

Curriculum Vitae

ERIC W. HUDSON

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Education:

Ph.D. Physics,	University of California, Berkeley,	1999
M.A. Physics,	University of California, Berkeley,	1994
B.A. Physics/Linguistics,	University of Chicago,	1992

Research Experience:

• Associate Professor	MIT	2008-Present
• Assistant Professor	MIT	2002-2008
• Postdoctoral Researcher	NIST Gaithersburg	2000-2001
• Postdoctoral Researcher	UC Berkeley	1999
• Graduate Student Researcher	UC Berkeley	1994-1999

“Investigating High- T_c Superconductivity on the Atomic Scale by Scanning Tunneling Microscopy”

Research Mentoring Experience:

- Postdoctoral Fellows (3): Takeshi Kondo (2005-2006), Yayu Wang (2007-2008), Yoshinori Okada (2009-)
- Graduate Students (6): Mike Boyer (PhD '08), Kamalesh Chatterjee, Doug Wise (Expected PhD Spr. '09), Michelle Tomasik, Bo Zhen (Started Summer '08), Laura Popa (Started Fall '09)
- Senior Thesis (4): 2005, 2006, 2 in 2007
- Non-senior thesis undergrads: MIT (13), Non-MIT (3)
- High School Students (5): Summers 2002, 2006, 2007, 2009 (2)

Teaching Experience:

• 8.02: Introduction to Electricity & Magnetism	MIT	2002-Present
• 8.02 TEAL Course Administrator	MIT	F05/7/9, S06/9
• Academic Tutor – Math & Physics	UC Berkeley	1995-1998
• Graduate Student Instructor	UC Berkeley	1992-1993
• Academic Tutor – Math	U. Chicago	1990-1992
• Discussion Section Leader – Math	U. Chicago	1989-1990

Honors and Awards:

- MIT Excellence Award for Fostering Diversity and Inclusion 2009
- Baker Award for Excellence in Undergraduate Teaching 2008
- MIT Buechner Teaching Prize in Physics 2007
- Research Corporation Cottrell Scholarship 2006
- Class of 1958 Career Development Chair 2005
- NSF CAREER Award 2004
- NIST/NRC Postdoctoral Research Award 1999-2001

MIT Community Service:

Physics Department

Minority Advisor	2003-Present
Graduate Admissions	2002-Present
Colloquium Committee	2003-2005
CM Search Committee	'02, '03, '06
Pappalardo Committee	2003

Institute Wide

Project Converge (Search Committee Member, Chair 2008)	2006-Present
MSRP Redesign/Advisor	2004-2006
Sigma Phi Epsilon Faculty/Academic Advisor	2005-Present
Freshman Orientation	2004-Present
School of Science URM Strategic Group	2008-Present

Publications:

- “An auxiliary capacitor based ultrafast drive circuit for shear piezoelectric motors,” Kamalesh Chatterjee, M. C. Boyer, W. D. Wise & E. W. Hudson, *Rev. Sci. Inst.* **80**, 095110 (2009)
- “Imaging nanoscale Fermi surface variations in an inhomogeneous superconductor,” W. D. Wise, Kamalesh Chatterjee, M. C. Boyer, Takeshi Kondo, T. Takeuchi, H. Ikuta, Zhijun Xu, Jinsheng Wen, G. D. Gu, Yayu Wang & E. W. Hudson, *Nat. Phys.* **5**, 213 (2009)
- “Charge density wave origin of cuprate checkerboard visualized by scanning tunneling microscopy,” W. D. Wise, M. C. Boyer, Kamalesh Chatterjee, Takeshi Kondo, T. Takeuchi, H. Ikuta, Yayu Wang & E. W. Hudson, *Nat. Phys.* **4**, 696 (2008).
- “High-temperature superconductivity: Fits and starts,” E. W. Hudson, *Nat. Phys.* **4**, 217 (2008).
- “Visualization of the interplay between high-temperature superconductivity, the pseudogap and impurity resonances,” Kamalesh Chatterjee, M. C. Boyer, W. D. Wise, Takeshi Kondo, T. Takeuchi, H. Ikuta & E. W. Hudson, *Nat. Phys.* **4**, 108 (2008).
- “Imaging the two gaps of the high-temperature superconductor $\text{Bi}_2\text{Sr}_2\text{CuO}_{6+x}$,” M. C. Boyer, W. D. Wise, Kamalesh Chatterjee, Ming Yi, Takeshi Kondo, T. Takeuchi, H. Ikuta & E. W. Hudson, *Nat. Phys.* **3**, 802 (2007).
- “Coincidence of Checkerboard Charge Order and Antinodal State Decoherence in Strongly Underdoped Superconducting $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$,” K. McElroy, D.-H. Lee, J. E. Hoffman, K. M. Lang, J. Lee, E. W. Hudson, H. Eisaki, S. Uchida, and J. C. Davis, *Phys. Rev. Lett.* **94**, 197005 (2005)
- “Real-space imaging of structural transitions in the vortex lattice of V_3Si ,” C. E. Sosolik, Joseph A. Stroscio, M. D. Stiles, E. W. Hudson, S. R. Blankenship, A. P. Fein, and R. J. Celotta, *Phys. Rev. B* **68**, 140503 (2003).
- “Vortex-induced quasi-particle ‘checkerboard’ in $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$,” J. E. Hoffman, E. W. Hudson, K. M. Lang, H. Eisaki, S. Uchida and J. C. Davis, *Physica C* **388-389**, 703 (2003).
- “STM study of novel resonances in $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$,” E. W. Hudson, V. Madhavan, K. McElroy, J. E. Hoffman, K. M. Lang, H. Eisaki, S. Uchida and J. C. Davis, *Physica B* **329-333**, 1365 (2003).
- “Nanoscale one-dimensional scattering resonances in the CuO chains of $\text{YBa}_2\text{Cu}_3\text{O}_{6+x}$,” D.J. Derro, E.W. Hudson, K. M. Lang, S. H. Pan, J.C. Davis, J.T. Markert and A.L. de Lozanne, *Phys. Rev. Lett.* **88**, 097002 (2002).
- “Imaging the granular structure of high- T_c superconductivity in underdoped $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$,” K. M. Lang, V. Madhavan, J. E. Hoffman, E. W. Hudson, H. Eisaki, S. Uchida & J. C. Davis, *Nature* **415**, 412 (2002).
- “Discovery of a ‘checkerboard’ of quasiparticle states with four-unit-cell periodicity surrounding $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$ vortex cores,” J. E. Hoffman, E.W. Hudson, K.M. Lang, V. Madhavan, H. Eisaki, S. Uchida & J.C. Davis, *Science* **295**, 466 (2002).
- “Microscopic electronic inhomogeneity in the high- T_c superconductor $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+x}$,” S. H. Pan, J. P. O’Neal, R. L. Badzey, C. Chamon, H. Ding, J. R. Engelbrecht, Z. Wang, H. Eisaki, S. Uchida, A. K. Gupta, K.-W. Ng, E. W. Hudson, K. M. Lang & J. C. Davis, *Nature* **413**, 282 (2001).
- “Interplay of magnetism and high- T_c superconductivity at individual Ni impurity atoms in $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$,” E.W. Hudson, K.M. Lang, V. Madhavan, S.H. Pan, H. Eisaki, S. Uchida, and J.C. Davis, *Nature* **411**, 920 (2001).
- “A Detailed Scanning Tunneling Microscopy Study of the CuO Planes in $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$,” D.J. Derro, E.W. Hudson, K.M. Lang, S.H. Pan, J.C. Davis, K. Mochizuki, J.T. Markert, and A.L. de Lozanne, *Physica C* **341**, 425 (2000).
- “STM Studies of the Electronic Structure of Vortex Cores in $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$,” S.H. Pan, E.W. Hudson, A.K. Gupta, K.-W. Ng, H. Eisaki, S. Uchida, and J.C. Davis, *Phys. Rev. Lett.* **85**, 1536 (2000).
- “STM of quasiparticle scattering resonances in $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$,” E.W. Hudson, S.H. Pan, K.M. Lang, A.K. Gupta, K.-W. Ng, and J.C. Davis, *Physica B* **284-288**, 969 (2000).
- “Imaging the Effects of Individual Zinc Atoms on Superconductivity in $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$,” S.H. Pan, E.W. Hudson, K.M. Lang, H. Eisaki, S. Uchida, and J.C. Davis, *Nature* **403**, 746 (2000).
- “Atomic-Scale Quasi-Particle Scattering Resonances in $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$,” E.W. Hudson, S.H. Pan, A.K. Gupta, K.-W. Ng, and J.C. Davis, *Science* **285**, 88 (1999).
- “Search for Superconductivity in Lithium,” K.M. Lang, Ari Mizel, J. Mortara, E.W. Hudson, J. Hone, Marvin L. Cohen, A. Zettl, and J.C. Davis, *J. Low Temp. Phys.* **114**, 445 (1999).
- “ ^3He Refrigerator Based Very Low Temperature Scanning Tunneling Microscope,” S.H. Pan, E.W. Hudson and J.C. Davis, *Rev. Sci. Inst.* **70**, 1459 (1999).
- “Vacuum tunneling of superconducting quasiparticles from atomically sharp scanning tunneling microscope tips,” S.H. Pan, E.W. Hudson and J.C. Davis, *Appl. Phys. Lett.* **73**, 2992 (1998).
- “Imaging and identification of atomic planes of cleaved $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$ by high resolution scanning tunneling microscopy,” S.H. Pan, E.W. Hudson, J. Ma and J.C. Davis, *Appl. Phys. Lett.* **73**, 58 (1998).
- “A very low temperature vibration isolation system,” E.W. Hudson, R.W. Simmonds, C.A. YiLeon, S.H. Pan and J.C. Davis, *Czech. J. of Phys.* **46**, 2737 (1996).

Oral Presentations:

“Visualizing the Nanoscale Electronic Landscape of the Cuprates” (<i>Invited</i>) Nordic Workshop on Correlated Electrons Uppsala University	August 2009
“Visualizing the Nanoscale Electronic Landscape of the Cuprates” (<i>Invited</i>) Boston Area Quantum Matter Boston University	May 2009
“Visualizing the Nanoscale Electronic Landscape of the Cuprates” (<i>Invited</i>) Study of Matter at Extreme Conditions Miami, FL	March 2009
“Low Temperature Scanning Tunneling Microscopy of High Temperature Superconductors” (<i>Invited</i>) APS March Meeting Pittsburgh, PA	March 2009
“STM of Cuprate Superconductors: Yesterday, Today & Tomorrow” (<i>Invited</i>) Workshop: Functional Materials by Design Los Alamos National Lab	January 2009
“Visualizing the Nanoscale Electronic Landscape of the Cuprates” Condensed Matter Seminar U.C. Berkeley	November 2008
“Gaps in Our Understanding of High Temperature Superconductors” Condensed Matter Seminar California Institute of Technology	November 2008
“Investigating Complexity One Atom at a Time: STM of High Temperature Superconductors” Public Lecture/Physics Seminar Cal. State Fullerton	November 2008
“Gaps in Our Understanding of High Temperature Superconductors” Condensed Matter Seminar UCLA	November 2008
“Imaging the Two Gaps of the High Temperature Superconductor Pb-Bi ₂ Sr ₂ CuO _{6+δ} ” MSRP Student Seminar MIT	July 2008
“Gaps in Our Understanding of High Temperature Superconductors” (<i>Invited</i>) ICNT 2008 Keystone, CO	July 2008
“Gaps in Our Understanding of High Temperature Superconductors” (<i>Invited</i>) LEES 2008 Whistler, British Columbia	June 2008
“Understanding Inhomogeneity in the Cuprate Superconductors” (<i>Invited</i>) Gordon Conference: Correlated Electrons Biddeford, ME	June 2008
“Gaps in Our Understanding of High Temperature Superconductors” (<i>Invited</i>) Workshop on Nanoscale Phenomena Argonne National Lab	May 2008
“Gaps in Our Understanding of High Temperature Superconductors” Condensed Matter Seminar Michigan State University	March 2008
“Introducing Change in Undergraduate Education (Easy Steps for Junior Faculty)” APS March Meeting New Orleans, LA	March 2008
“Variable Temperature Tunneling Spectroscopy of Inhomogeneous High Temperature Superconductors” APS March Meeting New Orleans, LA	March 2008
“Gaps in Our Understanding of High Temperature Superconductors” Physics Department Colloquium BC	February 2008
“Gaps in Our Understanding of High Temperature Superconductors” Condensed Matter Seminar Harvard	February 2008
“Gaps in Our Understanding of High Temperature Superconductors” Condensed Matter Seminar MIT	February 2008
“Gaps in Our Understanding of High Temperature Superconductors” Dept. of Physics Faculty Meeting MIT	February 2008
“Investigating Complexity One Atom at a Time: STM of High Temperature Superconductors” Public Lecture MIT	January 2008
“Imaging the Two Gaps of the High Temperature Superconductor Pb-Bi ₂ Sr ₂ CuO _{6+δ} ” Condensed Matter Seminar Ames Laboratory/U. Iowa	October 2007
“Imaging the Two Gaps of the High Temperature Superconductor Pb-Bi ₂ Sr ₂ CuO _{6+δ} ” Condensed Matter Seminar Stanford University	August 2007
“Imaging the Two Gaps of the High Temperature Superconductor Pb-Bi ₂ Sr ₂ CuO _{6+δ} ” Condensed Matter Seminar U.C. Berkeley	August 2007
“Recent advances in STM of Bi ₂ Sr ₂ CuO _{6+δ} ” Condensed Matter Seminar Northeastern University	June 2007
“An ultrahigh vacuum, variable temperature scanning tunneling microscope” APS March Meeting Denver, CO	March 2007
“Observation of Charge Ordering in the High Temperature Superconductor BSCCO by STM” Condensed Matter Seminar Northeastern University	April 2004
“Imaging Nanoscale Phase Segregation in Bi ₂ Sr ₂ CaCu ₂ O _{8+δ} ” (<i>Invited</i>) Study of Matter at Extreme Conditions Miami, FL (Florida International Univ.)	March 2003

“Scanning Tunneling Microscopy of Impurity Resonances in High Temperature Superconductors” (<i>Invited</i>)		
APS March Meeting	Austin, TX	March 2003
“Scanning Tunneling Microscopy: A Tool for Atomic Scale Measurement and Manipulation”		
Public Lecture	MIT	January 2003
“Imaging Nanoscale Phase Segregation in $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$ ”		
Faculty Lecture Series	MIT CMSE	September 2002
“Imaging Nanoscale Phase Segregation in $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$ ”		
Dept. of Physics Faculty Meeting	MIT	September 2002
“Tunneling Asymmetry in Spectroscopy of the Conventional Superconductor V_3Si ”		
APS March Meeting	Indianapolis, IN	March 2002
“Evidence for Nanoscale Phase Segregation in $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$ ”		
Condensed Matter Seminar	Michigan State University	January 2002
“Evidence for Nanoscale Phase Segregation in $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$ ” (<i>Invited</i>)		
Networks and Nanoscale Coherence	Banff, Alberta, Canada	August 2001
“Scanning Tunneling Microscopy of Magnetic Impurities”		
APS March Meeting	Seattle, WA	March 2001
“Scanning Tunneling Microscopy: A Tool for Atomic Scale Measurement and Manipulation”		
Public Lecture	UC Davis	March 2001
“Information from Imperfection: Imaging Atomic Scale Perturbations in High Temperature Superconductors”		
Condensed Matter Seminar	UC Davis	March 2001
“Information from Imperfection: Imaging Atomic Scale Perturbations in High Temperature Superconductors”		
Condensed Matter Seminar	UC Los Angeles	March 2001
“Information from Imperfection: Imaging Atomic Scale Perturbations in High Temperature Superconductors”		
Condensed Matter Seminar	UC Santa Barbara	March 2001
“Information from Imperfection: Imaging Atomic Scale Perturbations in High Temperature Superconductors”		
Condensed Matter Seminar	Case Western University	February 2001
“Information from Imperfection: Imaging Atomic Scale Perturbations in High Temperature Superconductors”		
Condensed Matter Seminar	University of Pennsylvania	February 2001
“Information from Imperfection: Imaging Atomic Scale Perturbations in High Temperature Superconductors”		
Condensed Matter Seminar	University of Florida	February 2001
“Information from Imperfection: Imaging Atomic Scale Perturbations in High Temperature Superconductors”		
Condensed Matter Seminar	McMaster University	February 2001
“Information from Imperfection: Imaging Atomic Scale Perturbations in High Temperature Superconductors”		
Condensed Matter Seminar	MIT	February 2001
“Information from Imperfection: Imaging Atomic Scale Perturbations in High Temperature Superconductors”		
Princeton University	Princeton, NJ	January 2001
“STM of High Temperature Superconductors” (<i>Invited</i>)		
Workshop on Interfaces in High T_C	Williamsburg, VA	September 2000
“Quasi-Particle States of Vortex Cores in $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$ As Measured by High Resolution, Low Temperature, Scanning Tunneling Spectroscopy”		
APS March Meeting	Minneapolis, MN	March 2000
“STM Studies of Impurity Scattering in the High Temperature Superconductor $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$ ”		
Surface Science Seminar	NIST, Gaithersburg	March 2000
“STM Study of Quasi-Particle Scattering in the High Temperature Superconductor $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$ ”		
Atomic Physics Seminar	University of California, Berkeley	September 1999
“Quasi-particle Scattering Resonances and Magnetic Vortices in Zn-doped $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$ ” (<i>Invited</i>)		
Superconducting Vortex Conference	Los Alamos National Lab	August 1999
“ ^3He Refrigerator Based Very Low Temperature Scanning Tunneling Microscopy and Spectroscopy”		
STM ‘99	Seoul, Korea	July 1999
“Atomic Scale Imaging and Spectroscopy of Vortices in $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$ ” (<i>Invited</i>)		
Superconducting Vortex Conference	University of California, Irvine	May 1999
“Evidence for a Charge Density Wave in Sr_2RuO_4 by Scanning Tunneling Microscopy and Spectroscopy”		
APS March Meeting	Atlanta, GA	March 1999
“High Resolution, Low Temperature STM/STS of Vortices in Single Crystal $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$ ”		
APS March Meeting	Atlanta, GA	March 1999
“Observation of Multiple Atomic Layers on Bi-2212 by Low Temperature Scanning Tunneling Microscopy”		
APS March Meeting	Los Angeles, CA	March 1998
“Very Low Temperature Scanning Tunneling Microscopy” (<i>Invited</i>)		
Students Only Seminar	University of California, Berkeley	September 1997

“Low Temperature Physics” (*Invited*)
Cal Day

University of California, Berkeley

March 1997