coated Vessels," Proc. 43rd Rocky Mtn. Conf. Analyt. Chem., Denver, CO, p. 109; *July 2001*.

R.E. Jacob, S.W. Morgan, J.C. Leawoods, and B.Saam, " ^3He Spin Relaxation Due to Ferromagnetism in Pyrex Surfaces," Bull. Amer. Phys. Soc. **46**, No. 3, p. 16 (abstract B2.9; DAMOP, London, Ontario, Canada); *May 2001*

D.S. Gierada, B. Saam, D.A. Yablonskiy, J.D. Cooper, S.S. Lefrak and M.S. Conradi, "Dynamic EPI of Human Lung Ventilation Using Hyperpolarized ^3He : Results from Normal Subjects and Patients with Severe Emphysema" in Proc. Int. Soc. Magn. Reson. Med., Eighth Scientific Meeting, Denver, CO, p. 79; *May 2000*

B. Saam, D.A. Yablonskiy, D.S. Gierada, J.D. Cooper, and M.S. Conradi, "Measurements of ^3He Diffusivity in Human Lung: Preliminary Results from an Emphysema Patient," in Proc. Int. Soc. Magn. Reson. Med., Seventh Scientific Meeting, Philadelphia, p. 136; *May 1999*

B. Saam, D.A. Yablonskiy, D.S. Gierada, J.D. Cooper, and M.S. Conradi, "Rapid ^3He MRI of Lung Ventilation Using EPI: Preliminary Results from an Emphysema Patient," in Proc. Int. Soc. Magn. Reson. Med., Seventh Scientific Meeting, Philadelphia, p. 2094; *May 1999*

B. Saam, D.A. Yablonskiy, D.S. Gierada, J.D. Cooper, S.S. Lefrak, and M.S. Conradi, "Measuring Diffusivity of ^3He in Human Lung: Preliminary Study of Patients with Emphysema," Eur. Radiol. **9**, B22 (Proc. Workshop on Hyperpolarized Gases in Magnetic Resonance: Biomedical Investigations and Clinical Applications, Les Houches, France); *June 1999*

B. Saam, D.A. Yablonskiy, D.S. Gierada, and M.S. Conradi, "Testdriving HP- ^3He MRI: A Vertically Integrated Approach," Eur. Radiol. **9**, B33 (Proc. Workshop on Hyperpolarized Gases in Magnetic Resonance: Biomedical Investigations and Clinical Applications, Les Houches, France); *June 1999*

D.S. Gierada, B. Saam, D.A. Yablonskiy, J.D. Cooper, S.S. Lefrak, and M.S. Conradi, "Dynamic ^3He MRI Using EPI: Preliminary Studies of Patients with Emphysema," *Eur. Radiol.* **9**, B29 (Proc. Wkshp. on Hyperpolarized Gases in Magnetic Resonance: Biomedical Investigations and Clinical Applications, Les Houches, France); *June 1999*

B. Saam, D.A. Yablonskiy, D.S. Gierada, and M.S. Conradi, "Hyperpolarized ^3He as a Contrast Material for Rapid MRI of the Lung," *Excerpta Medica International Congress Series ICS192, Proceedings of the International Symposium on Ultrafast Magnetic Resonance Imaging in Medicine*, Kyoto, Japan, p. 231; *January 1999*

D.A. Yablonskiy, D.S. Gierada, B.T. Saam, and M.S. Conradi, "High-speed Dynamic MRI of Lung Ventilation with Hyperpolarized ^3He and EPI," *Radiology* **209(P)**, 449 and 553 (*Rad. Soc. North Amer. 84th Sci. Assembly and Ann. Mtg.*, Chicago); *November 1998*

B. Saam, D.A. Yablonskiy, M.S. Conradi, and D.S. Gierada, "EPI Imaging of Lung Function Using Hyperpolarized Gas," *Proc. Int. Soc. Magn. Reson. Med.*, Sixth Scientific Meeting, Sydney, Australia, p. 1912; *May 1998*

J.P. Mugler, B. Driehuys, J.R. Brookeman, G.D. Cates, S.S. Berr, R.G. Bryant, T.M. Daniel, E.E. de Lange, C.J. Erickson, W. Happer, D.P. Hinton, T. Maier, B.T. Saam, K.L. Sauer and M.E. Wagshul, "MR Imaging of the Human Lungs Using Hyperpolarized ^{129}Xe Gas," *Proc. Int. Soc. Magn. Reson. Med.*, Fifth Scientific Meeting, Vancouver, Canada, p. 2113; *May 1997*

J.P. Mugler, B. Driehuys, J.R. Brookeman, G.D. Cates, S.S. Berr, R.G. Bryant, J.H. Downs, C.J. Erickson, W. Happer, D.P. Hinton, N.F. Kassel, T. Maier, C.D. Phillips, B.T. Saam, K.L. Sauer and M.E. Wagshul, "MR Spectroscopy of Dissolved-Phases Hyperpolarized ^{129}Xe in the Human Chest and Head," *Proc. Int. Soc. Magn. Reson. Med.*, Fifth Scientific Meeting, Vancouver, Canada, p. 306; *May 1997*

B. Saam, N. Drukker, and W. Happer, "MRI Edge Enhancement Observed with Hyperpolarized ^3He ," *Bull. Amer. Phys. Soc.* **42**, 8 (March Mtg., Kansas City, MO); *March 1997*

J.R. Brookeman, J.P. Mugler, B. Driehuys, G.D. Cates, M.E. Wagshul, E.E. de Lange, T.M. Daniel, W. Happer, S.S. Berr, C. Erickson, K. Sauer, B. Saam, and R. Bryant, "MR imaging of the human lungs with hyperpolarized ^{129}Xe gas, and spectroscopy of dissolved phases of ^{129}Xe in the lungs and brain," in *Conference on Perspectives of MR Imaging Using Polarised Gases*, Les Houches, France, p. 22; *October 1996*

J.R. MacFall, H.C. Charles, R.D. Black, H. Middleton, J. Swartz, B. Saam, W. Happer, G. Cates, G.A. Johnson and C.E. Ravin, "MR Imaging of Lung Air Spaces with Hyperpolarized ^3He " in *Proc. Int. Soc. Magn. Reson. Med.*, Fourth Scientific Meeting, New York, p. 21; *May 1996*

G.D. Cates, C. Charles, R. Black, B. Driehuys, W. Happer, A. Johnson, J. MacFall,

H. Middleton, C. Ravin, B. Saam K. Sauer, J. Swartz, M. Wagshul, and A. Wishnia, "MRI Using Laser-Polarized ^3He and ^{129}Xe ," Bull. Amer. Phys. Soc. 41, 1104 (DAMOP, Ann Arbor, MI); *May 1996*

A.S. Barton, N.R. Newbury, G.D. Cates, B. Driehuys, H. Middleton, and B. Saam, "A Self Calibrating Measurement of Polarization Dependent Frequency Shifts from Rb- ^3He Collisions," Bull. Amer. Phys. Soc. 38, 1140 (DAMOP, Reno, NV); *May 1993*.

B. Driehuys, J.A. Katine, H. Mabuchi, B.T. Saam, and G.D. Cates, "Relaxation of Nuclear Spin Polarized ^{129}Xe Due to Interactions with Surfaces," Bull. Amer. Phys. Soc. 38, 1120 (DAMOP, Reno, NV); *May, 1993*

B. Saam, M. Gatzke, and G.D. Cates, "Resonant Laser-Driven Excitation of Non-Resonant States in Rb," Bull. Amer. Phys. Soc. 37, 1081 (DAMOP, Chicago); *May 1992*

M. Gatzke, G.D. Cates, B. Driehuys, W. Happer, and B. Saam, "Spin Relaxation of Frozen Laser Polarized ^{129}Xe ," Bull. Amer. Phys. Soc. 37, 1127 (DAMOP, Chicago); *May 1992*

**CONFERENCE
ADMINISTRATION**

45th *New Mexico Regional Nuclear Magnetic Resonance Meeting*, University of Utah Department of Physics (Host, Chair of Organizing Committee, Chair of Program Committee); 50 participants; *November 2004*

12th Meeting of the International Society for Magnetic Resonance in Medicine, Kyoto, Japan (Co-Chair of oral session: *Applications of Hyperpolarized Gases*); *May 2004*

7th *International Conference on Magnetic Resonance Microscopy*, Snowbird, UT (Local Organizing Committee, Program Committee); 200 participants; *September 2003*

40th *New Mexico Regional Nuclear Magnetic Resonance Meeting*, University of Utah Department of Physics (Host, Chair of Organizing Committee, Chair of Program Committee); 40 participants; *May 2002*

**STUDENTS &
POST-DOCS
SUPERVISED**

Post-doctoral Fellows:

Hans Malissa: *May 2012 – present*

Eric G. Sorte: *July 2011 – January 2012*

Tining Su: *Sept. 2001 – June 2003*

Ph.D. Students:

Edward Thenell (Physics); Ph.D. anticipated 2015.

Mark Limes (Physics); Ph.D. anticipated 2013.

Zayd Ma (Physics); Ph.D. Thesis: *Frequency Shifts During Spin Exchange Optical*

Pumping of ^3He and ^{129}Xe and Applications of Hyperpolarized ^{129}Xe ; 2012

Eric Sorte (Physics); Ph.D. Thesis: *Investigation of a New Model of Dipolar-Coupled Nuclear Spin Relaxation and Applications of Dynamic Nuclear Polarization; 2011*

Geoffrey Schrank (Physics); Ph.D. Thesis: *Xenon Polarizer Characterization and Biological Studies; 2009*

Benjamin C. Anger (Physics); Ph.D. Thesis: *Polarization and Relaxation Mechanisms in Hyperpolarized ^3He and ^{129}Xe ; 2008*

Steven W. Morgan (Physics); Ph.D. Thesis: *Relaxation of Solid Hyperpolarized ^{129}Xe ; 2007*

Jared Teter (Physics); Ph.D. Thesis: *Wall Relaxation Studies of Hyperpolarized ^3He ; 2005*

Gary L. Samuelson, Jr. (Physics); Ph.D. Thesis: *Nuclear Relaxation of Polycrystalline ^{129}Xe at Low Temperature and Low Magnetic Field; 2005*

Richard E. Jacob (Physics); Ph.D. Thesis: *Studies of Hyperpolarized ^3He Relaxation at Glass Surfaces; 2002*

M.S. Students:

Curtiss Melder, M.S. (Instrumentation Physics); Project title: *An Improved Apparatus to Measure Rb and K Number Densities Using Faraday Rotation; 2007*

Ryan May, M.S. (Instrumentation Physics); Project title: *Using Faraday Rotation to Measure Alkali-Metal Vapor Density; 2005*

Undergraduate Students:

Haleigh Van Eerden (2010-present); B.S. (Physics) anticipated 2013

Laurel Hales (2009-2011), B.S. (Physics) anticipated 2013

Thomas Van Hook (2010-2011), B.S. (Physics), 2011

Allison Schoeck (2007-2009), B.S. (Physics), 2009

Kimberly Butler, B.S. (Physics), 2008 (entered Univ. of Utah Medical School, Fall 2008).

Brittany N. Berry (2003-2006), B.S. (Physics), 2006 (entered graduate school in medical physics at UCLA, Fall 2007).

Tricia B. Hauschild (2004-2005), post-baccalaureate student (M.D. from Univ. of Utah Medical School 2010).

Douglas Wiseman (2003-2005), post-baccalaureate (entered medical school at

Wayne State University, Fall 2006).

Ryan Stapley (2002-2003), B.S. (Physics), 2004 (entered medical school, Fall 2004).

T. Davis, B.S. (Physics), 2002 (M.D. from Univ. of Utah Medical School, 2007).

Steven W. Morgan: B.S. (Physics), 2001; Senior Honors Thesis: *Field-Dependent Spin-Lattice Relaxation of Laser-Polarized Helium-3 in Magnetized Cells*.
