

Andrew David Beyer

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Education

California Institute of Technology Pasadena, CA (June 2009)
Ph.D. in Physics; *Experimental physics: low-temperature condensed matter physics*

The University of Texas Austin, TX (May 2002)
B.S. Physics
GPA 4.0, Phi Beta Kappa, Best Senior Thesis—Univ. of Texas Physics Dept.

Experience

Research:

Jet Propulsion Laboratory (JPL)/California Institute of Technology (Caltech)

Pasadena, CA

June 2009-present

Post-doctoral scholar in Physics

-Characterizing ultra-sensitive transition-edge sensor (TES) bolometers and related devices for the Background Limited Infrared/Sub-millimeter Spectrograph (BLISS), a potential space-borne IR/sub-mm instrument to fly on the SPICA satellite mission led by JAXA with NASA collaboration. Measuring single-pixel TESs, as well as multiplexed arrays of TESs, for demonstration of BLISS capabilities. Utilizing a pumped ^3He refrigerator, two adiabatic demagnetization refrigerators, and a dilution refrigerator as operational testbeds for the TES measurements.

California Institute of Technology (Caltech)

Pasadena, CA

Sept. 2002-June 2009

Graduate Research Assistant, Experimental Condensed Matter Physics
Advisor: Professor Nai-Chang Yeh

Ph.D. Thesis: *Studies of the low-energy quasiparticle excitations in high-temperature superconducting cuprates with scanning tunneling spectroscopy and magnetization measurements*

-Investigated high-temperature cuprate superconductors using cryogenic scanning tunneling microscopy and bulk measurements techniques:
-Designed and began construction of an ultra-high vacuum cryogenic STM/Scanning Electron Microscope (cryogenic STM/SEM) for the Kavli Nanoscience Institute at Caltech.

The University of Texas at Austin (UT)

Austin, TX

August 2000- May 2002

Undergraduate Research Assistant, Experimental Condensed Matter Physics
Advisor: Professor Alex de Lozanne

-Tested a piezoelectric, slip-stick coarse approach stage for a STM using proximity probes to detect the reproducibility and minimum step size of the stage's translation. Synthesized multi-wall carbon

nanotubes on STM tips using Chemical Vapor Deposition under high electric fields to improve STM resolution.

Physics Honors Thesis: *Scanning tunneling microscopy (STM) Modifications: Nanotube tips and a novel coarse approach mechanism.*

Fellowships, Awards, and Honors

JPL Postdoc Poster winner	
-in Technology, Instrumentation, Engineering and Other Category	September 2011
Caltech Moore Foundation Postdoc Fellowship	June 2009-present
Intel Foundation Fellowship	October 2006-08
Highest Academic Honors, Univ. of Texas Physics Department.	May 2002
Member, Phi Beta Kappa—Texas Alpha Chapter	May 2002
Member, Sigma Pi Sigma (Physics Honor Society)	May 2001
Member, Golden Key International Honour Society	May 2002
Eagle Scout, Boy Scouts of America	October 1998
Scout of the Year Award for Boy Scout Troop 345	October 1998

Selected Publications

"Ultra-sensitive transition-edge sensors for the Background Limited Infrared/Sub-mm Spectrograph (BLISS)." **A.D. Beyer**, M.E. Kenyon, P. M. Echternach, T. Chui, B.-H. Eom, P.K. Day, J.J. Bock, W.A. Holmes, C.M. Bradford. Submitted to The Journal of Low Temp. Phys. August 2011.

"Characterization of an ultra-sensitive transition-edge sensor for space-borne far-IR/sub-mm spectroscopy." **A.D. Beyer**, M.E. Kenyon, P. M. Echternach, B.-H. Eom, J. Bueno, P.K. Day, J.J. Bock, C.M. Bradford, P. Khosropanah, M. Ridder, M. Bruijn, H. Hoevers, and J.R. Gao. *IEEE Trans. on Applied Superconductivity* **21**,199 (2011).

"Characterizing Si_xN_y absorbers and support beams for far-infrared/submillimeter transition-edge sensors." **A.D. Beyer**, M.E. Kenyon, P. M. Echternach, B.-H. Eom, J. Bueno, P.K. Day, J.J. Bock, C.M. Bradford. *Proc. SPIE* **7741**, 774121 (2010).

"Spectroscopic evidence for competing order-induced pseudogap phenomena and unconventional low-energy excitations in high-T_c cuprate superconductors." N.-C. Yeh, **A. D. Beyer**, M. L. Teague, S.-P. Lee, S. Tajima and S. I. Lee. *J. Superconductivity and Novel Magnetism* **23**, 757 (2010). [Manuscript received the Scientific & Technological Accomplishment Papers Award at the 7th International Conference on "New Theories, Discoveries and Applications of Superconductors and Related Materials" in Beijing, China, May 13 – 16 (2009)]

"Spin-polarized tunneling spectroscopic studies of the intrinsic heterogeneity and pseudogap phenomena in colossal magnetoresistive manganite La_{0.7}Ca_{0.3}MnO₃" C. R. Hughes, J. Shi, **A. D. Beyer**, and N.-C. Yeh, *Phys. Rev. B* **82**, 13441 (2010).

"Scanning tunneling spectroscopic evidence for magnetic field-induced microscopic orders in the high-T_c superconductor YBa₂Cu₃O₇." **A. D. Beyer**, M. S. Grinolds, M. L. Teague, S. Tajima, and N.-C. Yeh. *Europhysics Letters* **87**, 37005 (2009)

"Unconventional low-energy excitations in cuprate superconductors." N.-C. Yeh and **A. D. Beyer**, invited review article, *Int. J. Mod. Phys. B* **23**, 4543 (2009).

"Observation of vortices and hidden pseudogap from scanning tunneling spectroscopic studies of electron-doped cuprate superconductor $\text{Sr}_{0.9}\text{La}_{0.1}\text{CuO}_2$." M. L. Teague, **A. D. Beyer**, M. S. Grinolds, S.-I. Lee and N.-C. Yeh. *Europhysics Letters* **85**, 17004 (2009).

"Evidence for strain-induced local conductance modulations in single-layer graphene on SiO_2 ." M. L. Teague, A. P. Lai, J. Velasco, C. R. Hughes, **A. D. Beyer**, M. W. Bockrath, C.-N. Lau, and N.-C. Yeh. *Nano Letters* **9**, 2542 (2009).

"Possible competing order-induced Fermi arcs in cuprate superconductors." B.-L. Yu, J. C. F. Wang, **A. D. Beyer**, M. L. Teague, G. P. Lockhart, J. S. A. Horng, S.-P. Lee, and N.-C. Yeh. *Solid State Communications* (Fast-track communication) **149**, 261 (2009)

"Competing orders and the doping and momentum dependent quasiparticle excitations in cuprate superconductors." **A. D. Beyer**, C.-T. Chen, and N.-C. Yeh. *Physica C* **468**, 471 (2008). *Physica C* **468**, 471 (2008).

"Macroscopic evidence for quantum criticality and field-induced quantum fluctuations in cuprate superconductors." **A. D. Beyer**, V. S. Zapf, H. Yang, F. Fabris, M. S. Park, K. H. Kim, S.-I. Lee, and N.-C. Yeh. *Physical Review B*, **76**, 140506(R) (2007).

"Competing orders and quantum phase fluctuations on the low-energy excitations and pseudogap phenomena of cuprate superconductors." C.-T. Chen, **A. D. Beyer**, and N.-C. Yeh. *Solid State Communications* **143** (Fast Communications), 447 (2007).

"Dimensionality of superconductivity and vortex dynamics in the infinite-layer cuprate $\text{Sr}_{0.9}\text{M}_{0.1}\text{CuO}_2$ ($M=\text{La}, \text{Gd}$)." V. S. Zapf, N.-C. Yeh, **A. D. Beyer**, C. R. Hughes, C. H. Mielke, N. Harrison, M. S. Park, K. H. Kim and S.-I. Lee. *Phys. Rev. B* **71**, 134526 (2005).

"Macroscopic coherence effects in a mesoscopic system: Weak localization of thin silver films." **A. D. Beyer**, M. Koesters, K.G. Libbrecht, and E.D. Black. *Am. J. Phys.* **73**, 1014 (2005).

"Investigating the physical origin of unconventional low-energy excitations and pseudogap phenomena in cuprate superconductors." N.-C. Yeh, C.-T. Chen, **A. D. Beyer**, and S.-I. Lee *Chinese J. Phys.* **45** (2007).

"Experimental investigation of the competing orders and quantum criticality in hole- and electron-doped cuprate superconductors." N.-C. Yeh, C.-T. Chen, V. S. Zapf, **A. D. Beyer**, C. R. Hughes, M.-S. Park, K.-H. Kim, and S.-I. Lee, *Chinese J. Phys.* **43**, Suppl. 2, 505 (2005).

"Quasiparticle spectroscopy and high-field phase diagrams of cuprate superconductors -- An investigation of competing orders and quantum criticality", N.-C. Yeh, C.-T. Chen, V. S. Zapf, **A. D. Beyer**, and C. R. Hughes. *Int'l Journal of Modern Physics B* **19**, 285 (2005).

"Experimental investigation of the asymmetric spectroscopic characteristics of electron- and hole-doped cuprates", N.-C. Yeh, C.-T. Chen, **A. D. Beyer**, C. R. Hughes, T. A. Corcovilos, and S. I. Lee. *Physica C* **408-410**, 792 (2004).

Mentoring/Volunteering

Co-mentored five undergraduate SURF (summer undergraduate research fellowship) students in summer research projects.

Co-mentored two undergraduate students to perform senior thesis research. One senior physics student was a finalist for the highly selective LeRoy Apker Award (American Physical Society Undergraduate Achievement Award).

Co-mentored four visiting undergraduate students from National Taiwan University with research resulting in the publication of a journal article.

Volunteered to teach science in a kindergarten classroom (Powell School, Azusa Unified School District) as part of the Caltech Classroom Connection.

Conferences/Workshops Attended

- 14th Low Temperature Detectors Conference—August 2011 poster presentation, publication submitted.
- Applied Superconductivity Conference August 2010—poster presentation, publication.
- SPIE Astronomical Instrumentation Conference June 2010—oral presentation, poster presentation, publication.
- 13th Low Temperature Detectors Conference August 2009.
- American Physical Society (APS) March Meeting 2009—oral presentation.
- APS March Meeting 2008-- oral presentation.
- APS Workshop on Opportunities in Energy Research 2008.
- APS March Meeting 2007-- oral presentation.
- APS March Meeting 2005—oral presentation.

Activities and Interests

- Kavli Nanoscience Institute Colloquium Committee member Sept. 2006-2008
- Caltech Floorball Club President Sept. 2005-present

References

Available upon request. Email requests to: beyer@caltech.edu.