

# Loren J. Swenson

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## Education

### **Ph.D., Physics**

University of California, Santa Barbara (March 2007)

### **B.A., Physics**

University of Minnesota, Twin Cities (June 2001)

### **B.S., Chemistry - Summa Cum Laude**

University of Minnesota, Twin Cities (June 2001)

## Skill Summary

- Broad experience in nanoscale processing including: thin-film deposition (sputter, e-beam, thermal), etching (wet, RIE, and plasma), and lithography (e-beam and optical).
- Familiarity with standard semiconductor metrology tools: SEM, ellipsometry, AFM, and probe stations.
- Comprehensive understanding of cryogenic methods. Expert knowledge of dilution (~30 mK) and He3 (~300 mK) refrigeration systems.
- Experience with low-frequency and RF electronic measurements of physical systems.
- Proficient with digital logic. In particular, experience with Field-Programmable Gate Array (FPGA) technology and VHDL programming.
- Strong background in scientific computing including adeptness with MATLAB, LabVIEW, Mathematica, AutoCAD, SONNET, Fortran, C, Python, Linux and Windows.
- Ability to fabricate and measure a variety of nanoscale devices including high-quality superconducting resonators and single-electron transistors with nanometer-scale tunnel junctions.

## Professional Experience

### **Institut Néel - Centre national de la recherche scientifique - Grenoble, France**

*Postdoc - July 2008 to present*

Responsible for the design, fabrication and measurement of detector arrays based on frequency-multiplexed superconducting resonators. Target applications include terrestrial astronomy, quantum computing and fundamental physical measurements.

### **Cañada Community College - Redwood City, CA**

*Adjunct Faculty - January 2008 to June 2008*

Instructor for introductory physics and astronomy courses.

## University of California, Santa Barbara

*Graduate Research Scientist - June 2002 to March 2007*

Thesis Adviser: Professor Andrew Cleland.

Conducted fundamental research on novel high-speed electronics at cryogenic temperatures. Pioneered new methods for extremely sensitive calorimetry and photon-limited bolometry. Thesis: *High-speed measurement of single-electron circuits at low temperatures with bolometric and calorimetric applications.*

*Teaching Assistant - August 2001 to June 2002*

Led discussion and laboratory sections in undergraduate physics.

## University of Minnesota, Twin Cities

*Undergraduate Research Scientist - August 1999 to June 2001*

Synthesized and characterized novel inorganic compounds for use in molecular sensing applications. Thesis: *Electronic transitions in vapochromic quasi one-dimensional [Pt(arylisocyanide)<sub>4</sub>][Pt(CN)<sub>4</sub>] crystals.*

## Publications

**L. J. Swenson**, A. Cruciani, A. Benoit, M. Roesch, C. S. Yung, A. Bideaud, A. Monfardini, "High-speed phonon imaging using frequency-multiplexed kinetic inductance detectors," submitted for publication (<http://arxiv.org/abs/1004.5066v1>).

A. Monfardini, **L. J. Swenson**, A. Bideaud, F. X. Désert, S. J. C. Yates, A. Benoit, A. M. Baryshev, J. J. A. Baselmans, S. Doyle, B. Klein, M. Roesch, C. Tucker, P. Ade, M. Calvo, P. Camus, C. Giordano, R. Guesten, C. Hoffmann, S. Leclercq, P. Mauskopf, K. F. Schuster, "NIKA: A Millimeter-Wave Kinetic Inductance Camera," submitted for publication (<http://arxiv.org/abs/1004.2209v1>).

**L. J. Swenson**, J. Minet, G. J. Grabovskij, O. Buisson, F. Lecocq, C. Hoffmann, P. Camus, J.-C. Villégier, S. Doyle, P. Mauskopf, M. Roesch, M. Calvo, C. Giordano, S.J.C. Yates, A.M. Baryshev, J.J.A. Baselmans, A. Benoit and A. Monfardini, "A fast, ultra-sensitive and scalable detection platform based on superconducting resonators for fundamental condensed-matter and astronomical measurements," in *Proc. 13th Int. Workshop on Low Temperature Detectors (LTD-13)*, AIP Conf. Proc. **1185**, 84 (2009).

S. J. C. Yates, J. J. A. Baselmans, A. M. Baryshev, Y. J. Y. Lankwarden, **L. Swenson**, A. Monfardini, B. Klein and R. Güsten, "Readout for large arrays of microwave kinetic inductance detectors using a fast fourier transform spectrometer," in *Proc. 13th Int. Workshop on Low Temperature Detectors (LTD-13)*, AIP Conf. Proc. **1185**, 249 (2009).

S. Doyle, P. Mauskopf, J. Zhang, S. Withington, D. Goldie, **L. J. Swenson**, A. Monfardini and D. Glowacka, "Optimisation of lumped-element kinetic-inductance detectors for use in ground based large arrays," in *Proc. 13th Int. Workshop on Low Temperature Detectors (LTD-13)*, AIP Conf. Proc. **1185**, 156 (2009).

A. Monfardini, **L. J. Swenson**, A. Benoit, A. Bideau, G. Bres, P. Camus, G. Garde, C. Hoffmann, J. Minet, H. Rodenas and the NIKA collaboration, “Kinetic inductance detectors development for mm-wave astronomy,” Astrophysics Detector Workshop 2008, P. Kern (ed), *EAS Publications Series*, 37 (2009) 95-9.

G. J. Grabovskij, **L. J. Swenson**, O. Buisson, C. Hoffmann, A. Monfardini, and J.-C. Villégier, “In situ measurement of the permittivity of helium using microwave NbN resonators,” *Appl. Phys. Lett.*, **93**, 134102 (2008).

**L. J. Swenson**, D. K. Wood, and A. N. Cleland, “Diffusion-based electron thermometry using a three-junction single electron transistor,” *Nano Lett.*, **7** (6), 1804 (2007).

D. K. Wood, J.-L. Fraikin, **L. J. Swenson**, and A. N. Cleland, “Electronic microbarcodes: labels for diverse cell populations,” *Lab Chip*, **7**, 469 (2007).

**L. J. Swenson**, D. R. Schmidt, J. S. Aldridge, D. K. Wood, and A. N. Cleland, “Mixing with the radio-frequency single-electron transistor,” *Appl. Phys. Lett.*, **86**, 173112 (2005).

## Presentations

Contribution: “Progress in fast, sensitive, high-resolution imaging utilizing frequency-multiplexed, superconducting resonators,” CASPER Workshop III, Cape Town, South Africa (2009). Video link: <http://casper.berkeley.edu/wiki/Videos>

Contribution: “A fast, ultra-sensitive and scalable detection platform based on superconducting resonators for fundamental condensed-matter and astronomical measurements,” 13th Int. Workshop on Low Temperature Detectors (LTD-13), Stanford, CA (2009).

Contribution: “In situ measurement of the permittivity of helium using microwave NbN resonators,” APS March Meeting, Pittsburgh , PA (2009).

Contribution: “A three-junction single electron transistor as a diffusive, high-speed thermometer: Experiment and simulation,” APS March Meeting, Denver, CO (2007).

Contribution: “Nanoscale metal thermometry using a radiofrequency single electron transistor,” APS March Meeting, Baltimore, MD (2006).

Contribution: “Mixing with the radiofrequency single-electron transistor,” APS March Meeting, Los Angeles, CA (2005).

## **Honors and Awards**

National Science Foundation/Lando Fellowship, 2000.

University of Minnesota, Department of Chemistry, Undergraduate Scholarship, 1999, 2000, and 2001.

Marshall H. and Nellie Alworth Memorial Fund, 1997-2002.

## **Professional Affiliations**

American Physical Society