

# CURRICULUM VITAE OF Joseph A.F.S. Pingenot

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<b>Affiliation:</b>	Department of Physics and Astronomy Center for Semiconductor Physics in Nanostructures The University of Oklahoma	<b>Position:</b>	Postdoctoral Researcher
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## EDUCATIONAL AND PROFESSIONAL HISTORY

### Academic Preparation

**Doctor of Philosophy** 2009, University of Iowa, USA. *Electron And Hole Spins In Quantum Dots.*  
**Bachelor of Science** 2002, Kansas State University, USA. Bachelor of Science in physics.

### Professional Experience

**Postdoctoral Researcher** 2008-present. Department of Physics and Astronomy, The University of Oklahoma, USA. Investigating numerically and analytically the Rashba spin-orbit interaction in InSb/AlInSb quantum wells and interacting arrays of CdS/CdSe/CdS quantum well quantum dots. Developed software (C, C++) to calculate the charge and spin properties of semiconductor nanostructures. Used GNOME (e.g. glib/GIO), scientific libraries (e.g. FFTW3, GSL), Free and Open Source software (e.g. flex, bison), and high-performance computing technologies (e.g. OpenMP, MPI, CUDA/GPGPU) to quickly, accurately, and flexibly perform calculations in research and educational settings. Used shell scripting and perl to perform needed pre- and postprocessing of data in order to do a large number of calculations and present them coherently and accurately. Organized a scientific conference, working with with others on the organizing committee, vendors, sponsors, and attendees in order to provide a world-class scientific interaction experience to the attendees. Supervised students as they pursued scientific research. Met regularly with colleagues to understand experimental data and guide further experimental research.

**Research Assistant** 2003-2008. Department of Physics and Astronomy, The University of Iowa, USA. Examined g-tensor modulation resonance and direct spin manipulation via the g-tensor of electrons and holes in self-assembled quantum dots. Additionally, examined enhancing spin injection through a Schottky barrier by using a tuned superlattice structure. Used multiband  $k\cdot p$  codes to investigate the structures and developed some code in perl, Matlab, Mathematica, C, and C++ as needed for research.

**Teaching Assistant** 2002-2008. Department of Physics and Astronomy, The University of Iowa, USA. Taught undergraduate lab sections. Graded both graduate and undergraduate courses, including a course in which I previously had no experience. Attended "tutorial room" hours, providing guidance and instruction to graduate and undergraduate students in their coursework as needed.

**Intern** Summer 2006, 2007. Seagate Technology, Bloomington, MN, USA. Developed software in perl to create simplified 3D ANSYS models of hard drive heads from 2D CAD data. Software allowed designers to rapidly and flexibly design new and old models of hard disk drive heads for calculations. Created, performed calculations of, and analyzed data from models of hard drive heads to investigate their performance and characteristics. Evaluated modeling software in preparation for purchasing.

**Programmer** Summer 2002. Physics Education Research Group, Kansas State University, USA. Wrote extensible interactive quantum well demonstration software in Java.

**Programmer/Systems Administrator** 1999-2002. Kansas State University, USA. Managed central campus Solaris servers and wrote software in perl, C, and sh/bash. Wrote inventory management website, with CGI.

## SELECTED SKILLS

### Professional Skills

<b>Operating Systems</b>	Linux (primary; Ubuntu, Debian, Fedora, Red Hat), Windows (secondary), Mac (little)
<b>Office/Productivity</b>	OpenOffice/LibreOffice, gnumeric, AbiWord (primary), MS Office (secondary)
<b>Revision Control</b>	bzr, git, svn (primary); CVS, RCS (secondary); hg (little)
<b>GUI Technologies</b>	gtk+/gtkmm, glade, cairo (primary), clutter, OpenGL, Swing (little)
<b>Platforms</b>	GNOME (primary; gobject, glib, GIO, gtk+, glade), GNU (automake, autoconf, bison, GCC, glibc, etc.); Java (secondary)
<b>HPC Technologies</b>	OpenMP (gcc, icc), MPI (primarily OpenMPI), GPGPU (primarily CUDA; little OpenCL)
<b>Web Technologies</b>	HTML (strict XHTML1.0, some HTML5), CSS, SSI, CGI (perl); JavaScript (little)
<b>Languages</b>	C, C++, bash, perl (primary); Java, Matlab, Mathematica (intermediate); FORTRAN, elisp
<b>Scientific Libraries</b>	BLAS (various), LAPACK (various), GSL, FFTW3, ACML, HDF5, Cell SDK
<b>Graphics Programs</b>	Inkscape, POV-ray, pitivi, xmgrace, gnuplot (primary), gstreamer (little)
<b>Databases</b>	SQL, particularly using sqlite (some)
<b>Spoken Languages</b>	English (native), German (fluent)
<b>Business</b>	Six Sigma, Lean (introductory)

### Scientific Skills

<b>Computational Methods</b>	Monte Carlo and Monte Carlo-like calculations, various numerical integration methods and libraries, numerical optimization searches
<b>Physics Models</b>	$k \cdot p$ , effective mass (primary), method of moments, finite element electromagnetics (starting)
<b>Modeling Software</b>	own programs, nextnano, dotcode, ANSYS, Coventor, nec2c

## PROFESSIONAL MEMBERSHIPS

American Physical Society; Deutsche Physikalische Gesellschaft; Association for Computing Machinery; American Association for the Advancement of Science; Institute of Electrical and Electronics Engineers; The Minerals, Metals, and Materials Society; Society for Industrial and Applied Mathematics

## AWARDS AND EXCHANGES

### Awards

Putnam Mathematical Competition	2001	Third-highest score at Kansas State University; top third in nation.
Swift Scholarship	2002	Department of Physics and Astronomy, University of Iowa.
Branson Scholarship	2001	Physics Department, Kansas State University.
Curnutte Scholarship	1999-2000	Physics Department, Kansas State University.
Cardwell Scholarship	1998	Physics Department, Kansas State University.
Travel award	2007	Spintech IV
NSF Travel Award to NATO ASI	2005	Manipulating Quantum Coherence in Solid State Systems
Travel award	2004	Gordon Research Conference: Defects in Semiconductors

### Exchanges

International Bicycle Project	1999	Kiel, Germany
Kansas State University - Justus Liebig University	1997-1998	Gießen, Germany
Rotary Youth Exchange	1995-1996	Lilienthal, Germany

## CONFERENCE ORGANIZATION

### Conferences Organized

Local organizing committee member and technical lead, *56th Midwest Solid State Conference*. 2010.

### Conference Work

Session chair, *56th Midwest Solid State Conference*. 2010.

# PRESENTATIONS AND PUBLICATIONS

## Refereed Publications

- “Continuously Alloyed Quantum Wells for Maximal Rashba Couplings”, Joseph Pingenot, K. Mullen. *In preparation*
- “Digitally Alloyed Quantum Wells for Maximal Rashba Couplings”, Joseph Pingenot, K. Mullen. *In preparation*
- “Theoretical Comparison of Rashba Spin-Orbit Coupling in Digitally, Discretely, and Continuously Alloyed Nanostructures” Joseph Pingenot, K. Mullen. Submitted for publication; available at arXiv:1105.1804.
- “Electric-field Manipulation of the Landé g-Tensor of Holes in  $\text{In}_{0.5}\text{Ga}_{0.5}\text{As}/\text{GaAs}$  Self-assembled Quantum Dots,” Joseph Pingenot, Craig E. Pryor, and Michael E. Flatté. Submitted for publication; available at arXiv:1011.5014.
- “Spin Injection Enhancement Through Schottky Barrier Superlattice Design,” Joseph Pingenot and Michael E. Flatté. Submitted for publication; available at arXiv: arXiv:0909.4594v1.
- “Method for Full Bloch-Sphere Control of a Localized Spin via a Single Electrical Gate,” Joseph Pingenot, Craig E. Pryor, and Michael E. Flatté, *Applied Physics Letters* **92**, 222502 (2008).

## Non-Refereed Publications

- “Method for Full Bloch-Sphere Control of a Localized Spin via a Single Electrical Gate,” J. Pingenot and C. E. Pryor and Michael E. Flatté, *Device Research Conference, 2008* p. 225. (2008).
- “Manipulation of individual electronic spins in semiconductors,” Craig E. Pryor, Joseph Pingenot, Amrit De, and Michael E. Flatté, *Proc. SPIE* **7036**, 70361A (2008).

## Seminar and Invited Presentations

- Joseph Pingenot and Kieran Mullen, “Optimizing the Rashba Spin-Orbit Interaction in Digitally and Continuously Alloyed Quantum Wells,” *SAS Institute, Inc.* (2011).
- Joseph Pingenot, “Using OpenMP in FORTRAN,” *University of Oklahoma* (2011).
- Joseph Pingenot, “Approaching Rashba from the Side,” *University of São Paulo at São Carlos Physics Department Journal Club* (2010).
- Joseph Pingenot, “There and Back Again: Reflections on a Nascent Physics Career,” *Engineering and Science Summer Institute at Kansas State University* (2010).
- Joseph Pingenot, Kieran J. Mullen, “Recent Progress in CSPIN Theory: Rashba in wells and excitons in shells,” *Joint C-SPIN Seminar for the University of Oklahoma and University of Arkansas* (2009).
- Joseph Pingenot, Craig E. Pryor, and Michael E. Flatté, “Spin Manipulation in Quantum Dots,” *University of Arkansas* (2009).
- Joseph Pingenot, Craig E. Pryor, and Michael E. Flatté, “The Landé g-Tensor and Coherent Spin Manipulation in Quantum Dots,” *University of Oklahoma* (2008).
- Joseph Pingenot, Craig E. Pryor, and Michael E. Flatté, “Method for Full Bloch-Sphere Control of a Localized Spin via a Single Electrical Gate,” *University of Iowa Solid State Seminar* (2008).
- Joseph Pingenot, Craig E. Pryor, and Michael E. Flatté, “Electron Spin Resonance and g-Tensors,” *University of Iowa Solid State Seminar* (2007).
- Joseph Pingenot, Craig E. Pryor, and Michael E. Flatté, “Optimizing g-factor tuning with electric fields in self-assembled  $\text{InAs}/\text{GaAs}$  Quantum Dots,” *University of Iowa Solid State Seminar* (2006).

## Conference Presentations

- Joseph Pingenot and Kieran J. Mullen, “Rashba Spin-Orbit Interaction in Digital Alloys,” *APS March Meeting* (2011).
- Joseph Pingenot and Kieran J. Mullen, “Inter-dot Effects in a Chain of  $\text{CdS}/\text{CdSe}/\text{CdS}$  Quantum Well Quantum Dots,” *APS March Meeting* (2010).
- Joseph Pingenot, Craig E. Pryor, and Michael E. Flatté, “Fast Spin Manipulation of Hole Spins in  $\text{In}_{0.5}\text{Ga}_{0.5}\text{As}$

- Quantum Dots,," *Advanced Workshop: Spin and Charge Properties of Low Dimensional Systems* (2009).
- Joseph Pingenot, Craig E. Pryor, and Michael E. Flatté, "Method for Full Bloch-Sphere Control of a Localized Spin via a Single Electrical Gate," *Device Research Conference* (2008).
- Joseph Pingenot, Craig E. Pryor, and Michael E. Flatté, "Method for Full Bloch-Sphere Control of a Localized Spin in a Quantum Dot via a Single Electrical Gate," *APS March Meeting* (2008).
- Joseph Pingenot, Craig E. Pryor, and Michael E. Flatté, "Tuning Hole g-Factors in Self-Assembled InAs/GaAs Quantum Dots with an Electric Field," *APS March Meeting* (2007).
- Joseph Pingenot, Craig E. Pryor, and Michael E. Flatté, "Optimizing g-factor tuning with electric fields in self-assembled InAs/GaAs Quantum Dots," *APS March Meeting* (2006).
- Joseph Pingenot, Craig E. Pryor, and Michael E. Flatté, "Electric Field Dependence of the g Tensor of MBE-grown Semiconductor Quantum Dots," *Electronic Materials Conference* (2005).
- Joseph Pingenot, Craig E. Pryor, and Michael E. Flatté, "Manipulating the Spin of a Single Electron In a Quantum Dot With an Electric Field," *APS March Meeting* (2005).
- Joseph Pingenot, Craig E. Pryor, and Michael E. Flatté, "Spin Injection Enhancement Through Schottky Barrier Engineering," *APS March Meeting* (2004).
- Joseph Pingenot, "Linux in the Enterprise," *Kansas Conference on Higher Education Computing* (2002).