

COLEMAN, Piers

Condensed Matter (Theory)

Professor, Rutgers University.

Born: February 13, 1958. **Cheltenham, UK.**

Nationality: UK/US Citizen

Education:

B.A. , Cambridge University	1979
Ph.D. , Princeton University	1984

Positions :

Professor, Rutgers University	1997-
Associate Professor, Rutgers University	1991-1997
Assistant Professor, Rutgers University	1987-1991
Research Fellow, Trinity College, Cambridge	1984-1989
Postdoctoral Fellow, ITP, U. C. Santa Barbara,	1984-1986

Grants and Fellowships:

DOE Grant "Nano-scale spin systems." (+ D. Langreth)	\$330,000	2004-2007
N.S.F. Grant "Local Moment and Heavy Fermion Physics"	\$450,000	2003-2006
I2CAM International Materials Institute	\$ 3.3M	2004-2009
Alfred P. Sloan, Foundation Research Fellow	\$25,000	1988-1992

Visiting positions, awards etc.

Organizer, KITP, Workshop on Quantum Phase Transitions.	2005 Jan-Apr
Organizer, "Frontiers in Correlated Matter" Aspen Snowmass.	2004 Aug
Advisory committee, SCES 04, Karlsruhe	2004 Aug
Organizer, ICAM conf "Quantum Criticality", Columbia U.	2003 March
Fellow, American Physics Society,	2000-
Organizer, Trieste Miniworkshop on Strongly Correlation	1992- 2004
US Editor, Journal of Physics, Condensed Matter	1999-2000
Fellow, Institute of Physics,	1999-
Advisory committee, SCES 98, Paris, France	1998 Aug
Organizer, ITP, Santa Barbara Workshop on Non Fermi Liquids.	1996 Jan-June
Advisory committee, SCES 94, Amsterdam, Holland	1994 Aug
Lecturer du Troisieme Cycle, U. Lausanne, Switzerland	1991 Dec
Les Houches Summer School, France . Invited Lecturer.	1991 Aug

Kathmandu Summer School, Nepal. Invited Lecturer.	1991 Jun
Advisory committee, ICVF, Rio de Janeiro, Brazil	1990 Jul
Research Visitor, Landau Inst. , Moscow, USSR.	1989 Oct
First Wohlfarth Memorial Lecture, Imperial College, UK.	1989 Apr
Participant, US-Soviet Academy scientific exchange, USSR.	1988 Oct

Publications:

1. “*Frustration can not preserve a Quasi-Two-Dimensional Spin Fluid*”, M. Maltseva and P. Coleman, Phys. Rev. B in press, (2005).
2. “*Schwinger Boson approach to the fully screened Kondo model.*”, J. Rech, P. Coleman, O. Parcollet and G. Zarand, submitted to Phys. Rev. Lett, (2005).
3. “*Transport anomalies in a simplified model for a heavy electron quantum critical point*”, P. Coleman, A. Schofield and J. B. Marston, Phys. Rev. B, in press (2005).
4. “*Sum Rules and Ward Identities in the Kondo Lattice*”, P. Coleman, I. Paul and J. Rech, Phys. Rev. B 72, 094430 (2005).
5. “*Itinerancy and Hidden Order in URu₂Si₂*”, P. Chandra, P. Coleman and V. Tripathi, J. Phys.: Condens. Matter 17, 5285 (2005).
6. “*Non equilibrium noise as a probe of the Kondo effect in mesoscopic wires*”, Eran Lebanon and P. Coleman, Phys. Rev. Lett. 95, 046803 (2005).
7. “*Quantum Criticality*” Piers Coleman and Andrew J. Schofield, Nature, “Einstein Centenary Edition”, Nature vol 433, 226-229 (2005).
8. “*Anomalous conductance of a spin 1 quantum dot*”, A. Posazhennikova & P. Coleman, Phys. Rev. Lett. 94, 036802 (2005)
9. “*Singular Fermi Liquid fixed points in quantum impurity models*”, Pankaj Mehta, L. Borda, Gergely Zarand, Natan Andrei, P. Coleman, Phys. Rev. B, Phys. Rev. B 72, 014430 (2005).
10. “*Destruction of large Fermi surface at a heavy-fermion quantum critical point*”, S. Paschen, T. Lühmann, S. Wirth, P. Gegenwart, O. Trovarelli, Ch. Geibel, F. Steglich, P. Coleman and Q. Si, Nature, Nature 432, 881 - 885 (16 December 2004).
11. “*Frontiers in Correlated Matter*”, P. Coleman, MRS Bulletin **29**, 968-970 (2004).
12. “*Quantum replica approach to the under-screened Kondo model*”. P. Coleman & I. Paul. Phys. Rev. B **70**,1 (2004).
13. “*Spin Dynamics from Majorana Fermions*”, W. Mao, P. Coleman, C. Hooley and D. Langreth, Phys. Rev. Lett. 91, 207203, (2003).

14. “*Many Body Physics: Unfinished Revolution*”, P. Coleman, Ann Henri Poincare 4, Suppl. 2 (2003) S559-S580.
15. “*Non-Fermi liquid behavior in the Under-Screened Kondo model*” P. Coleman and C. Pépin, Physical Review B 68 220405 (2003) RC.
16. *The Case for Phase Separation in URu₂Si₂*, P. Chandra, P. Coleman, J.A. Mydosh, V. Tripathi, J. Phys. Cond. Mat. 15, S1965-71 (2003).
17. “*Break up of the heavy electron at a quantum critical point*” J. Custers, P. Gegenwart, H. Wilhelm, K. Neumaier, Y. Tokiwa, O. Trovarelli, C. Geibel, F. Steglich, C. Pépin and P. Coleman, Nature, 424, 524-527 (2003).
18. “*Local moment physics in heavy electron systems*” P. Coleman, in *Lectures on the Physics of Highly Correlated Electron Systems VI: Sixth Training Course*, edited by F. Mancini, American Institute of Physics, (2002).
19. “*Breakdown of Fermi liquid theory in heavy fermion compounds*” C. Pépin and P. Coleman, Proceedings of LT23 Hiroshima (2002), Physica (2003).
20. “*Susy atomic model*” J. Hopkinson and P. Coleman, Proceedings of the SCES 2002 conference, Acta Physica Polonica B, 34, 733 (2003).
21. “*Heavy Electron Quantum Criticality*” P. Coleman and C. Pépin, Proceedings of the SCES 2002 conference, Kraków, Poland, Acta Physica Polonica B **34**, 691-705, (2003).
22. Hidden Order in URu₂Si₂: The Need for a Dual Description, J. Mydosh, P. Chandra, P. Coleman and V. Tripathi, Proceedings of the SCES 2002 conference Kraków, Poland, (2002), Acta Polonica (2003).
23. Quenched Disorder Formulation of the Pseudo-Gap Problem, A. Posazhennikova and P. Coleman, Phys. Rev. B **67**, 165109-1-12, (2003).
24. “*LiV₂O₄: frustration induced heavy fermion metal*”, J. Hopkinson and P. Coleman, Phys. Rev. Lett **89**, 267201 (2002).
25. “*Atomic Model of Susy Hubbard Operators*”, J. Hopkinson and P. Coleman, Phys. Rev. B, 67, 085110 (2003).
26. “*Magnetization of the d.c. biased quantum dot*” P. Coleman and W. Mao, posted on bulletin board (2002).
27. “*Hidden Orbital Order in URu₂Si₂*”, P. Chandra, P. Coleman, J. Mydosh and V. Tripathi, Nature, **417**, 831-834 (2002).
28. “*Oscillatory Instabilities in DC biased quantum Dots*” P. Coleman, C. Hooley, A. F. Ho, Y. Avishai and Y. Goldin, J. Phys.: Condens. Matter **14** L205-L211, (2002).

29. “Two stage screening model of LiV_2O_4 ” J. Hopkinson and P. Coleman, Physica B, 312-313, 711-713 (2002).
30. “Pressure-Induced Magnetism and Hidden Order in URu_2Si_2 ” P. Chandra and P. Coleman, Physica B 312-313,397-400, (2002).
31. “Supersymmetric approach to the infinite U Hubbard Model”P. Coleman and C. Pepin, Physica B 312-313, 539-541 (2002).
32. “What is the Fate of the heavy electron at a Quantum Critical Point?”, P. Coleman, C. Pepin, Physica B , 312-313, 383-389 (2002).
33. “Magnetic Spins that last For Ever” P. Coleman, Nature News and Views, Nature, **413**, 788-789, (2001).
34. “How do Fermi liquids get heavy, and die?”, P. Coleman, C. Pepin, Q. Si and R. Ramazashvili, J. Cond Matt **13**, R723 (2001).
35. “Two-channel Kondo Lattice Model on a ladder studied by the Density Matrix Renormalization Group Method”, Juana Moreno, Shaojin Qin and P. Coleman, Phys. Rev. **B64**, 085116 (2001).
36. “Magnetic glue exposed”, Nature News and Views, Nature vol 410, 320-321, (2001)
37. “Is the quantum dot at large bias a weak-coupling problem?”, P. Coleman, C. Hooley and O. Parcollet, Phys. Rev. Lett. 86, 4088 (2001).
38. “Supersymmetric Hubbard Operators” P. Coleman, C. Pépin and J. Hopkinson , Phys. Rev. **B 63**, 140411(R) (2001).
39. “Strong coupling approach to the supersymmetric Kondo model” P. Coleman, C. Pépin, A. M. Tsvelik, Nuclear Physics B586, 641-667, (2000).
40. “Hidden Order in URu_2Si_2 ” Nayana Shah,P. Chandra, P.Coleman and J.A. Mydosh, Phys. Rev. **B 61**, 564 (2000)
41. “Supersymmetric Spin Operators” P. Coleman, C. Pépin, A. M. Tsvelik, Phys. Rev. B, 62, 3852-3868 (2000).
42. “Onset of magnetism in heavy fermion metals”A. Schroeder, G. Aeppli, R. Coldea, M. Adams, O. Stockert, H. von Lohneyson, E. Bucher, R. Ramazashvili and P. Coleman, Nature, 407, 351-355 (2000).
43. *Bound-State Instability of the Chiral Luttinger Liquid in One-Dimension.* A. F. Ho and P. Coleman, Phys. Rev. **B 62**, 1688 (2000).

44. “Gap-anisotropic model for the narrow-gap Kondo insulators”, J. Moreno and P. Coleman, Phys. Rev. Lett. **84**, 342 (2000).
45. “Breakdown of the Chiral Luttinger Liquid in One-Dimension. ”, A. F. Ho and P. Coleman, Physical Review Letters, **83**, 1383 (1999).
46. “Theories of non-Fermi liquid behavior”, invited talk, P. Coleman, Proceedings of 1998 Strongly Correlated Electron Systems conference, Paris, Physica B, 259-261, 353 (1999).
47. “Co-operative Kondo Effect in the two-channel Kondo Lattice”, P. Coleman, A. M. Tsvelik, N. Andrei and H. Y. Kee, Phys. Rev. **B 60**, 3608 (1999).
48. “Marginal Fermi Liquid in a Lattice of Three Body bound-states”, Phys. Rev. B, **58**, 4418 (1998).
49. “Scaling of magnetic fluctuations near a quantum phase transition”, A. Schroder, G. Aeppli, E. Bucher, R. Ramazashvili, P. Coleman Phys. Rev. Lett., PRL 80, 5623 (1998).
50. “Superconductors gap out”, Nature News and Views article, P. Coleman, March 14th (1998).
51. “Local Moments in an Interacting Environment” P. Coleman and A. M. Tsvelik, Phys. Rev. B, Vol. 57, 12757 (1998).
52. “Co-operative Two-Channel Kondo Effect”, P. Coleman, A. M. Tsvelik, N. Andrei and H. Y. Kee, J. Physics : Cond. Matt Letters, Vol. 10, L239-245, (1998).
53. “Superconducting Quantum Critical Point” Revaz Ramazashvili and Piers Coleman, Phys. Rev. Letters, Vol. 79, 3752 (1997).
54. “f-sum rule for the optical Hall angle” P. Coleman and D. Drew, Phys. Rev. Letters, Vol. 78, 1572 (1997).
55. Reflections on the one-dimension realization of odd-frequency pairing P. Coleman, A. Georges and A. M. Tsvelik, J. Phys: Cond Matt, Vol 79, 345 (1997).
56. “How should we interpret the two transport relaxation times in the cuprates?” P. Coleman, A. J. Schofield and A. M. Tsvelik, J. Physics (Cond Matt.),8, 9985 (1996).
57. “Ultrasound attenuation in gap-anisotropic systems” J. Moreno and P. Coleman, Phys. Rev B Rapid Comm, **53**, R2995 (1996).
58. “Phenomenological Transport Equation for the Cuprate Superconductors” P. Coleman, A. Schofield and A. M. Tsvelik, Phys. Rev. Lett **76**, 1324 (1996).
59. “Condensed Matter Physics, the understated frontier”, P. Coleman, Physics World Issue 12, 29 (1995).

60. "New Outlooks and Old Dreams in Quantum Antiferromagnets," P. Chandra and P. Coleman in Strongly Interacting Fermions and High Temperature Superconductivity: Les Houches Lecture Notes (Session LVI), ed. B. Douçot and J. Zinn-Justin, 495-594, (North-Holland, 1995)
61. "Simple description of the anisotropic two-channel Kondo model" P. Coleman and A. Schofield, *Phys. Rev. Lett.*, **75**, 2184, (1995).
62. "Simple formulation of the two-channel Kondo model", P. Coleman, L. Ioffe and A. M. Tsvelik, *Phys. Rev. B*, **52**, 6611 (1995).
63. "Three Body bound-states and the development of odd frequency pairing" P. Coleman, E. Miranda and A. Tsvelik, *Phys. Rev. Lett.*, **74**, 1654 (1995).
64. "Questions and Issues at SCES '94", **Conference Theory Summary Talk** P. Coleman, *Physica B*, **210**, 191, (1995).
65. "Odd Frequency Pairing in Heavy Fermion Superconductors", P. Coleman, E. Miranda and A. Tsvelik, *Physica B*, **206**, 628, (1995).
66. "Finite-Temperature Transition into a Power Law Spin Phase with an Extensive Zero Point Entropy", P. Chandra, P. Coleman and L. Ioffe, *PRB*, **49**, 12897, (1994).
67. "Non Linear Susceptibility as a probe of the Quadrupolar Kondo Effect", A. Ramirez, P. Chandra, P. Coleman, Z. Fisk, J. L. Smith and H. Ott, *Phys. Rev. Lett.*, **73**, 3018 (1994).
68. "Odd Frequency Pairing in the Kondo Lattice", P. Coleman, E. Miranda and A. Tsvelik, *Phys. Rev. B.*, **49**, 8955, (1994).
69. "Non Linear Susceptibility measurements in Heavy Fermion systems", P. Chandra, A. Ramirez, P. Coleman, E. Brück, A. A. Menovsky, Z. Fisk, & E. Bücher *Physica B*, 199-200, 426 (1994).
70. "Instabilities of the Abrikosov Suhl Resonance", P. Coleman, E. Miranda and A. Tsvelik, *Physica B*, **199-200**, 197(1994).
71. "Gutzwiller-Jastrow wave functions for the $1/r$ Hubbard Model", D. F. Wang, Q. F. Zhong and P. Coleman, *Phys. Rev. B.* **48**, 5502 (1993).
72. "Spin Folding in The Two Dimensional Kagome Lattice Antiferromagnet", I. Ritchey, P. Coleman and P. Chandra, *Phys. Rev. Rapid Comm.* **B 47**, 15342 (1993).
73. "Possible Realization of Odd Frequency Pairing in Heavy Fermion Superconductors", E. Miranda, P. Coleman and A. Tsvelik, *Phys. Rev. Lett.* **70**, 2960 (1993).
74. "Perturbative Approach to the Non-Fermi-Liquid Fixed Point of the Overscreened Kondo Problem", J. Gan, N. Andrei and P. Coleman, *Phys. Rev. Lett.* **70**, 686, (1993)

75. “*The anisotropic Kagome Antiferromagnet: a topological spin glass?*”, P. Chandra, P. Coleman and I. Ritchey, *Journal de Physique*, **3**, 591 (1993).
76. “*Are Heavy Fermion Insulators Gapless ?*”, P. Coleman, E. Miranda and A. Tsvelik, *Physica B* **186-188**, 362 (1993).
77. “*Energy Spectrum of the One Dimensional Supersymmetric t - J model with Long Range hopping and Exchange*”, D. Feng, J. T. Liu and P. Coleman, *Phys. Rev.* **B**, **46**, 6639 (1992)
78. “*Coexistence of Fermi Liquid and Magnetism in the Underscreened Kondo Model*”, J. Gan and P. Coleman, *Phys. Rev. Lett.* **68**, 3476, (1992)
79. “*Non Linear Susceptibility as a Probe of Tensor Spin Order*”, A. Ramirez, P. Coleman, P. Chandra, A. Menovsky, E. Brück, Z. Fisk and E. Bücher, *Physical Review Letters*, **68**, 2680,(1992).
80. “*Heavy Fermion Physics: Physics on the Brink of Magnetism*”, P. Coleman, Kathmandu Summer School 1991 Lectures, to be published (World Scientific)
81. “*Charge Kondo Effect in negative U Anderson Model*”, A. Taraphder and P. Coleman, *Physical Review Letters* **66**, 2814, (1991).
82. “*Spin Waves in Doped Mott Insulators*”, J. Gan, P. Coleman and N. Andrei, *J. Cond. Matt* **20**, 3396, (1991).
83. “*Micromagnetism in heavy Fermion Compounds*” , J. Gan and P. Coleman, *Physica B*, **171**, 3 (1991).
84. “*Quantum fluids treatment of the Triangular Heisenberg Model*”, I. Ritchey and P. Coleman, *J. Cond Matt Lett*, (1990).
85. “*Quantum Spin Nematics: Moment Free Magnetism*”, P. Coleman and P. Chandra, *Phys. Rev. Lett.* **66**, 100 (1991).
86. “*Chiral Spin Fluctuations: Long versus short wavelength*”, I. Ritchey, P. Chandra and P. Coleman, *Phys. Rev. Lett.* **64**, 2583(1990).
87. “*Quantum fluids approach to Frustrated Heisenberg Models*”, P. Chandra , P. Coleman & A. I. Larkin, *Journal of Condensed Matter Physics*, **2** 7933, (1990).
88. “*Ising Phase Transition in Frustrated Heisenberg Models*”, P. Chandra, P. Coleman and A. Larkin, *Phys. Rev. Lett.* **64**, 88 (1990).
89. “*Twisted Magnets & Twisted Superfluids*”, P. Coleman & P. Chandra, *Int. J. Mod. Phys. B*, 1729 (1989).

90. "Some new perspectives on Quantum Antiferromagnets", "Wohlfarth Memorial Lecture", J.M.M.M. **82**, 159 (1989).
91. "Kondo stabilized spin liquids and heavy fermion superconductivity", P. Coleman and N. Andrei, J. Phys. Cond. Matt. **C 1**, 4057-4080 (1989).
92. "Cooper instability in the presence of a spin liquid", N. Andrei and P. Coleman, Phys. Rev. Lett. **62**, 595 (1989).
93. "SU(2) spin liquids and heavy fermion superconductivity, P. Coleman and N. Andrei, J.M.M.M. **66 & 67**, 504 (1988).
94. "Dynamical Magnetic Fluctuations in Narrow Band Metals", P. Coleman and G. G. Lonzarich, Proc. Narrow Band Workshop, Staverden, Nederland, Ed. J. Fuggle (Plenum 1988).
95. "Slave Boson Methods", P. Coleman, Proc. 1987 CAP/NSERC Summer Inst. in Theoretical Physics, Edmonton, Alberta (North Holland) Ed. F. C. Khanna, et. al. World Scientific (1988).
96. "Electron Transport in Mixed Valence and Heavy Fermion Metals", P. Coleman, Proc. 5th International Conference on Valence Fluctuations, Bangalore, 1987, Plenum (1988).
97. "Constrained Quasiparticles and conduction in heavy fermion systems", P. Coleman, Phys. Rev. Lett. **59**, 1026 (1987).
98. "Fluctuations and Dissipation in the Kondo Lattice", P. Coleman, Proc. 5th International Conference on Actinides and Rare Earth Alloys, J. Magn. & Magn. Mat. **63 & 64**, 245 (1987).
99. "Mixed Valence as an Almost Broken Symmetry", P. Coleman, Phys. Rev. **B 35**, 5072-1186 (1987).
100. "Diagonalization of Generalized Anderson Model", P. Coleman and N. Andrei, J. Phys. **C 19**, 3211 (1986).
101. "Broken Symmetry, Heavy Band Formation and the Generalized Anderson Model", Proc. 5th International Conference on Crystalline Fields and Anomalous Mixing Effects, Sendai, Japan 1985, J. Mag. Mat. 1985.
102. "Modelling Mixed Valence Using the Generalized Anderson Model", P. Coleman, Proc. 8th Taniguchi Symposium on Mixed Valence, Kashikojima, Japan 1985. (Springer Verlag) Ed. T. Kasuya, 1985, Springer Series in Solid State Physics, Vol. 62, p.163.
103. "Theory of Anomalous Hall effect in Mixed Valence Systems", P. Coleman, P.W. Anderson and T.V. Ramakrishnan, Phys. Rev. Lett. **55**, 414 (1985).

104. "*Anomalous Hall Effect in Kondo and Mixed Valence Systems*", T.V. Ramakrishnan, P. Coleman and P.W. Anderson, Proc. 4th Int. Conf. on Valence Fluctuations, Cologne 1984, J. Magn. and Magn. Mat. **47 & 48**, 493 (1985). (Invited talk)
105. "*Large N as a Classical Limit of Mixed Valence*", P. Coleman, Proc. 4th International Conference on Valence Fluctuations, Cologne 1984, J. Magn. and Magn. Mat. **47 & 48**, 323 (1985). (Invited talk)
106. "*New Approach to the Mixed Valence Problem*", P. Coleman, Phys. Rev. **B 29**, 3035 (1984).
107. "*Mixed Valence: a new formulation*", P. Coleman, Proc. 1983 NATO Summer School in "Moment formation in Solids", (Plenum 1985) Ed. W. Buyers, p.279.
108. "*1/N Expansion for the Kondo Lattice*", P. Coleman, Phys. Rev. **B 28**, 5255 (1983).

Invited Talks , lectures etc. 1994-

1994 Jan Imperial College, London, UK. Seminar
1994 Jan Birmingham Univ, Birmingham, UK. Seminar
1994 May Princeton Univ, NJ. Seminar
1994 June ICTP, Trieste. Plenary Seminar
1994 July Participant, Aspen Center for Physics.
1994 Aug Conference Summary. "Strongly Correlated Electron Systems", Amsterdam
1994 Nov Lake Hamana, Japan. Monbusho Conference. Invited Speaker
1994 Nov Hiroshima Univ, Seminar
1994 Nov Osaka Univ, Seminar
1994 Nov Nagoya Univ, Seminar
1994 Nov ISSP, Tokyo, Seminar
1994 Nov National Univ of Korea, Seoul, Seminar

1995 Apr Penn State Univ, PA, Seminar
1995 May City College, NY, Seminar
1995 Jul ICTP, Trieste, Seminar
1995 Aug International Center for Physics, Heraklion, Crete, Seminar
1995 Aug IRC, Cambridge, UK, Seminar
1995 Oct Los Alamos National Lab, Seminar
1995 Nov Lake Hamana, Japan. Monbusho Conference. Invited Speaker
1995 Nov Nagoya Univ, Seminar
1995 Dec ISSP, Tokyo, Seminar
1995 Dec Pacific Conference on Strong Correlation, Seoul. Invited speaker.

1996 Mar March Meeting, St Louis. Invited Speaker
1996 Mar U. C. Riverside, Seminar
1996 Mar U. C. Santa Cruz, Seminar
1996 Nov U. Wisconsin, Colloquium.
1996 Nov U. Michigan, Ann Arbor
1997 Feb U. Birmingham, Seminar.
1997 Mar U. Warwick, UK, Seminar.
1997 Apr U. Bristol, UK, Colloquium.
1997 Apr U. Paris Sud, Paris, France Seminar.
1997 Apr ILL, Grenoble, France, Seminar.
1997 May U. Cambridge, UK, Seminar.
1997 Oct Rice University, Houston. Colloquium.
1997 Nov Brookhaven National Lab. Seminar.

1998 Jan U. Cambridge, UK, Seminar.

1998 Sep Imperial College, London. Seminar.
 1998 Sep Agio Pelage, Crete. Seminar.
 1998 Oct City College, NY, Colloquium.
 1998 Oct J. Hopkins U., Colloquium.

1999 Jan Center for Physics, Aspen. Invited Talk.
 1999 Mar APS Centennial Meeting. Centennial Seminar.
 1999 Mar U. Gainesville, Florida. Seminar
 1999 May Los Alamos National Lab.
 1999 Jul ICTP, Trieste Seminar.
 1999 Jul Center for Physics, Aspen. Seminar.
 1999 Nov U. Tennessee, Knoxville. Colloquium

2000 Jan Newton Inst, Cambridge. Invited talk.
 2000 Jan Center for Physics, Aspen. Public Lecture.
 2000 Oct Ferlin meeting, Il Ciocco, Italy. Invited talk.
 2000 Oct ITP, Santa Barbara. Seminar.

2001 Mar Boston College, Invited talk at workshop
 2001 Apr SNS Conference, Chicago, Invited Speaker
 2001 May Festschrift Fur Frank Steglich, Schloss Ringberg, Germany, Invited Speaker
 2001 May SpHT, Saclay, Seminar.
 2001 Aug SCES 01, Ann Arbor, Invited Speaker
 2001 Sept Seminar, NHMFL, Tallahassee, Fl.
 2001 Oct Lecturer at 7th School of CMT, Vietri Sur Mare, Salerno.
 2001 Oct High Fields Conference, Santa Fe, NM, Invited Speaker.
 2001 Oct Board of Physics Meeting, National Science Council, Irvine Cal. Invited Speaker.
 2001 Dec Max Planck Inst, Dresden, Seminar
 2001 Dec LVSM , Katholeike U., Leuven, Colloquium.
 2001 Dec ISIS, Rutherford Lab, UK.

2002 Jan U. Toronto, Canada
 2002 Mar Invited Speaker, APS March meeting, Indianapolis
 2002 Apr Colloquium, Kent St. University
 2002 May ICAM lecturer, Los Alamos, NM
 2002 Jun Invited Speaker, musR 2000, Williamsburg
 2002 Jun Visitor, UT Knoxville, / ORNL .
 2002 Jul Invited Speaker, ICM Poznan, Poland
 2002 Jul Invited Speaker, Actinide Physics, Czech Republic
 2002 Jul Invited Speaker, Th2002, Paris.
 2002 Aug Colloquium, UT Knoxville

2002 Sep Invited Speaker Concepts in Strong Correlation 02, Hvar, Croatia
2002 Oct Seminar, U. Michigan
2002 Nov Lecturer, Emergent Materials, Brazilia, Brazil
2002 Dec Colloquium, Jefferson Lab, Virginia

2003 Jan Seminar, U. College, London
2003 May Ehrenfest Colloquium, Leiden.
2003 Jun Seminar, Max Planck, Dresden
2003 Jun Seminar, Karlsruhe,
2003 Jul Physics Dialog, Aspen
2003 Dec Colloq, Temple U
2003 Nov Colloq Northwestern University
2003 Dec Colloq, U. Penn
2003 Nov Seminar, NHMFL, Los Alamos

2004 Feb Seminar UC San Diego
2004 May Colloquium, Argonne National Lab
2004 May Invited talk, ICAM conference Cargese
2004 May Seminar, Inst. for Solid State, Budapest
2004 Jul Invited talk, ICTP Trieste, Italy
2004 Jul Invited speaker, CMD20, Prague
2004 Oct Colloquium, UNC Chapel Hill
2004 Nov Colloquium, UIC, Chicago
2004 Dec Seminar, Technical U. Budapest

2005 Jan Colloquium, UC Irvine