

## Curriculum Vitae

### I. Personal

Born: May 15, 1952, St. Louis, Missouri, USA.

### II. Education

Ph.D. in Physics - University of California, Berkeley, 1980

A.B. - Oberlin College, 1974; Highest Honors in Physics, Phi Beta Kappa.

### III. Employment

California Institute of Technology, Frank J. Roshek Professor of Physics and Applied Physics, Emeritus, 2018 - present

California Institute of Technology, Frank J. Roshek Professor of Physics and Applied Physics, 2005 – 2018

California Institute of Technology, Frank J. Roshek Professor of Physics, 2004 – 2005

California Institute of Technology, Professor of Physics, 1996 – 2004.

AT&T Bell Laboratories, Murray Hill - Member of Technical Staff, 1985 - 1996.

AT&T Bell Laboratories, Murray Hill - Postdoctoral Member of Technical Staff, 1983 – 1985.

Assistant Professor of Physics, Williams College, 1980 - 1985.

### IV. Professional Honors and Activities

Oliver E. Buckley Prize, American Physical Society, 2007

National Academy of Sciences, elected 2005

Morris Loeb Lecturer, February 2003, Harvard University

ASCIT Excellence in Teaching Award, May 2003

AT&T Bell Laboratories Distinguished Member of Technical Staff, 1993

Fellow of the American Physical Society, 1992

Visiting Professor, Indian Institute of Science, Bangalore, India, 2013

Visiting Professor, Tata Institute for Fundamental Research, Mumbai, India, 2012-2013

Associate Editor, Annual Review of Condensed Matter Physics, 2009-2013

National Research Council Board on Physics and Astronomy, 2009-2011

Executive Advisory Board, Kavli Institute of Theoretical Physics, 2010-2012

National Research Council Committee on 2010 Decadal Survey of Condensed Matter Physics

Member-at-Large, Executive Committee, APS Division of Condensed Matter Physics

Solid States Sciences Committee of the National Research Council, 2000-2003 & 2004-2007.

Mentor of 2002 APS Apker Award winner Kathryn Todd.

National Research Council Associateships Program Evaluation Panel, 2001-2006.

National Research Council Panel on Assessment of NIST Programs 1996-1999.

### V. General Area of Research

Experimental Condensed Matter Physics at Low Temperatures: Transport and Thermodynamics of Low Dimensional Electronic Systems, Correlated Electron Systems in High Magnetic Fields, Physics of Semiconductor Heterostructures and Quantum Wells, etc.

## **VI. Patent**

“Apparatus for Contacting Closely Spaced Quantum Wells and Resulting Devices” U.S. Patent 5,241,190. Issued Aug. 31, 1993. Co-inventor L.N. Pfeiffer.

## VII. Recent Invited Talks

### 2018

1. "Interlayer Interactions and Tunneling in Bilayer Composite Fermion Metals", International Symposium on Quantum Hall Effects and Related Topics, MPI Stuttgart (June).
2. "Quantum Hall Exciton Condensate", CECAM Workshop on Excitonic Insulators, Lausanne (September).

### 2017

1. "Spin Dependent Tunneling in the Fractional Quantum Hall Regime", 22nd International Conference on the Electronic Properties of Two-Dimensional Systems, Pennsylvania State University (July).

### 2016

1. "Spin Dependent Tunneling in the Fractional Quantum Hall Regime", March APS Meeting, New Orleans.
2. "Spin Dependent Tunneling in the Fractional Quantum Hall Regime", Symposium in celebration of B.I. Halperin's 75th birthday, Harvard. (I was the only experimentalist invited to speak.)

### 2015

1. "Disorder and the  $\nu=1$  Bilayer Exciton Condensate", Okinawa Institute of Science and Technology Graduate University.

### 2014

1. "Correlated Electrons in Two Dimensions: The Fractional Quantum Hall Effect and More", Kavli Special Symposium on the Many-body Problem, March APS Meeting, Denver.

### 2013

1. "Bose Condensation, Superfluidity, and the Quantum Hall Effect", National Chao Tung University, Taiwan (December).
2. "Exciton Transport and Perfect Coulomb Drag", Columbia University (September).
3. "Recent Results in Single and Double Layer Quantum Hall Systems", Plenary talk at 20th International Conference on the Electronic Properties of Two-Dimensional Systems, Wroclaw, Poland (July).
4. "Tunneling and Counterflow Transport in a Bilayer Quantum Hall System", QHE Symposium, Stuttgart, Germany (June).
5. "Bose Condensation, Superfluidity, and the Quantum Hall Effect", Indian Institute for Science, Bangalore, India (May).

### 2012

1. "Condensate versus Quasiparticle Transport in Bilayer Quantum Hall Superfluid", Chandrasekhar Discussion Meeting, Bangalore, India (December).
2. "Bose Condensation, Superfluidity, and the Quantum Hall Effect", Tata Institute for Fundamental Research, Mumbai, India (December).
3. "Exciton Condensation and Perfect Coulomb Drag", UC Riverside (November).

4. "Exciton Transport in Quantum Hall Bilayers", 20th International Conference on High Magnetic Fields in Semiconductor Physics, Chamonix, France, (July).
5. "Condensate and Quasiparticle Transport in a Bilayer Quantum Hall Excitonic Superfluid", SpinOptronics 2012, Ioffe Institute, St. Petersburg, Russia, (July).

"Condensate and Quasiparticle Transport in a Bilayer Quantum Hall Excitonic Superfluid", CQS Symposium on Condensate Quantum Mechanics, University of Texas, Austin, (April).

## VIII. Publications (refereed publications noted by \*)

1. \* "Interlayer Interactions and the Fermi Energy of Bilayer Composite-Fermion Metals", J.P. Eisenstein, L.N. Pfeiffer, and K.W. West, *Phys. Rev. B* **98**, 201406(R) (2018).
2. \* "Quantum Hall Spin Diode", J.P. Eisenstein, L.N. Pfeiffer, and K.W. West, *Phys. Rev. Lett.* **118**, 186801 (2017).
3. \* "Tunnel Transport and Interlayer Excitons in Bilayer Fractional Quantum Hall Systems", Yuhe Zhang, J.K. Jain, and J.P. Eisenstein, *Phys. Rev. B* **95**, 195105 (2017).
4. \* "Charge Metastability and Hysteresis in the Quantum Hall Regime", J. Pollanen, J.P. Eisenstein, L.N. Pfeiffer, and K.W. West, *Phys. Rev. B* **94**, 245440 (2016).
5. \* "Signatures of Phonon and Defect-Assisted Tunneling in Planar Metal-Hexagonal Boron Nitride-Graphene Junctions", U. Chandni, K. Watanabe, T. Taniguchi, and J.P. Eisenstein, *NanoLetters* **16**, 7982 (2016).
6. \* "Spin and the Coulomb Gap in the Half-Filled Lowest Landau Level", J.P. Eisenstein, T. Khaire, D. Nandi, A.D.K. Finck, L.N. Pfeiffer, and K.W. West, *Phys. Rev. B*, **94**, 125409 (2016).
7. \* "Heterostructure Symmetry and the Orientation of the Quantum Hall Nematic Phases", J. Pollanen, K.B. Cooper, S. Brandsen, J.P. Eisenstein, L.N. Pfeiffer, and K.W. West, *Phys. Rev. B*, **92**, 115410 (2015).
8. \* "Evidence for Defect-Mediated Tunneling in Hexagonal Boron Nitride-Based Junctions", U. Chandni, K. Watanabe, T. Taniguchi, and J.P. Eisenstein, *NanoLetters* **15**, 7329 (2015).
9. \* "Transport in Indium-Decorated Graphene", U. Chandni, E.A. Henriksen, and J.P. Eisenstein, *Phys. Rev. B* **91**, 245402 (2015).
10. \* "Exciton Condensation in Bilayer Quantum Hall Systems", J.P. Eisenstein, *Annu. Review of Condens. Matter Phys.* **5**, 159 (2014).
11. \* "Tunneling at  $\nu_T = 1$  in Quantum Hall Bilayers", D. Nandi, T. Khaire, A.D.K. Finck, J.P. Eisenstein, L.N. Pfeiffer, and K.W. West, *Phys. Rev. B* **88**, 165308 (2013).
12. "Exciton Transport in a Bilayer Quantum Hall Superfluid", J.P. Eisenstein, A.D.K. Finck, D. Nandi, L.N. Pfeiffer, and K.W. West, *Proc. of the 20th Intl. Conf. on the Applications of High Magnetic Fields in Semiconductor Physics*, Chamonix (2013).
13. \* "Thermoelectric response of fractional quantized Hall and re-entrant insulating states in the  $N=1$  Landau level", W.E. Chickering, J.P. Eisenstein, L.N. Pfeiffer and K.W. West, *Phys. Rev. B* **87**, 075302 (2013).
14. \* "Exciton Condensation and Perfect Coulomb Drag", D. Nandi, A.D.K. Finck, J.P. Eisenstein, L.N. Pfeiffer, and K.W. West, *Nature* **488**, 481 (2012).
15. \* "Quantum Hall Effect and Semimetallic Behavior of Dual-Gated ABA Trilayer Graphene", E.A. Henriksen, D. Nandi, and J.P. Eisenstein, *Phys. Rev. X* **2**, 011004 (2012).
16. \* "Evidence for a Fractionally Quantized Hall State with Anisotropic Longitudinal Transport", Jing Xia, J.P. Eisenstein, L.N. Pfeiffer and K.W. West, *Nature Physics* **7**, 845 (2011).
17. \* "Exciton Transport and Andreev Reflection in a Bilayer Quantum Hall System", Aaron Finck, J.P. Eisenstein, L.N. Pfeiffer and K.W. West, *Phys. Rev. Lett.* **106**, 236807 (2011).
18. "Nematic Fermi Fluids in Condensed Matter Physics", E. Fradkin, S.A. Kivelson, M.J. Lawler, J.P. Eisenstein, and A.P. MacKenzie, *Annual Reviews of Condensed Matter Physics*, **1**, 153 (2010).
19. \* "Tilt-Induced Anisotropic to Isotropic Phase Transition at  $\nu = 5/2$ ", Jing Xia, Vaclav Cvicek, J.P. Eisenstein, L.N. Pfeiffer, K.W. West, *Phys. Rev. Lett.* **105**, 176807 (2010).

20. \* "Measurement of the Electronic Compressibility of Bilayer Graphene", E.A. Henriksen and J.P. Eisenstein, *Phys. Rev. B* **82**, 041412(R) (2010).
21. \* "Thermopower of Two-Dimensional Electrons at Filling Factors  $\nu = 3/2$  and  $5/2$ ", W.E. Chickering, J.P. Eisenstein, L.N. Pfeiffer and K.W. West, *Phys. Rev. B* **81**, 245319 (2010).
22. \* "Clausius-Clapeyron Relations for First-Order Phase Transitions in Bilayer Quantum Hall Systems", Y. Zou, G. Refael, A. Stern, and J.P. Eisenstein, *Phys. Rev. B* **81**, 205313 (2010).
23. \* "Quantum Hall Exciton Condensation at Full Spin Polarization", A.D.K. Finck, J.P. Eisenstein, L.N. Pfeiffer and K.W. West, *Phys. Rev. Lett.* **104**, 016801 (2010).
24. "Edge Heat Transport in the Quantum Hall Regime", Ghislain Granger, J.P. Eisenstein, and J.L. Reno, *Intl. Journal of Modern Physics*, **23**, 12 (2009).
25. "Breakdown of Particle-Hole Symmetry in the Lowest Landau Level Revealed by Tunneling Spectroscopy", J.P. Eisenstein, L.N. Pfeiffer, and K.W. West, *Solid State Commun.* **149**, 1867 (2009).
26. \* "Hot-Electron Thermocouple and the Diffusion Thermopower of Two-Dimensional Electrons in GaAs W.E. Chickering, J.P. Eisenstein, J.L. Reno, *Phys. Rev. Lett.* **103**, 046807 (2009).
27. \* "Observation of Chiral Heat Transport in the Quantum Hall Regime", G. Granger, J.P. Eisenstein, J.L. Reno, *Phys. Rev. Lett.* **102**, 086803 (2009).
28. \* "Charge Imbalance and Bilayer 2D Electron Systems at  $\nu_T = 1$ ", A.R. Champagne, A.D.K. Finck, J.P. Eisenstein, L.N. Pfeiffer, and K.W. West, *Phys. Rev. B* **78**, 205310 (2008).
29. \* "Area Dependence of Interlayer Tunneling in Strongly Correlated Bilayer 2D Electron Systems at  $\nu_T = 1$ ", A.D.K. Finck, A.R. Champagne, J.P. Eisenstein, L.N. Pfeiffer, and K.W. West, *Phys. Rev. B* **78**, 075302 (2008).
30. \* "Evidence for a Finite Temperature Phase Transition and Phase Competition in a Bilayer 2D Electron System", A.R. Champagne, J.P. Eisenstein, L.N. Pfeiffer and K.W. West, *Phys. Rev. Lett.* **100**, 076803 (2008).
31. "Quantum Lifetime of Two-Dimensional Holes", J.P. Eisenstein, D. Syphers, L.N. Pfeiffer and K.W. West, *Solid State Commun.* **143**, 365 (2007).
32. \* "Spin Transition in the Half-filled Landau Level", L.A. Tracy, J.P. Eisenstein, L.N. Pfeiffer and K.W. West, *Phys. Rev. Lett.* **98**, 086801 (2007).
33. \* "Resistively-Detected NMR in a Two-Dimensional Electron System near  $\nu = 1$ : Clues to the Origin of the Dispersive Lineshape", L.A. Tracy, J.P. Eisenstein, L.N. Pfeiffer and K.W. West, *Phys. Rev. B* **73**, 121306(R) (2006).
34. \* "Observations of Nascent Superfluidity in a Bilayer Two-Dimensional Electron System at  $\nu_T = 1$ ", M.J. Kellogg, J.P. Eisenstein, L.N. Pfeiffer, and K.W. West, *Physica E* **34**, 6 (2006).
35. "Surface Acoustic Wave Propagation and Inhomogeneities in Low-Density Two-Dimensional Electron Systems near the Metal-Insulator Transition" L.A. Tracy, J.P. Eisenstein, M.P. Lilly, L.N. Pfeiffer and K.W. West, *Solid State Commun.* **137**, 150 (2005).
36. \* "Spin Transition in Strongly Correlated Bilayer Two Dimensional Electron Systems", I.B. Spielman, L.A. Tracy, J.P. Eisenstein, L.N. Pfeiffer and K.W. West, *Phys. Rev. Lett.* **94**, 076803 (2005).
37. "Novel Phenomena in Double Layer Two-Dimensional Electron Systems", in *Nanophysics: Coherence and Transport*, edited by H. Bouchiat, Y. Gefen, S. Gueron, G. Montambaux, and J. Dalibard. Les Houches Summer School Session. (Elsevier, 2005).

38. \* “Bose-Einstein Condensation of Excitons in Bilayer Electron Systems”, J.P. Eisenstein and A.H. MacDonald, *Nature* **432**, 691 (2004).
39. “Half Full or Half Empty?”, J.P. Eisenstein, *Science* **305**, 950 (2004)
40. \* “Onset of Interlayer Phase Coherence in a Bilayer Two-Dimensional Electron System: Effect of Layer Density Imbalance”, I.B. Spielman, M. Kellogg, J.P. Eisenstein, L.N. Pfeiffer and K.W. West, *Phys. Rev. B* **70**, 081303(R) (2004).
41. "Vanishing Hall and Longitudinal Resistances in Bilayer Two-Dimensional Electron Systems at at  $\nu_T = 1$ ", M. Kellogg, J.P. Eisenstein, L.N. Pfeiffer, and K.W. West, *Intl. Journal of Modern Physics B* **18**, 27 (2004).
42. \* “Vanishing Hall Resistance at High Magnetic Field in a Double Layer Two-Dimensional Electron System”, M. Kellogg, J.P. Eisenstein, L.N. Pfeiffer and K.W. West, *Phys. Rev. Lett.* **93**, 036801 (2004).
43. \* “Metastable Resistance Anisotropy Orientation of Two-Dimensional Electrons in High Landau Levels”, K.B. Cooper, J.P. Eisenstein, L.N. Pfeiffer and K.W. West, *Phys. Rev. Lett.* **92**, 026806 (2004).
44. “Evidence for spontaneous interlayer phase coherence in a bilayer quantum Hall exciton condensate”, J.P. Eisenstein, *Solid State Commun.* **127**, 123 (2003).
45. \* "Bilayer 2D Electron Systems at at  $\nu_T = 1$ : Phase Boundary between Weak and Strong Coupling", J.P. Eisenstein, M.J. Kellogg, I.B. Spielman, L.N. Pfeiffer, and K.W. West, *Physica E* **20**, 111 (2003).
46. \* "Evidence of Superfluidity in Double Layer 2D Electron Systems", J.P. Eisenstein, I.B. Spielman, M.J. Kellogg, L.N. Pfeiffer, and K.W. West, *Physica E* **18**, 103 (2003).
47. \* “Bilayer Quantum Hall Systems at  $\nu_T = 1$ : Coulomb Drag and the Transition from Weak to Strong Interlayer Coupling”, M.Kellogg, J.P. Eisenstein, L.N. Pfeiffer and K.W. West, *Phys. Rev. Lett.* **90**, 246801 (2003).
48. \* “Observation of narrow-band noise accompanying the breakdown of insulating states in high Landau levels”, K.B. Cooper, J.P. Eisenstein, L.N. Pfeiffer and K.W. West, *Phys. Rev. Lett.* **90**, 226803 (2003).
49. \* “Resistivity of dilute 2D electrons in an undoped GaAs heterostructure”, M.P. Lilly, J.L. Reno, J.A. Simmons, I.B. Spielman, J.P. Eisenstein, L.N. Pfeiffer, K.W. West, E.H. Hwang, and S. Das Sarma, *Phys. Rev. Lett.* **90**, 056806 (2003) .
50. “Evidence for  $2k_F$  Electron-Electron Scattering Processes in Coulomb Drag”, M.Kellogg, J.P. Eisenstein, L.N. Pfeiffer and K.W. West, *Solid State Commun.* **123**, 515 (2002).
51. "Tunneling in a Quantum Hall Excitonic Condensate", J.P. Eisenstein, I.B. Spielman, L.N. Pfeiffer, and K.W. West, *Intl. Journal of Modern Physics B* **16**, 2923 (2002).
52. \* “Observation of Quantized Hall Drag in a Strongly Correlated Bilayer Electron System”, M.Kellogg, I.B. Spielman, J.P. Eisenstein, L.N. Pfeiffer and K.W. West, *Phys. Rev. Lett.* **88**, 126804 (2002).
53. "Evidence for a Liquid Crystal Phase Transition in Two-Dimensional Electrons in High Landau Levels", K.B. Cooper, M.P. Lilly, J.P. Eisenstein, L.N. Pfeiffer, and K.W. West, *Journal de Physique IV* **12**, 377 (2002).
54. \* “Onset of Anisotropic Transport of Two-dimensional Electrons in High Landau Levels: Possible Isotropic-to-Nematic Liquid Crystal Phase Transition”, K.B. Cooper, M.P. Lilly, J.P. Eisenstein, L.N. Pfeiffer, and K.W. West, *Phys. Rev. B* **65**, 241313(R) (2002).

55. \* “Insulating and Fractional Quantized Hall States in the First Excited Landau Level”, J.P. Eisenstein, K.B. Cooper, L.N. Pfeiffer and K.W. West, *Phys. Rev. Lett.* **88**, 076801 (2002).
56. \* “An All-Cryogenic THz Transmission Spectrometer”, P.J. Burke, J.P. Eisenstein, L.N. Pfeiffer, and K.W. West, *Rev. Sci. Instr.* **73**, 130 (2002).
57. \* “Terahertz Photoconductivity and Plasmon Modes in Double-Quantum-Well Field-Effect Transistors”, X.G. Peralta, S.J. Allen, M.C. Wanke, N.E. Harff, J.A. Simmons, M.P. Lilly, J.L. Reno, P.J. Burke, and J.P. Eisenstein, *Applied Physics Letters* **81**, 1627 (2002).
58. \* “Observation of a Linearly Dispersing Goldstone Mode in a Quantum Hall Ferromagnet”, I.B. Spielman, J.P. Eisenstein, L.N. Pfeiffer, and K.W. West, *Phys. Rev. Lett.* **87**, 036803 (2001).
59. “The Quantum Hall Effect Branches Out”, J.P. Eisenstein, *Physics World* **14**, 30 (2001).
60. \* “New Collective States of 2D Electrons in High Landau Levels”, J.P. Eisenstein, M.P. Lilly, K.B. Cooper, L.N. Pfeiffer, and K.W. West, *Physica E* **9**, 1 (2001).
61. “An Investigation of Orientational Symmetry-Breaking Mechanisms in High Landau Levels”, K.B. Cooper, M.P. Lilly, J.P. Eisenstein, T. Jungwirth, L.N. Pfeiffer and K.W. West, *Solid State Commun.* **119**, 89 (2001).
62. “Experimental Signatures of Broken Symmetries in the Quantum Hall Regime”, J.P. Eisenstein, Proc. 25th Int. Conf. Phys. Semicond., Osaka 2000, edited by N. Miura and T. Ando (Springer, Berlin, 2001).
63. “Two-dimensional electrons in excited Landau levels: evidence for new collective states”, J.P. Eisenstein, *Solid State Commun.* **117**, 123 (2001).
64. \* “Resonantly Enhanced Tunneling in a Double Layer Quantum Hall Ferromagnet”, I.B. Spielman, J.P. Eisenstein, L.N. Pfeiffer, and K.W. West, *Phys. Rev. Lett.* **84**, 5808 (2000).
65. \* “High Frequency Conductivity of the High Mobility Two-Dimensional Electron Gas”, P.J. Burke, I.B. Spielman, J.P. Eisenstein, L.N. Pfeiffer, and K. W. West, *Appl. Phys. Lett.* **76**, 745 (2000).
66. “New Physics in High Landau Levels”, J.P. Eisenstein, Proc. 13<sup>th</sup> Int. Conf. on the Electronic Properties of Two-Dimensional Systems, Ottawa, 1999.
67. \* “Insulating Phases in High Landau Levels: Observation of Sharp Thresholds to Conduction”, K.B. Cooper, M.P. Lilly, J.P. Eisenstein, L.N. Pfeiffer, and K.W. West, *Phys. Rev. B* **60**, R11285 (1999).
68. \* “Anisotropic Phases of Two-Dimensional Electron Systems in High Landau Levels: Effect of an In-Plane Magnetic Field”, M.P. Lilly, K.B. Cooper, J.P. Eisenstein, L.N. Pfeiffer, and K.W. West, *Phys. Rev. Lett.* **83**, 824 (1999).
69. \* “Evidence for an Anisotropic State of Two-Dimensional Electrons in High Landau Levels”, M.P. Lilly, K.B. Cooper, J.P. Eisenstein, L.N. Pfeiffer, and K.W. West, *Phys. Rev. Lett.* **82**, 394 (1999).
70. \* “Coulomb Drag in the Extreme Quantum Limit”, M.P. Lilly, J.P. Eisenstein, L.N. Pfeiffer, and K.W. West, *Phys. Rev. Lett.* **80**, 1714 (1998).
71. “Experimental Studies of Multicomponent Quantum Hall Systems”, J.P. Eisenstein, in *Perspectives in Quantum Hall Effects*, edited by S. Das Sarma and A. Pinczuk, (John Wiley, New York, 1997).
72. “Double Layer Two Dimensional Electron Systems at High Magnetic Field”, J.P. Eisenstein, *Brazilian Journal of Physics* **26**, 68 (1996).
73. \* “Observation of many-body interactions of electrons in coupled double quantum wells”, A.S. Plaut, A. Pinczuk, B.S. Dennis, J.P. Eisenstein, L.N. Pfeiffer, and K.W. West, *Surf. Sci.* **362**, 158 (1996).



74. \* “Light-scattering determination of electron tunneling gaps in double quantum wells”, A.S. Plaut, A. Pinczuk, B.S. Dennis, J.P. Eisenstein, L.N. Pfeiffer, and K.W. West, *Solid State Electronics*, **40**, 291 (1996).
75. \* “Evidence for Skyrmions and Single Spin Flips in the Integer Quantized Hall Effect”, A. Schmelzer, J.P. Eisenstein, L.N. Pfeiffer, and K.W. West, *Phys. Rev. Lett.* **75**, 4290 (1995).
76. \* “Lifetime of Two-Dimensional Electrons Measured by Tunneling Spectroscopy”, S.Q. Murphy, J.P. Eisenstein, L.N. Pfeiffer, and K.W. West, *Phys. Rev. B* **52**, 14825 (1995).
77. \* “Evidence for an Inter-Layer Exciton in Tunneling between Two-Dimensional Electron Systems”, J.P. Eisenstein, L.N. Pfeiffer, and K.W. West, *Phys. Rev. Lett.* **74**, 1419 (1995).
78. “Capacitance of Two-Dimensional Electron Systems subject to an In-Plane Magnetic Field”, J. Hampton, J.P. Eisenstein, L.N. Pfeiffer, and K.W. West, *Sol. State Commun.* **94**, 559 (1995).
79. “New Physics in Double Layer 2D Electron Systems”, J.P. Eisenstein, *11<sup>th</sup> Int'l. Conf. on High Magnetic Fields in Semiconductor Physics*, edited by D. Heiman, (World Scientific, Singapore, 1995)
80. \* “Compressibility of the Two-Dimensional Electron Gas: Measurements of the Zero Field Exchange Energy and Fractional Quantum Hall Gap”, J.P. Eisenstein, L.N. Pfeiffer, and K.W. West, *Phys. Rev. B* **50**, 1760 (1994).
81. \* “Many-Body Integer Quantum Hall Effect: Evidence for New Phase Transitions”, S.Q. Murphy, J.P. Eisenstein, G.S. Boebinger, L.N. Pfeiffer, and K.W. West, *Phys. Rev. Lett.* **72**, 728 (1994).
82. \* “Tunneling between Highly Correlated 2D Electron Systems”, J.P. Eisenstein, L.N. Pfeiffer, and K.W. West, *Surf. Sci.* **305**, 393 (1994).
83. \* “New Collective Quantum Hall States in Double Quantum Wells”, G.S. Boebinger, S.Q. Murphy, J.P. Eisenstein, L.N. Pfeiffer, K.W. West, and Song He, *Surf. Sci.* **305**, 8 (1994).
84. \* “Separately Contacted Electron-Hole Double-Layer in a GaAs/Al<sub>x</sub>Ga<sub>1-x</sub>As Heterostructure” B.E. Kane, J.P. Eisenstein, W. Wegscheider, L.N. Pfeiffer, K.W. West, *Appl. Phys. Lett.* **65**, 3266 (1994).
85. \* “Measuring Electron-Electron Scattering Rates Through Mutual Friction”, T.J. Gramila, J.P. Eisenstein, A.H. MacDonald, L.N. Pfeiffer, and K.W. West, *Physica B* **197**, 442 (1994).
86. “Evidence for Virtual Phonon Exchange Between 2-D Electron Gases”, T.J. Gramila, J.P. Eisenstein, A.H. MacDonald, L.N. Pfeiffer, and K.W. West, in *Phonon Scattering in Condensed Matter VII: Proceedings of the Seventh International Conference*, edited by M. Meissner and R.O. Pohl (Springer, 1993).
87. \* “Evidence for Virtual Phonon Exchange in Semiconductor Heterostructures”, T.J. Gramila, J.P. Eisenstein, A.H. MacDonald, L.N. Pfeiffer, and K.W. West, *Phys. Rev. B* **47**, 12957 (1993).
88. “The Quantum Hall Effect”, J.P. Eisenstein, *Am. J. Phys.* **61**, 179 (1993).
89. \* “Coulomb Barrier to Tunneling between Parallel Two-Dimensional Electron Systems”, J.P. Eisenstein, L.N. Pfeiffer, and K.W. West, *Phys. Rev. Lett.* **69**, 3804 (1992).
90. \* “New Transport Phenomena in Coupled Quantum Wells”, J.P. Eisenstein, *Superlattices and Microstructures* **12**, 107 (1992).
91. \* “Multiquantum Well Structure with an Average Electron Mobility of  $4.0 \times 10^6$  cm<sup>2</sup>/Vs”, L.N. Pfeiffer, K.W. West, J.P. Eisenstein, K.W. Baldwin, and P. Gammel, *Appl. Phys. Lett.* **61**, 1211 (1992).
92. \* “New Fractional Quantum Hall State in Double-Layer Two-Dimensional Electron Systems”, J.P. Eisenstein, G.S. Boebinger, L.N. Pfeiffer, K.W. West, and Song He, *Phys. Rev. Lett.* **68**, 1383 (1992).

93. \* “Negative Compressibility of Interacting Two-Dimensional Electron and Quasiparticle Gases”, J.P. Eisenstein, L.N. Pfeiffer, and K.W. West, *Phys. Rev. Lett.* **68**, 674 (1992).
94. “Compressibility of the Interacting Two-Dimensional Electron Gas”, J.P. Eisenstein in *Low-Dimensional Electronic Systems*, eds. G. Bauer, F. Kuchar, and H. Heinrich,, vol. 111 Springer Series in Solid State Sciences, (Springer Verlag, Berlin, 1992).
95. \* “Resonant Tunneling in GaAs/AlGaAs Double Quantum Wells”, J.P. Eisenstein, T.J. Gramila, L.N. Pfeiffer, and K.W. West, *Surf. Sci.* **267**, 377 (1992).
96. \* “Electron-Electron Scattering between Parallel Two-Dimensional Gases”, T.J. Gramila, J.P. Eisenstein, A.H. MacDonald, L.N. Pfeiffer, and K.W. West, *Surf. Sci.* **263**, 446 (1992).
97. “Resonant Tunneling in Coupled Quantum Wells”, J.P. Eisenstein in *Nanostructures and Mesoscopic Systems*, edited by W.P. Kirk and M.A. Reed, (Academic Press 1992).
98. \* “Probing a Two-Dimensional Fermi Surface by Tunneling”, J.P. Eisenstein, T.J. Gramila, L.N. Pfeiffer, and K.W. West, *Phys. Rev. B* **44**, 6511 (1991).
99. \* “Field-Induced Resonant Tunneling between Parallel Two Dimensional Electron Systems”, J.P. Eisenstein, L. N. Pfeiffer, and K. W. West, *Appl. Phys. Lett.* **58**, 1497 (1991).
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## IX. Current Research Group and Funding Sources

### Graduate Students:

1. **Debaleena Nandi**

### Postdoctoral Associates:

1. **Johannes Pollanen** Ph.D. Northwestern 2012
2. **Chandni U.** Ph.D. IISc, Bangalore, 2012

### Funding:

1. National Science Foundation
2. Department of Energy
3. Microsoft Corporation

## X. Former Graduate Students and Postdoctoral Associates

### Graduate Students:

1. **Aaron Finck** Caltech Ph.D. 2011 Postdoc at U. Illinois, Urbana-Champaign.
2. **Lisa A. Tracy** Caltech Ph.D. 2007 Member of Technical Staff, Sandia National Laboratories, Albuquerque, NM.
3. **Melinda J. Kellogg** Caltech Ph.D. 2004 Assistant Professor, University of Virginia, College at Wise.
4. **Ian B. Spielman** Caltech Ph.D. 2004 Fellow, Joint Quantum Institute, NIST and University of Maryland.
5. **Kenneth B. Cooper** Caltech Ph.D. 2003 Research Scientist, Jet Propulsion Laboratory, Pasadena, CA.

### Postdoctoral Associates:

1. **Trupti Khaire** Caltech 2011-2013 Argonne National Laboratory
2. **Erik Henriksen** Caltech 2009-2013 Asst. Prof. of Physics, Washington University, St. Louis, MO.
3. **Jing Xia** Caltech 2008-2011 Asst. Prof. of Physics, UC Irvine
4. **Ghislain Granger** Caltech 2005-2008 Member of Technical Staff, National Research Council of Canada.
5. **Alexandre Champagne** Caltech 2005-2008 Asst. Prof. of Physics, Concordia University, Montreal, Quebec.
6. **Joseph A. Bonetti** Caltech 2003-2005 Research Scientist, Jet Propulsion Laboratory, Pasadena, CA.
7. **Peter J. Burke** Caltech 1998-2001 Prof. of Electrical Engineering and Computer Science, UC Irvine.
8. **Michael P. Lilly** Caltech 1997-2000 Member of Technical Staff, Sandia National Laboratories, Albuquerque, NM.
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