

Nicholas C. Koshnick

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EDUCATION

March 2009 Stanford University Ph.D. Applied Physics,
March 2003 Stanford University M.S. in Applied Physics
June 2001 Dartmouth College B.A. Cum Laude with Honors in Physics

INTERNSHIPS, FELLOWSHIPS & AWARDS

2006-2008 Stanford Nanoscale Science and Engineering Fellow, sponsored
by the NSF Center for Probing the Nanoscale
July 2007 Stanford Business School, Summer Institute for Entrepreneurship
March 2007 First Prize Poster at Stanford's Annual Nanoprobes Workshop
2000-2001 Casque and Gauntlet Senior Society for Campus Leaders

RESEARCH EXPERIENCES

09 Founding member of Solum, Inc
-Co-Invented new method for detecting soil nitrates
'03-'09 Research Assistant in the lab of Kathryn Moler, Applied Physics/Physics
-Lead collaboration with UC-Denver, National Institute for Science and
Technology, and Texas Instruments to build new submicron scanning SQUID
susceptometers
-Scanning SQUID based magnetic detection of phase coherence effects in
micron scale superconducting and normal metal rings (0.02 – 1.8 Kelvin)
-Superconducting Vortex-Topography correlation and de-pinning
measurements with a 4 Kelvin Magnetic Force Microscope
-Fluxoid transitions in under-doped YBCO superconducting cylinders
'02-'03 Research projects with various Stanford professors, Applied Physics/Physics
Prof. Goldhaber-Gordon – Magnetically doped ZnSe quantum wells
Prof. Yamamoto – High Tc band manipulation with laser illumination
Prof. Kasevich – Experimental construction of Bose-Einstein condensates
'00-'01 Senior Thesis Project, Advisor, W. Lawrence, Dartmouth College
“Non-exponential Decay of Metastable Quantum Mechanical States.”

PUBLICATIONS

- Hendrik Bluhm, Julie A. Bert, Nicholas C. Koshnick, Martin E. Huber, and Kathryn A. Moler, “Spin-like susceptibility of metallic and insulating thin films at low temperature.” *Physical Review Letters*, 103, 026805 (2009)
- Hendrik Bluhm, Nicholas C. Koshnick, Julie A. Bert, Martin E. Huber, Kathryn Moler, “Persistent currents in normal metal rings.” *Physical Review Letters*, 102, 136802 (2009)
- Nicholas C. Koshnick, Martin E. Huber, Julie Bert, Clifford Hicks, Jeff Large, Hal Edwards, Kathryn A Moler, “A terraced scanning superconducting quantum interference device susceptometer with terraced submicron pickup loops.” *Applied Physics Letters* **93** 243101 (2008)

PUBLICATIONS CONTINUED

- Ophir M. Auslaender, Lan Luan, Eric W. J. Straver, Jennifer E. Hoffman, Nicholas C. Koshnick, Eli Zeldov, Douglas A. Bonn, Ruixing Liang, Walter N. Hardy and Kathryn A. Moler, “Nanomechanics of Individual, Isolated Vortices in a Cuprate Superconductor” *Nature Physics* **5**, 35-39 (2009)
- Martin E. Huber, Nicholas C. Koshnick, Hendrik Bluhm, Leonard J. Archuleta, Tommy Azua, Per G. Björnsson, Brian W. Gardner, Sean T. Halloran, Erik A. Lucero, Kathryn A. Moler “Gradiometric micro-SQUID susceptometer for scanning measurements of mesoscopic samples” *Review of Scientific Instruments* **79**, 053704 (2008)
- Nicholas C. Koshnick, Hendrik Bluhm, Martin E. Huber, Kathryn Moler “Fluctuation Superconductivity in Mesoscopic Aluminum Rings” *Science* **318** 5855 (2007)
- Hendrik Bluhm, Nicholas C. Koshnick, Martin E. Huber, and Kathryn A. Moler "Multiple fluxoid transitions in mesoscopic superconducting rings" www.arXiv.org:0709.1175v1 cond-mat.supr-con (2007)
- Hendrik Bluhm, Nicholas C. Koshnick, Martin E. Huber, Kathryn Moler, “Magnetic Response of Mesoscopic Superconducting Rings with Two Order Parameters” *Physical Review Letters* **97** 23 (2006)
- Miles P. Blencowe, Nicholas C. Koshnick, “Partition asymptotics from one-dimensional quantum entropy and energy currents.” *J. Math. Phys* **42** 5713 (2001)

MANUSCRIPTS IN PREPARATION

- Nicholas C. Koshnick, Hendrik Bluhm, Martin E. Huber, Kathryn A. Moler, “Fluxoid fluctuations in Mesoscopic Aluminum Rings”
- Franco Moriconi, Nick Koshnick, Francisco De La Rosa, and Amandeep Singh “Modeling and Test Validation of a 15kV 24MVA Superconducting Fault Current Limiter.”

PRESENTATIONS

- Aug '08 • Invited Speaker: “A Nano-Scale Scanning SQUID Susceptometer” Applied Superconductivity Conference, Chicago, IL
- June '08 • Invited Speaker: “Design and Application of Scanning SQUID susceptometers” CSIRO NanoSQUID science symposium, Sydney, Australia
- Mar '08 • Contributed Talk: “A Nano-Scale Scanning SQUID Susceptometer for the Measurement of Isolated Magnetic Moments” American Physical Society Meeting,
- June '07 • Invited Speaker: “Fluctuation Superconductivity in Quasi-1D Mesoscopic Aluminum Rings.” Workshop on Fluctuations and Phase Transitions in Superconductors, Nazareth Israel
- Mar '07 • Contributed Talk: “Fluctuation Superconductivity in Mesoscopic Quasi-1D Superconducting Rings” American Physical Society Meeting
- Mar '06 • Contributed Talk: “Magnetic Response and Enhanced T_c in the 1D to 2D Crossover Regime of Mesoscopic Superconducting Aluminum Rings” American Physical Society Meeting
- Feb '06 • Contributed Poster “Fluctuation Diamagnetism in Individual Mesoscopic Aluminum Rings.” International Symposium for Mesoscopic Superconductivity and Spintronics Atsugi, Japan
- Mar 05' • Contributed Talk: “Correlation of Vortex Pinning with Topography in a Thin Film YBCO sample” American Physical Society Meeting

TEACHING AND OUTREACH

- '05-'08 • Participant in Stanford Continuing Studies classes, giving classes & lab tours
- '07 • Instructor and planning participant: Summer Institute for Middle School Teachers
- '06-'07 • Nanomagnetism theme meetings organizer, Stanford CPN program
- '07 • Instructor and planning assistant: workshop for teachers and students at the National Hispanic University
- '06,'07 • Two time lecturer in Applied Physics 275 "Probing the Nanoscale"
- '06,'07 • Instructor: Provided lectures and lab tours to SLAC's Science Undergraduate Laboratory Internship
- '05 • Teaching Assistant: Physics 108, Low Temperature Experimental Methods
- '05 • Coach: Lego Team Nanoscience Theme competition
- '04 • Participating Instructor: Science Bus after school program at the East Palo Alto Charter School
- '00-'01 • Introductory Physics Tudor

SKILLS

- Dilution refrigerator and He3 cryostat operation.
- E-beam and optical lithography. Focus Ion Beam etch lithography
- Superconducting Integrated circuit design
- Data acquisition setup and design
- Construction of low temperature scanning systems, machine shop skills
- Programming / modeling with C++, Perl, Mathematica, Matlab, Fasthenry. Familiarity with Linux/Unix.

COLLEGIATE EXTRACURRICULAR EXPERIENCE

- 3 Year College Varsity Athlete, Nordic Skiing (red-shirted one year)
- President of the Ledyard Canoe Club, a \$40K/year canoe rental and whitewater kayaking group
- Co-founded swing dance performance team

CURRENT EXTRACURRICULAR ACTIVITIES

- Kiteboarding and Windsurfing
- Road Biking, Triathlons
- Playing and Recording Music