CURRICULUM VITAE

Personal Data

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University Studies

1987-1989	Physics at the Universidad de Buenos Aires
1989-1992 Degree: Licenciado in physics. (similar to Master Degree)	Instituto Balseiro-Universidad Nacional de Cuyo
1993-1996 Degree: Doctor in physics (Ph. D.)	Instituto Balseiro-Universidad Nacional de Cuyo Ph. D. advisor: Armando Aligia

Thesis title: *Superconducting and magnetic properties of high Tc cuprates.*

Languages

Spanish, English.

Teaching Experience

Teaching assistant at the Instituto Balseiro from August 1993 to December 1999.

Scholarships, Fellowships

Instituto Balseiro and Comisión Nacional de Energía Atómica (Argentina):
1989-1992.

CONICET (Argentina), 1993-1997,
To investigate "Electronic structure and pairing mechanism in high T_c superconductors."
Advisor: Dr. Armando Aligia.

CONICET (Argentina), 1997-2000,
To investigate "Electronic structure of strongly correlated systems."
Advisor: Dr. Blas Alascio.

Los Alamos National Laboratory , 2000-2001,
Director Founded Post-Doctoral position at CNLS and T-11 Groups
Advisor: Dr. James Gubernatis.

Los Alamos National Laboratory , 2002-2004,
J. R. Oppenheimer Post-Doctoral position at CNLS and T-11 Groups

University of New South Wales, Australia, November-December 2008,
Gordon Godffrey Senior Visiting Fellow

Researcher Positions

CONICET (Argentina), August 1999,
Research Permanent Position to investigate about "Electronic structure of strongly correlated systems."

Los Alamos National Laboratory , since 2004,
Staff Member of the Theoretical Division at LANL,
T-11 Group.

Awards and Prizes

Fundación José A. Balseiro's Prize for the best
Professor in Physics of Instituto Balseiro (1997).

Postdoctoral Publication Prize in Theoretical Physics,
Los Alamos National Laboratory (2004).

List of Postdocs

Dr. Pinaki Sengupta

Dr. Kahled Al-Hassanieh

Research Grants

Principal Investigator of the LDRD-20060043DR poject
Strongly Correlated Electrons: Duality and Implications.
Period: 2006-2009.

Publications

1 - *Validity of the t-J model. Quantum numbers for* $(Cu_4O_8)^{-7}$*,*
C. D. Batista and A. A. Aligia, Solid State Commun. **83**, 419 (1992).

2 - *Effective Hamiltonian for cuprate superconductors,*
C. D. Batista and A. A. Aligia, Phys. Rev. B **47**, 8929 (1993).

3 - *Validity of the t-J model,*
C. D. Batista and A. A. Aligia, Phys. Rev. B **48**, R4212 (1993).

4 - *Systematic derivation of a generalized t-J model,*
A. A. Aligia, M. E. Simón, and C. D. Batista, Phys. Rev. B **49**, 13061 (1994).

5 - *Effect of the Cu-Cu superexchange on the stability of Zhang-Rice singlets,*
C. D. Batista and A. A. Aligia, Phys. Rev. B **49**, 16048 (1994).

6 - *Superconductivity from correlated hopping,*
C. D. Batista, F. Lema and A.A. Aligia, Phys. Rev. B **52**, 6223 (1995).

7 - *RVB superconductivity in a generalized t-J model for the cuprates,*
C. D. Batista and A. A. Aligia, Physica C **264**, 319 (1996).

8 - *Space-time transformations within the path integral approach to stochastic processes,*
C. D.Batista, G. Drazer, D. Reidel and H. S. Wio, Phys. Rev. E **54**, 86 (1996).

9 - *Numerical comparison of the band structure and magnetic fluctuations of three band and generalized t-J models,*
J. Eroles, C. D. Batista and A. A. Aligia, Physica C **261**, 237 (1996).

10 - *Effect of correlated hopping on superconductivity on the one dimensional t-J model,*
F. Lema, C. D. Batista and A. A. Aligia, Physica C **259**, 287 (1996).

11 - *Excitons in insulating cuprates,*
M. E. Simón, A. A. Aligia, C. D. Batista and E. R. Gagliano, Phys. Rev. B **54**, R3780 (1996).

12 - *Resonance-Valence-Bond superconductivity in CuO_2 Planes,*
C. D. Batista and A. A. Aligia, J. of Low Temp. Phys. **105** (3/4), 591 (1996).

13 - *Charge and spin excitations of insulating lamellar copper oxides,*
F. Lema, J. Eroles, C. D. Batista and E. R.Gagliano, Phys. Rev. B **55**, 15295 (1997).

14 - *Superconductivity and incommensurate spin fluctuations in a generalized $t-J$ model for the cuprates,* C. D. Batista, L. O. Manuel, H. A. Ceccatto and A. A. Aligia, Europhys. Lett. **38**(2), 147 (1997).

15 - *Spin dynamics of hole doped Y_2BaNiO_5,*
C.D. Batista, A.A. Aligia and J. Eroles, Europhys. Lett. **43**(1), **71** (1998).

16 - *Specific Heat of defects in the Haldane system Y_2BaNiO_5,*
C. D. Batista, K. Hallberg and A. A. Aligia, Phys. Rev. **B 58**, 9248 (1998).

17 - *Intra-sublattice hopping and T_c^{max} in the cuprates,*
A. A. Aligia, F. Lema, M. E. Simon and C. D. Batista, Phys. Rev. Lett. **79**, 3793 (1997).

18 - *Magnetic Raman scattering of insulating cuprates,*
J. M. Eroles, C. D. Batista, E. Gagliano and S. Bacci, Phys. Rev. B **59** 1468 (1999).

19 - *Exact expression for the diffusion propagator in a family of time-dependent anharmonic potentials,* J. A. Giampaoli, D. E. Strier, C. D. Batista, G. Drazer and H. S. Wio, Phys. Rev. E **60**, 2540 (1999).

20 - *Modeling the Insulating $Sr_2CuO_2Cl_2$ lamellar cuprate,*
F. Lema, J. Eroles, C.D. Batista, S. Bacci and E. Gagliano, Revista Mexicana de Física B **44**, 6-9 (1998).

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C.D.Batista, A.A. Aligia and J. Eroles Phys. Rev. Lett. **81**, 4027 (1998).

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C. D. Batista, J. Eroles, M. Avignon and B. Alascio, Phys. Rev. B **58**, R14689 (1998).

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K. Hallberg, C. D. Batista and A. A. Aligia, Physica B **259-261** (1999) 1017-1018.

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J. Eroles, C. D. Batista and A. A. Aligia, Phys. Rev. B **59** 14092 (1999).

25 - *Superconductivity and topological numbers in the Hubbard chain with bond-charge interaction*, K. Hallberg, A. A. Aligia, C. D. Batista and G. Ortiz, J. of Low Temp., Phys. **117** 1747 (1999).

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C.D. Batista, J. Eroles, M. Avignon and B. Alascio, Phys. Rev. B **62**, 15047 (2000).

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C. D. Batista, J. Bonca and J. E. Gubernatis, Phys. Rev. **B 63**, 184428 (2001).

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M. Jaime, V. F. Correa, N. Harrison, C. D. Batista, N. Kawashima,Y. Kazuma,
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S. E. Sebastian, P. A. Sharma, M. Jaime, N. Harrison, V. Correa, L. Balicas,
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68 - *Quantum criticality: How 5-f electrons avoid singularities in* $U(Ru,Ru)_2Si_2$,
A. Shilanek, N. Harrison, C. D. Batista, M. Jaime, A. Lacerda,H. Amitsuka,
and J. A. Mydosh, Phys. Rev. Lett. bf 95, 026403 (2005).

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A. D. Christianson, J. M. Lawrence, A. M. Lobos, A. A. Aligia, N. O. Moreno,
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C. D. Batista and Z. Nussinov, Phys. Rev. B **72**, 045137 (2005).

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S. E. Sebastian, N. Harrison, C. D. Batista, L. Balicas, M. Jaime, P. A. Sharma,
N. Kawashima and I. R. Fisher, Nature **441**, 617 (2006).

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V. S. Zapf, D. Zocco, M. Jaime, N. Harrison, C. D. Batista, M. Kenzelmann,
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A. V. Silhanek, M. Jaime, N. Harrison, V. Fanelli, C. D. Batista, H. Amitsuka,
S. Nakatsuji, L. Balicas, K. H. Kim, Z. Fisk, J. L Sarrao, L. Civale and J. A. Mydosh,
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75 - *Phonon thermal transport of* URu_2Si_2*: broken translational symmetry and strong coupling of the hidden order to the lattice,* P. A. Sharma, N. Harrison, M. Jaime, Y. S. Oh,
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80 - *Electronic structure and magnetism in actinide compounds,*
T. Durakiewicz, J. J. Joyce, G. H. Lander, C. G. Olson, M. T. Butterfield, E. Guziewicz, C. D. Batista, A. J. Arko, L. Morales, K. Mattenberger, O. Vogt, Physica B **378-380**, 1033 (2006).

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S. E. Sebastian, P. Tanedo, P. Goodard, S. C. Lee, A. Wilson, R. D. McDonald, S. Hill, N. Harrison, C. D. Batista and I. R. Fisher, Phys. Rev. B **74**, 180401(RC) (2006).

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Ch. Ruegg, D. F. McMorrow, B. Normand, H. M. Ronnow, S. E. Sebastian, I. R. Fisher, C. D. Batista, Phys. Rev. Lett. **98**, 017202 (2007).

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S. A. Zvyagin, J. Wonitza, C. D. Batista, M. Tsukamoto, N. Kawashima, J. Krzystek, M. Jaime, V. Zapf, and A. Paduan-Filho , Phys. Rev. Lett. **98**, 047205 (2007).

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V. S. Zapf, V. F. Correa, C. D. Batista, T. P. Murphy, E. D. Palm, M. Jaime, S. Tozer, A. Lacerda, A. Padhuan Filho, Journal of Appl. Phys. **101**, 09E106 (2007).

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C. D. Batista, J. Schmalian, N. Kawashima, P. Sengupta, S. Sebastian, N. Harrison,
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95 - *Observation of two-magnon bound states in the spin-1 anisotropic Heisenberg ,*
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M. B. Stone, M. D. Lumsden, Y. Qiu, E. C. Samulon, C. D. Batista and I. R. Fisher,
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C. D. Batista, Journal of Nuclear Materials, **385**, 60 (2009).

106 - *Heavy holes-precursor to superconductivity in antiferromagnetic $CeIn_3$,*
S. E. Sebastian, N. Harrison, C. D. Batista, S. A. Trugman, V. Fanelli, M. Jaime, T. P. Murphy, E. C. Palm, H. Harima and T. Ebihara,
Proc. Nat. Acad. of Sciences 106(19), 7741 (2009).

107 - *Robust Pairing Mechanism from Repulsive Interactions,*
K. Al-Hassanieh, C. D. Batista, P. Sengupta, A. E. Feiguin,
Phys. Rev. B **80**, 115116 (2009).

108 - *Non-monotonic Field Dependence of Neel Temperature in the Quasi-2D Magnet $[Cu(HF_2)(pyz)_2]BF_4$,* P. Sengupta, C. D. Batista, R. McDonald, S. Cox, J. Singleton,

L. Huang, T. P. Papageorgiou, O. Ignatchik, T. Herrmannsdörfer, J. L. Manson, J. A. Schlueter, K. A. Funk, and J. Wosnitza, Phys. Rev. B **79**, 060409(R) (2009).

109 - *Magnetic-Field Induced Phase Transitions in a Weakly Coupled $s = 1/2$ Quantum Spin Dimer System $Ba_3Cr_2O_8$,* M. Kofu, H. Ueda, H. Nojiri, Y. Oshima, T. Zenmoto, K. C. Rule, S. Gerischer, B. Lake, C. D. Batista, Y. Ueda, S.-H. Lee, Phys. Rev. Lett. **102**, 177204 (2009).

110 - *Strong H...F Hydrogen Bonds as Synthons in Polymeric Quantum Magnets: Structural, Magnetic, and Theoretical Characterization of $[Cu(HF_2)(pyrazine)_2]SbF_6$, $[Cu_2F(HF)(HF_2)(pyrazine)_4](SbF_6)_2$, and $[CuAg(H_3F_4)(pyrazine)_5](SbF_6)_2$* J. L. Manson, J. A. Schlueter, K. A. Funk, H. I. Southerland, B. Twamley, K. H. Stone, T. Lancaster, S. J. Blundell, P. J. Baker, F. L. Pratt, J. Singleton, R. D. McDonald, P. A. Goddard, P. Sengupta, C. D. Batista, L. Ding, C. Lee, M. H. Whangbo, I. Franke, S. Cox, C. Baines and D. Trial, J. Am. Chem. Soc. **131**, 6733 (2009).

111 - *Asymmetric quintuplet condensation in the frustrated $S = 1$ spin dimer compound Ba3Mn2O8,* E. C. Samulon, Y. Kohama, R. D. McDonald, M. C. Shapiro, K. A. Al-Hassanieh, C. D. Batista, M. Jaime, I. R. Fisher, Phys. Rev. Lett. **103**, 047202 (2009).

112 - *Critical properties of the $S = 1$ spin dimer compound Ba3Mn2O8* S. Suh, K. A. Al-Hassanieh, E. C. Samulon, J. S. Brooks, W. G. Clark, P. L. Kuhns, L. L. Lumata, A. Reyes, I. R. Fisher, S. E. Brown, C. D. Batista, submitted to Phys. Rev. B.

113 - *Field Induced Orbital Antiferromagnetism in Mott Insulators* K. A. Al-Hassanieh, C. D. Batista, G. Ortiz, L. N. Bulaevskii, Phys. Rev. Lett. in press.

114 - *Finite-Temperature Transition in the Spin-dimer Antiferromanget $BaCuSi_2O_6$* Y. Kamiya, N. Kawashima and C. D. Batista, J. Phys. Soc. Jpn. **78**, 094008 (2009).

115 - *Control of Interlayer Magnetic Interaction in Oxide Heterostructures* J. W. Seo, W. Prellier, P. Padhan, P. Boullay, J.Y. Kim, H. Lee, I. Martin, C. D. Batista, and C. Panagopoulos, submitted to Nature Phys. .

116 - *Canted Spiral: An Exact Ground state of XXZ Zigzag Ladders* C. D. Batista, Phys. Rev. B in press.

Invited Talks

1 - *Spin 1/2 excitations in Haldane Systems*
Laboratoire de Physique Quantique, Universite Paul Sabatier,
Toulouse, France, September, 1998.

2 - *Generalized Jordan-Wigner Transformations*
XXIV International Workshop on Condensed Matter Theories
Buenos Aires, Argentina, September 12 - 17, 2000.

3 - *Generalized Jordan-Wigner Transformations*
Centro Atómico Bariloche, Instituto Balseiro,
S. C. Bariloche, September 28, 2000.

4 - *Ferromagnetism in The Periodic Anderson Model*
Los Alamos National Laboratory,
CMMC Seminar, October 16, 2000.

5 - *Generalized Jordan-Wigner Transformations*
Department of Physics, University of Illinois at Urbana-Champaign
Urbana, USA, November 6, 2000.

6 - *Generalized Jordan-Wigner Transformations*
Department of Physics, Tokyo Metropolitan University
Tokyo, Japan, November 17, 2000.

7 - *Generalized Jordan-Wigner Transformations*
Department of Applied Physics, University of Tokyo
Tokyo, Japan, November 20, 2000.

8 - *Ferromagnetism in the Periodic Anderson Model*
Institute For Solid State Physics, University of Tokyo
Tokyo, Japan, November 24, 2000.

9 - *Generalized Jordan-Wigner Transformations*
Department of Physics and Astronomy, University of Missouri - Columbia
Columbia, USA, April 25, 2001.

10 - *Itinerant Ferromagnetism for Mixed Valence Systems*
National High Magnetic Field Laboratory
Los Alamos, USA, March 2, 2001.

11 - *Algebraic Approach to Interacting Quantum Systems*
J. Stephan Institute
Ljubljana, Slovenia, September 12, 2001.

12 - *Algebraic Approach to Interacting Quantum Systems*
Department of Physics, Tokyo Metropolitan University
Tokyo, Japan, March 20, 2002.

13 - *Itinerant Ferromagnetism for Mixed Valence Systems*
Department of Physics 0319, University of California
San Diego, USA, April 12, 2002.

14 - *Electronic Ferroelectricity in the Falicov-Kimball Model*
2nd Hvar Meeting on Strongly Correlated Electron Systems
Hvar, Croatia, October 8th, 2002.

15 - *Sripe Phase and Topological Ordering in a $t - J_z$ Model.*
Fourth international Conference on New Theories, Discoveries and Applications of Superconductors and Related Materials
San Diego, USA, January 17, 2003.

16 - *Electronic Ferroelectricity: A Novel Broken Symmetry State*
Department of Physics, Ohio State University
Ohio, USA, February 3, 2003.

17 - *Electronic Ferroelectricity: A Novel Broken Symmetry State*
Department of Physics, Washington University
St. Louis, USA, February 27, 2003.

18 - *Itinerant Ferromagnetism in Mixed Valence Systems*
Department of Physics, Washington University
St. Louis, USA, February 28, 2003.

19 - *Itinerant Ferromagnetism in Mixed Valence Systems*
Department of Physics, Washington University
St. Louis, USA, February 28, 2003.

20 - *Electronic Ferroelectricity: A Novel Broken Symmetry State*
Conference: New Trends in Magnetism
S. C. Bariloche, Argenina, June 13, 2003.

21 - *Electronic Ferroelectricity: A Novel Broken Symmetry State*
Conference: Condensed Matter Theories 27

Toulouse, France, September 18, 2003.

22 - *Electronic Ferroelectricity: A Novel Broken Symmetry State*
Deaperment of Physics, University of Cologne
Cologne, Germany, September 22, 2003.

23 - *Electronic Ferroelectricity: A Novel Broken Symmetry State*
J. Stephan Institute
Ljubljana, Slovenia, September 26, 2003.

24 - *Electronic Ferroelectricity: A Novel Broken Symmetry State*
Laboratoire de Physique des Solides, Université Paris-Sud,
Orsay, France, October 1, 2003.

25 - *Condensation of Triplons in Han Purple Pigment* $BaCuSi_2O_6$
2nd Asia-Pacific Workshop, Frontier in Condensed Matter Physics,
Hong Kong, China, June 24, 2004.

26 - *Exact Ground States of a Frustrated 2D Magnet: Deconfined*
Fractional Excitations at a First Order Quantum Phase Transition,
International Workshop on Frustrated Magnetism,
Long Island, New York, September 17, 2004.

27 - *Electronic Ferroelectricity: A Novel Broken Symmetry State*
Department of Physics, University of Fribourg,
Fribourg, Switzerland, September 29, 2004.

28 - *Exact Ground States of a Frustrated 2D Magnet: Deconfined*
Fractional Excitations at a First Order Quantum Phase Transition,
Institute of Theoretical Physics (EPFL),
Lausanne, Switzerland, October 5, 2004.

29 - *Condensation of Triplons in Han Purple Pigment* $BaCuSi_2O_6$
Geballe Laboratory for Advanced Materials,
Stanford University, California, November 11, 2004.

30 - *Exact Ground States of a Frustrated 2D Magnet: Deconfined*
Fractional Excitations at a First Order Quantum Phase Transition,
Institute of Solid State Physics (ISSP),
Tokyo, Japan, March 16, 2005.

31 - *Condensation of Triplons in Han Purple Pigment* $BaCuSi_2O_6$
Department of Physics,

University of Alberta, Edmonton, Canada, May 5, 2005.

32 - *Intermediate Symmetries and Dimensional Reduction*
Louisiana State University,
Baton Rouge, Louisiana, September 15, 2005.

33 - *Intermediate Symmetries and Dimensional Reduction*
University of Southern California,
Los Angeles, California, September 23, 2005.

34 - *Condensation of Triplons in Han Purple Pigment* $BaCuSi_2O_6$
NHMFL and Florida State University,
Tallahassee, Florida, October 28, 2005.

35 - *Dimensional Reduction at a Quantum Critical Point*
XXX International Workshop On Condensed Matter Theories,
Dresden, Germany, June 05-10 2006.

36 - *Dimensional Reduction at a Quantum Critical Point*
Low Energy Electrodynamics in Solids,
Tallin, Estonia, July 1-6 (2006).

37 - *Frustration in Low Dimensional Systems*
ISSP Workshop on Computational Approaches to Quantum Critical Phenomena,
Tokyo, Japan, July 17 to August 11, 2006.

38 - *Dimensional Reduction at a Quantum Critical Point*
Symposium on Computational Approaches to Quantum Critical Phenomena,
Tokyo, Japan, August 9-11, 2006.

39 - *How to Find a Spin Supersolid at High Magnetic Fields*
National High Magnetic Filed Laboratory at Tallahassee,
Florida, October 20 (2006).

40 - *How to Find a Spin Supersolid at High Magnetic Fields*
Indiana University,
Indiana, November 20 (2006).

41 - *How to Find a Spin Supersolid at High Magnetic Fields*
University of Florida,
Florida, December 4 (2006).

42 - *Geometric Frustration and Dimensional Reduction at a Quantum Critical Point*

March Meeting (invited talk),
Denver, March 7 (2007).

43 - *Novel Phases and Quantum Critical Points in Spin Dimer Systems*
University of California,
Los Angeles, May 30 (2007).

44 - *Geometric Frustration and Dimensional Reduction at a Quantum Critical Point*
University of Southern California,
Los Angeles, November 19 (2007).

45 - *Geometric Frustration and Dimensional Reduction at a Quantum Critical Point*
DPG Conference Berlin 2008,
Germany, Berlin, February 25 (2008).

46 - *Strongly Correlated Approach to Pu Metal*
Second International Workshop on the Dual Nature of 5f electrons,
Santa Fe, USA, July 1 (2008).

47 - *Strongly Correlated Approach to Pu Metal*
Pu Futures - The Science 2008,
Dijon, France, July 11 (2008).

48 - *Strongly Correlated Approach to Pu Metal*
Symposium on Correlated Electron Physics,
Santa Fe,NM, USA, August 28 (2008).

49 - *Geometric Frustration and Dimensional Reduction at a Quantum Critical Point*
XIX Latin American Symposium on Solid State Physics,
Puerto Iguazu, Argentina, October 10 (2008).

50 - *Geometric Frustration and Dimensional Reduction at a Quantum Critical Point*
University of Buenos Aires,
Buenos Aires, Argentina, October 15 (2008).

51 - *Geometric Frustration and Dimensional Reduction at a Quantum Critical Point*
Colloquium of CNLS,
Los Alamos, NM, October 20 (2008).

52 - *Geometric Frustration and Dimensional Reduction at a Quantum Critical Point*
Argonne National Laboratory,
Argonne, IL, October 23 (2008).

53 - *Geometric Frustration and Dimensional Reduction at a Quantum Critical Point*
Indiana University,
Bloomington, IN, October 24 (2008).

54 - *Field Induced Quantum Phase Transitions in Frustrated Systems*
Iowa State University,
Ames, IW, October 30 (2008).

55 - *Geometric Frustration and Dimensional Reduction at a Quantum Critical Point*
University of New South Wales,
Sydney, Australia, November 26 (2008).

56 - *Electronic Orbital Currents and Polarization in Mott Insulators*
Workshop on Multiferroics organized by the Asian Pacific Center for Thoeretical Physics,
Pohang, Korea, December 14 (2008).

57 - *Magnetism and Ferroelectricity,*
Research Frontiers and Capability gaps for Controlling and Designing Functional Materials,
Los Alamos, NM, January 26 (2009).

58 - *Geometric Frustration and Dimensional Reduction at a Quantum Critical Point*
University of Virginia,
Charlottesville, VA, February 5 (2009).

59 - *Field Induced Supersolid in Spin-One Heisenberg Models*
John Hopkins University,
Baltimore, MD, April 27 (2009).

60 - *Electronic Orbital Currents and Polarization in Mott Insulators*
John Hopkins University,
Baltimore, MD, April 29 (2009).

61 - *Electronic Orbital Currents and Polarization in Mott Insulators*
University of California (Irvine),
Irvine, CA, May 20 (2009).

62 - *Frustrated Quantum Magnetism*
Paul Scherrer Institute,
Villingen, Switzerland, June 5 (2009).

63 - *Field Induced Supersolid in Spin-One Heisenberg Models*
Workshop on the Heisenberg Model: Past, Present and Future,
Brasilia, Brazil, July 22 (2009).