

# Stanford University Photonics Retreat (SUPR)

April 12-14, 2013

DoubleTree Hotel Sonoma Wine Country

Rohnert Park, California

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# Welcome!

The Stanford Optical Society (a Student Chapter of OSA & SPIE) and the Stanford Photonics Research Center (SPRC) are delighted to welcome you all to SUPR 5, our fifth annual conference and retreat! We are excited to build on here previous retreats with SUPR 5 here in beautiful Sonoma County.

SUPR began five years ago with the premise that an off-campus conference to bring together Stanford's diverse and dispersed photonics community was long overdue. Since 2009, we have organized this retreat as a way to strengthen Stanford's photonics community, promote cross-disciplinary interaction, and engage with the wider research community beyond campus. Our agenda includes three days and two nights filled with seminars, panels, poster sessions, workshops and social activities. We believe that hosting this retreat off campus is essential to avoid daily distractions and to create an engaging yet relaxing atmosphere, conducive to fostering collaboration and innovation.

A special welcome goes to our many invited speakers and corporate partners. We greatly appreciate you sharing your valuable time and expertise with our community, and for your support of this retreat. Thank you for joining us!

We hope everyone enjoys this weekend and finds it a fun and intellectually stimulating experience!



### *SUPR 5 Organizing Committee*

(left to right) Lana Lau, Marissa Lee, Patrick Landreman, Kristen Anand, Aaswath Raman, Sam Bockenhauer, Matthew Lew, Marina Radulaski, Cathy Jan, Yu-Wei Lin, Robert Chen, Stephen Wolf



# Financial Support

The SUPR Planning Committee would like to thank the generous support of our many partners, and their committment to the success of SUPR 5.

We are delighted to welcome five corporate partners to SUPR this year:

SUPR Partner



Gold Level



We are also deeply grateful for the financial support of the following organizations:

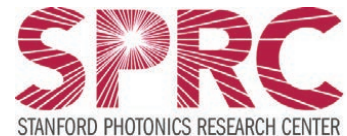


**Dept. of Physics**



STANFORD UNIVERSITY  
VICE PROVOST FOR GRADUATE EDUCATION  
SPICE Program

**Dept. of Applied Physics**



Special thanks go to the Directors of the Stanford Photonics Research Center (SPRC) for their continued support and enthusiasm for SUPR:

Dr. Thomas M. Baer, Executive Director  
Sara Lefort, Assistant Director  
Prof. Robert L. Byer, Co-Director  
Prof. Martin M. Fejer, Co-Director  
Prof. David A. B. Miller, Co-Director



# SUPR Schedule

## Friday April 12, 2013

2:30-3:00pm		Leave Stanford campus
4:00-5:00pm	<i>Lobby</i>	Arrive & check-in
5:00-6:00pm	<i>Upper Lobby/ Patio</i>	Welcome reception
6:00-7:00pm	<i>Salon I-II-III</i>	Dinner
7:00-7:10pm		Opening remarks
7:10-7:20pm		Corporate partner introductions
7:20-8:10pm		<u>Keynote</u> : David Blake (NASA)
8:30-10:00pm		<u>Poster session I</u>
10:00pm		<u>Icebreakers</u> : Team Trivia

## Saturday April 13, 2013

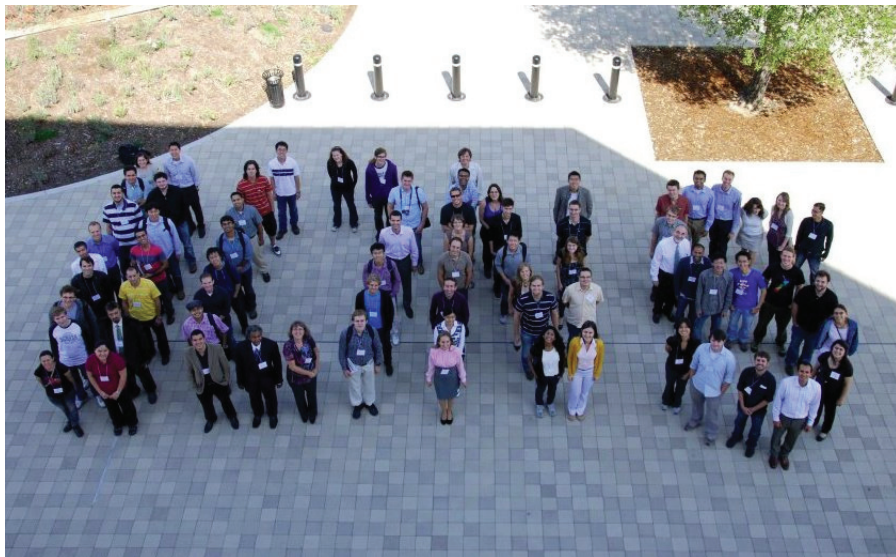
8:00-9:00am	<i>Ballroom Foyer</i>	Breakfast
9:00-9:40am	<i>Salon I-II-III</i>	<u>Invited Lecture</u> : Leo Hollberg
9:40-10:20am		<u>Invited Lecture</u> : Jennifer Dionne
10:20-10:40am	<i>Ballroom Foyer</i>	Coffee break
10:40-12:15pm	<i>Salon I-II-III</i>	<u>Workshop -- Making the most of your PhD</u> : Chris Golde (Stanford VPGE)
12:15-1:15pm	<i>Ballroom Foyer</i>	Lunch
1:15-5:30pm		Free time
5:30-6:30pm	<i>Upper Lobby/Patio</i>	Reception
6:30-7:30pm	<i>Salon I-II-III</i>	Dinner
7:30-8:20pm		<u>Keynote</u> : Arthur Bienenstock (Stanford)
8:30-9:30pm		<u>Panel -- Forces Shaping the Future of Optics</u> : Ferey Faridian (IFOS), Praj Kulkarni (AAAS fellow), Paulina Kuo (NIST), Jim Renfro (Corning); Moderated by Alok Vasudev
9:30-10:30pm		Post-Panel Mixer

## Sunday April 14, 2013

8:00-9:00am	<i>Ballroom Foyer</i>	Breakfast
9:00-9:40am	<i>Salon I-II-III</i>	<u>Invited Lecture</u> : Manish Butte
9:40-10:20am		<u>Invited Lecture</u> : James Harris
10:20-10:45am	<i>Ballroom Foyer</i>	Coffee Break
10:45-12:15am	<i>Salon I-II-III</i>	<u>Poster Session II</u>
12:15-1:15pm		Poster Awards & Closing Remarks, Lunch



*SUPR 2012 @ Asilomar - Group Picture*



*IONS NA-3 @ Stanford - Group Picture*



# Organizing Committee

SUPR is a student-run and focused event that is generously supported by SPRC and our many sponsors. The SUPR Student Organizing Committee includes Ph.D. students from a variety of areas in optics, and across multiple disciplines. We are all members of the Stanford Optical Society and hold various leadership roles, including SUPR Chair (Matt), Chapter co-Presidents (Kristen & Sam), Vice-President (Robert), Treasurer (Stephen), Secretary (Marissa), Outreach Chairs (Marina & Patrick), Membership Committee Member (Cathy), Speakers Committee Member (Yu-Wei) & past board members (Lana & Aaswath). We have met regularly since late summer in 2012 to plan, fundraise, and invite speakers to make SUPR 5 a reality.

We hope that this photonics retreat will continue to happen on an annual basis thanks to our sponsors and an enthusiastic team of dedicated student volunteers. If you are interested in being involved in the Stanford Optical Society or the SUPR 6 Planning Committee, please contact us!

More information about student leadership opportunities is available at: <http://photons.stanford.edu>

# Stanford Optical Society



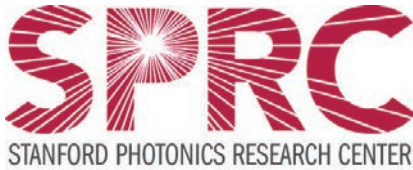
The Stanford Optical Society is a joint Optical Society (OSA)/SPIE student chapter that has become one of the largest student chapters in the world. It is also one of the most active graduate student groups on campus. With a multi-disciplinary focus, we have organized a variety of activities to bring students together for technical education, science education outreach, and networking / social events.

We began as a small society, hosting technical seminars as well as luncheon discussions. Our seminar series has grown rapidly to include leaders such as Dr. David Welch (Co-Founder and Chief Marketing and Strategy Officer of Infinera), Dr. Timothy Day (Founder and CEO of Daylight solutions), Dr. Richard Swanson (CTO of SunPower), Dr. Jim Turner (former NIST Acting Director) and Prof. Bruce Tromberg (Director of the Beckman Laser Institute). In 2009 we organized the first Photonics Retreat.

In addition to our seminars and SUPR, our recent activities include high-impact science education outreach events and collaborative events with neighboring chapters and optics groups. These events include participation in the Stanford SPLASH program, Girls Go Tech, Expanding Your Horizons, the Maker Faire, the Frontiers in Optics Educator's Day teacher training event, and an international photography competition for middle school and high school students.

In 2011 we hosted a two-day IONS (International OSA Network of Students) conference on campus that was attended by 100 Ph.D. students from 13 different countries! Renowned scientists, industry executives and entrepreneurs spoke and interacted with participants, and the conference was a hit with attendees. We have also hosted collaborative events with the UC Berkeley OSA/SPIE chapter, including laboratory tours (e.g. the National Ignition Facility, SLAC National Accelerator Laboratory, Lawrence Berkeley Lab's Advanced Light Source and the Lawrence Berkeley Lab's Molecular Foundry), poster sessions, and mixers with faculty.

More information about us and our upcoming events is available at: <http://photons.stanford.edu>



The Stanford Photonics Research Center (SPRC) builds strategic partnerships between the Stanford University photonics community and corporations and organizations active in photonics or employing lasers and optical technologies in their research and product development activities. Member companies gain facilitated access to Stanford faculty, students and researchers by participating in SPRC events, supporting and collaborating on specific research projects, mentoring students and visiting research labs.

Member benefits also include priority alerting for Stanford photonics invention disclosures. SPRC promotes member company recruitment of Stanford students, and facilitates research interactions with Stanford Ph.D. students, faculty, and other researchers. In turn, Stanford students establish research connections with scientific experts and business leaders in the photonics industry that continue beyond their Stanford experience.

SPRC faculty and student members belong to one or more working groups which are aligned with their research interests. These working groups cover a wide range of research areas and technologies, including:

Solar Cell Technologies	High Power Laser Sources	Photonic sensors
Information Technology	Ophthalmology	Medical Diagnostics
Telecommunications	Consumer Photonics & Electronics	Aerospace
Neuroscience	Quantum Information Science	Automotive
Microscopy & Molecular Imaging	Nanophotonics	Entrepreneurship

SPRC corporate members interact directly with faculty working groups conducting research in areas most directly related to company interests.

For more information, please visit: <http://photonics.stanford.edu>

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# Invited Speakers

## Keynote Speakers



### **Prof. Arthur Bienenstock**

Professor of Photon Science (SLAC), Applied Physics, and Materials Science and Engineering, Emeritus, *Stanford University*

Member, National Science Board, *National Science Foundation*  
Special Assistant to the President for Federal Research Policy  
Director of Wallenberg Research Link, *Stanford University*

Arthur Bienenstock received his B.S. and M.S. degrees in Physics from the Polytechnic Institute of Brooklyn, and his Ph.D. degree in Applied Physics from Harvard University in 1962. He joined the Stanford faculty in 1967 and has served as Professor of Applied Physics, Professor of Materials Science and Engineering, Vice Provost for Faculty Affairs (1972-77), Director of the Stanford Synchrotron Radiation Laboratory (1978-97), Associate Director of the Stanford Linear Accelerator Center (1992-97) and Vice Provost for Research and Graduate Policy (2003-6). From November, 1997 to January, 2001, he served as Associate Director for Science of the Office of Science and Technology Policy while on leave from Stanford.

Prior to joining Stanford, Bienenstock was a National Science Foundation Postdoctoral Fellow at the Atomic Energy Research Establishment, Harwell, England (1962-3) and an Assistant Professor in Harvard University's Division of Engineering and Applied Physics (1963-7). His early research involved a broad range of theoretical studies of crystalline solids, with some experimental and theoretical X-ray studies of poorly crystallized and amorphous systems. While still at Harvard, he became increasingly interested in the properties of amorphous materials and gradually shifted towards experimental studies of atomic arrangements in these materials.

This, in turn, led Bienenstock to recognize the great potential of X-ray synchrotron radiation (SR) for studying these arrangements. He turned his attention to the development of SR techniques for analysis of bulk and thin film amorphous materials, as well as to the development of increasingly powerful synchrotron radiation sources as director of the Stanford Synchrotron Radiation Laboratory (SSRL). His responsibilities as SSRL director led him increasingly into science policy and, subsequently, to the Office of Science and Technology Policy.

He has published over 100 papers in scientific and science policy journals, and his graduate students and postdoctoral associates hold major research and leadership positions throughout the world. In 1968, Bienenstock was the first recipient of the Pittsburgh Diffraction Society's Sidhu Award. He received the Distinguished Alumnus Award of the Polytechnic Institute of New York Alumni Association in 1977, the Distinguished Service Award of the Department of Energy in 2005 and the Cuthbertson Award from Stanford University in 2009. He is a fellow of the American Physical Society, the Institute of Physics, the American Association for the Advancement of Science and the California Council of Science and Technology.

He was awarded honorary PhDs by Polytechnic University (1998) and Lund University (2006). He was president of the American Physical Society (2008) and chair of the Council of Scientific Society Presidents (2010).



## **Dr. David Blake**

Principal Investigator of CheMin XRD/XRF instrument,  
Mars Science Laboratory (Curiosity Rover)

Senior Research Scientist, *NASA Ames Research Center*

David Blake received a B.S. in Biological Sciences from Stanford University in 1973. After a stint in the US Navy, he attended graduate school at the University of Michigan, where he received a Ph.D. in Geology & Mineralogy in 1983. He came to Ames Research Center as a NRC postdoctoral fellow, and became a research scientist in the Exobiology Branch at Ames in 1989. He was the Exobiology Branch Chief from 2000-2004. In nearly 25 years of research at Ames, he has studied astrophysical ices, interplanetary dust, Mars meteorites, lunar soils and stratospheric soot.

Dr. Blake is also the Principal Investigator of CheMin, a mineralogical instrument that is included in the analytical laboratory of the Mars Science Laboratory (MSL) mission. MSL launched in November 2011 and successfully landed in Gale Crater in August 2012. A principal goal of MSL is to identify and characterize present or past habitable environments on Mars. During the mission, CheMin will perform quantitative mineralogical analyses of rocks and soil delivered to it by the MSL sampling system. Mineralogy is important to the goals of the MSL mission because minerals are thermodynamic phases, formed or altered under specific (and known) conditions of temperature, pressure and composition. The CheMin instrument was conceived and developed at Ames Research Center over a nearly 20-year period by Dr. Blake. During the operational period of the mission (2012-2014), CheMin activities will be managed and directed from Ames.

## **Faculty Speakers**



## **Prof. Manish J. Butte**

Assistant Professor, Dept. of Pediatrics  
*Stanford University School of Medicine*

Manish J. Butte, MD PhD is an Assistant Professor in the Department of Pediatrics at Stanford University. He studied Physics at Brown University where he earned his Sc.B. with honors in 1993, studying mathematical neural networks in Prof. Leon Cooper's group. Afterwards, he earned his M.D. degree from the Brown University School of Medicine in 1996. He then studied protein crystallography under Prof. Robert Fletterick at UCSF and graduated with a Ph.D. in Biophysics in 2000. Returning to clinical training, he completed a Pediatrics residency at the Children's Hospital of Philadelphia in 2003 and a clinical fellowship in Allergy & Immunology at Children's Hospital Boston in 2006, where he specialized in the care of children with immunodeficiencies, autoimmunity, auto-inflammatory disorders, asthma, and allergies.

He is board certified in both Pediatrics and Allergy & Immunology. During a joint post-doctoral fellowship at Harvard Medical School (under Prof. Arlene Sharpe) and in the Harvard Chemistry & Chemical Biology Dept. (under Prof. George Whitesides), he worked on T cell inhibitory pathways and development of microfabricated tools to capture and study immune cells. He transitioned to Stanford in 2009 to start his own lab. The group addresses fundamental, long-standing questions in immunology using innovative nanotechnological approaches to visualize and manipulate cells. His group has pioneered use of biological atomic force microscopy to study immune cell function in health and disease. Dr. Butte is clinically active, and cares for children and adults with immunological diseases at the Lucile Packard Children's Hospital at Stanford and at Stanford Hospital & Clinics.



**Prof. Jennifer Dionne**

Assistant Professor, Dept. of Materials Science and Engineering  
*Stanford University*

Jennifer Dionne is an assistant professor in the department of Materials Science and Engineering at Stanford University. In 2009, Jen received her Ph. D. in Applied Physics at the California Institute of Technology, working with Professor Harry Atwater. In 2010, Jen served as a postdoctoral research fellow in Chemistry, working with Professor Paul Alivisatos at the University of CA, Berkeley and Lawrence Berkeley National Laboratory.

Jen's research investigates plasmonic metamaterials and colloidal nanocrystal-based materials, including their fundamental electrodynamic properties and applications to solar energy and bioelectromagnetism. Her research has led to new theoretical and experimental techniques for manipulating light on subwavelength scales. Among numerous research contributions, Jen demonstrated the first negative index material at visible wavelengths and developed a subwavelength silicon electro-optic modulator. Together, her results form the basis for new plasmonic materials with applications ranging from optical microscopes with nanometer-scale resolution to new optical computation networks and improved renewable energy technologies. Her research could dramatically increase the efficiency of solar-to-electric and solar-to-fuel conversion without increasing cost, lead to subwavelength integrated optical and electro-optic devices, and even allow for optical sensing of neuronal transmission.

Recently, Jen was named a Stanford Terman Fellow (2010) and a Robert N. Noyce Family Faculty Fellow (2010). She was also awarded the Clauser Prize for best Caltech thesis (2009), the Materials Research Society Gold Award for outstanding graduate student (2008), and an Everhart lectureship (2008). In addition, Jen has received several 'best paper' awards at international conferences and holds two pending patents on plasmonic modulators and display technologies. Jen's work been featured in Nature, Science, and other major scientific journals, as well as on PBS and in Michio Kaku's book "Physics of the Impossible."

Jen perceives outreach as a critical component of her role as an educator, and is active both in the scientific and general communities. This year, she is serving as the chair of the "Plasmonic Materials and Metamaterials" symposium for the Materials Research Society Spring 2010 meeting. She is also recruiting the next generation of scientists and engineers through her participation in Career Day outreach and "Chemistry in the Classroom," a solar outreach program for local elementary and high school students.



## **Prof. James S. Harris**

James and Ellenor Chesebrough Professor of Electrical Engineering, Materials Science & Engineering (by courtesy), and Applied Physics (by courtesy)  
*Stanford University*

James Harris is the James and Ellenor Chesebrough Professor of Electrical Engineering, Applied Physics and Materials Science at Stanford University. He received B.S., M.S. and Ph.D. degrees in Electrical Engineering from Stanford University in 1964, 1965 and 1969, respectively.

In 1969, Dr. Harris joined the Rockwell International Science Center in Thousand Oaks, CA where he initiated much of their work on III-V compound semiconductors. He was one of the key contributors in developing ion implantation in GaAs, MBE and heterojunction device technologies, leading to Rockwell's preeminent position in GaAs device technology. He was successively Manager of Infra-red devices, Principal Scientist and Director of the Optoelectronics Research Department. In 1982, Dr. Harris joined the Solid State Electronics Laboratory, Stanford University, as Professor of Electrical Engineering to establish a program in compound semiconductor materials and heterojunction devices.

His current research interests are in the physics and application of ultra-small structures and novel materials to new optoelectronic and spin based devices. He has supervised over 95 PhD students and has over 850 publications in these areas.

Dr. Harris is a Fellow of IEEE, the American Physical Society, Optical Society of America and he received the 2000 IEEE Morris N. Liebmann Award, the 2000 International Compound Semiconductor Conference Welker Medal, an IEEE Third Millennium Medal and an Alexander von Humboldt Senior Research Prize in 1998.



## **Prof. Leo Hollberg**

Research Professor, Dept. of Physics  
*Stanford University*

Leo Hollberg moved to Stanford University as a Research Professor in the Department of Physics in 2011 after spending two years as the Chief Technical Officer of AOSense Inc., a small growing high-tech company developing inertial sensors (accelerometers and gyroscopes) based on atomic interferometry for applications in navigation and geosciences. Prior to that Leo was at the National Institute of Standards and Technology, NIST-Boulder for 20+ years where he established, and was group leader of the Optical Frequency Measurements group. He spent two postdoctoral years at AT&T Bell Laboratories working with the Steven Chu on laser-cooling and -trapping of atoms, and with Richard Slusher on squeezed states of light. Leo's PhD research was done at the University of Colorado on high-resolution laser spectroscopy with Jan Hall at JILA. His undergraduate degree in physics was completed at Stanford.



Leo's research has focused on high-resolution laser spectroscopy of laser-cooled and -trapped atoms, the development of semiconductor lasers for scientific and technical applications, ultra-sensitive detection of trace gases with applications in atmospheric, environmental and process monitoring, optical coherence effects of driven multilevel atoms, chip-scale atomic-clocks and -magnetometers, optical frequency standards, optical frequency combs, microwave photonics and optical atomic clocks. Areas of expertise include frequency-stabilized lasers, optical systems and precision measurements, laser technologies, clocks and timing for navigation and communication systems, low noise microwave sources and electronics, high-resolution nonlinear optical spectroscopy and optical/microwave frequency standards and experimental laser/atomic physics. At Stanford he is also associated with the Stanford Center on position Navigation and Time (SCPNT) and HEPL.

## Workshop Speaker



**Dr. Chris Golde**

Associate Vice Provost for Graduate Education  
*Stanford University*

Chris Golde is a researcher and scholar in American higher education, with an emphasis on doctoral education. She joined the VPGE staff in February 2007. Prior to that she was a Senior Scholar at the Carnegie Foundation for the Advancement of Teaching, where she was research director for the Carnegie Initiative on the Doctorate. She is a nationally recognized expert on graduate education—actively conducting research, speaking and publishing on the graduate student experience, student attrition, doctoral pedagogies, and graduate education reform. She is the lead author of *At Cross Purposes: What the Experiences of Today's Doctoral Students Reveal about Doctoral Education* (2001), co-editor of *Envisioning the Future of Doctoral Education: Preparing Stewards of the Discipline* (2006) a compilation of essays on the doctorate, and co-author of *The Formation of Scholars: Rethinking Doctoral Education for the 21st Century* (2008). Prior to joining Carnegie, she was a faculty member at the University of Wisconsin-Madison. She holds a Ph.D. in education and an M.A. in sociology, both from Stanford University.

## Panelists



### **Dr. Fereydoun “Ferey” Faridian**

President  
*Intelligent Fiber Optic Systems*

Dr. Ferey Faridian is the president of Intelligent Fiber Optic Systems Corporation (IFOS), a Santa Clara based company that designs and manufactures optical sensing systems for use in energy, medicine and aerospace.

Dr. Faridian started his technology management career at Schlumberger, where he led an accelerated products group responsible for an advanced sensor system that flies on NATO’s current Typhoon Eurofighter Aircraft. He then spent several years in Fortune 500 management consulting in corporate strategy, followed by joining a boutique California investment bank as VP, engaged in venture consulting, middle market M&As and private placements of technology companies. Dr. Faridian then joined a \$1 billion fund in Washington, DC to work on a portfolio investment, a \$100 million venture capital fund in Denver, representing both funds on the West Coast as principal and venture partner.

Dr. Faridian has since served as CEO/ President of four entrepreneurial companies and as member of several Boards, currently the Board of the American Red Cross, Silicon Valley. Dr. Faridian has an MSc in Microwaves & Modern Optics and a PhD in EE both from University College, London, and an MBA from the University of Cambridge Judge Business School.



### **Dr. Prajwal “Praj” Kulkarni**

Software Engineer  
AAAS Science and Technology Policy Fellow  
*Environmental Protection Agency (2009-2011)*

Prajwal “Praj” Kulkarni was born and lived in Kingston, Jamaica for the first 12 years of his life. He moved to New York City for the next two years, the suburbs of Philadelphia for high school, Penn State for college, and Stanford for graduate school. Praj received his Ph.D. in Applied Physics from Stanford in March 2009. His PhD research focused on the near-Earth space environment.

From Sept. 2009 – Sept. 2011, Praj was an AAAS Science and Technology Policy Fellow at the Environmental Protection Agency. Since January 2012, he has worked as an engineer at a mid-sized software company in Palo Alto, CA.



**Dr. Paulina S. Kuo**

Research Scientist  
Information Technology Laboratory & Joint Quantum Institute  
*NIST*

Paulina S. Kuo received S. B. degrees in physics and materials science from the Massachusetts Institute of Technology in 2000, and M. S. and Ph. D. degrees in applied physics from Stanford University in 2002 and 2008, respectively. She has been at the National Institute of Standards and Technology (NIST) and the Joint Quantum Institute (NIST-University of Maryland) since 2008 and was a recipient of the National Research Council Postdoctoral Fellowship (2008-2010).

She currently works in the Information Technology Laboratory at NIST, with a joint appointment at the Joint Quantum Institute.



**Jim Renfro**

Senior Project & Business Development Manager  
*Corning*

Jim currently leads Corning's USB 3.0 Active Optical Cable program, centered at the Corning West Coast Technology Center in Palo Alto. Active Optical Cables (AOCs) are an emerging consumer product class that incorporate photonic, opto-mechanical, and electrical technologies into traditionally copper-based interconnect systems such as USB, Thunderbolt, and HDMI.

Jim received his BS in Physics from Washington & Lee University ('86) and his MBA-Finance from the University of Colorado ('99). Jim started with Corning 22 years ago as a Field Engineer and worked in a succession of leadership roles spanning Marketing, Manufacturing, Sales, Product Line Management, and Applied Research. He has made, sold, and installed fiber optical cables & connectors, patch panels, fusion splicers, and test equipment, as well as led new product development activities augmenting passive fiber optic elements with RFID, Wireless, and software functionality.

Prior to Corning, Jim served as a communications officer with the US Army Signal Corps in Germany. In his spare time, he enjoys studying history, traveling to interesting places, golfing, and taking his three dogs up the mountains around Pacifica.

 **ILX Lightwave**  
 Photonic Test & Measurement  
*26 Years*

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 **New Focus**  
 Simply Better Photonics™  
*22 Years*


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 **Newport**  
 Photonics Research Solutions  
*43 Years*

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 **OPHIR**  
 Optics & Photonics Solutions  
*36 Years*

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 **DRIEL  
INSTRUMENTS**  
 Light Sources & Detection Systems  
*47 Years*

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 **Richardson Gratings**  
 Diffraction Gratings  
*65 Years*

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 **Spectra-Physics**  
 Lasers for Industry & Science  
*51 Years*

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 **Spiricon**  
 OPHIR Photonics  
 Laser Beam Measurement  
*34 Years*

# Newport. Brands That Have Built An Industry.

Newport was founded in 1969 to meet the specific needs of an emerging new laser industry and soon became the leader in vibration control solutions. As the broader photonics industry developed, Newport continued to advance its product portfolio, offering opto-mechanical components, optics, photonics instrumentation and precision motion control.

Today, Newport has grown to include a family of well-respected brands. Individually, each has a strong history of leadership and innovation in product excellence that has and continues to shape the photonics industry. Together, united as a family of brands, Newport is dedicated to continued product innovation and to providing our customers with an unsurpassed level and breadth of expertise.

For more information on Newport and its family of brands, visit [www.newport.com](http://www.newport.com)



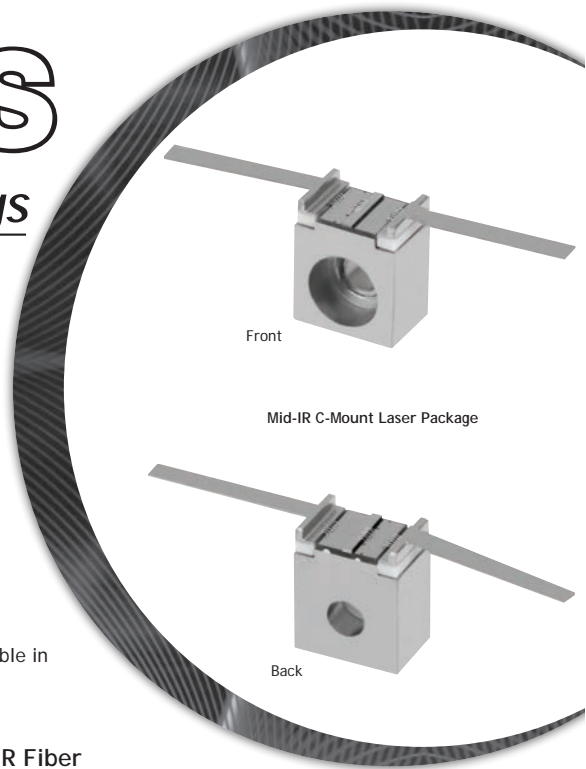
# THORLABS

## New MIR Product Offerings

With the recent acquisitions of Maxion Technologies Inc. and IRphotonics' iGuide™ optical fiber solutions, Thorlabs has added interband cascade (IC) and quantum cascade (QC) laser products as well as fluoride-based optical fiber to its growing product portfolio.

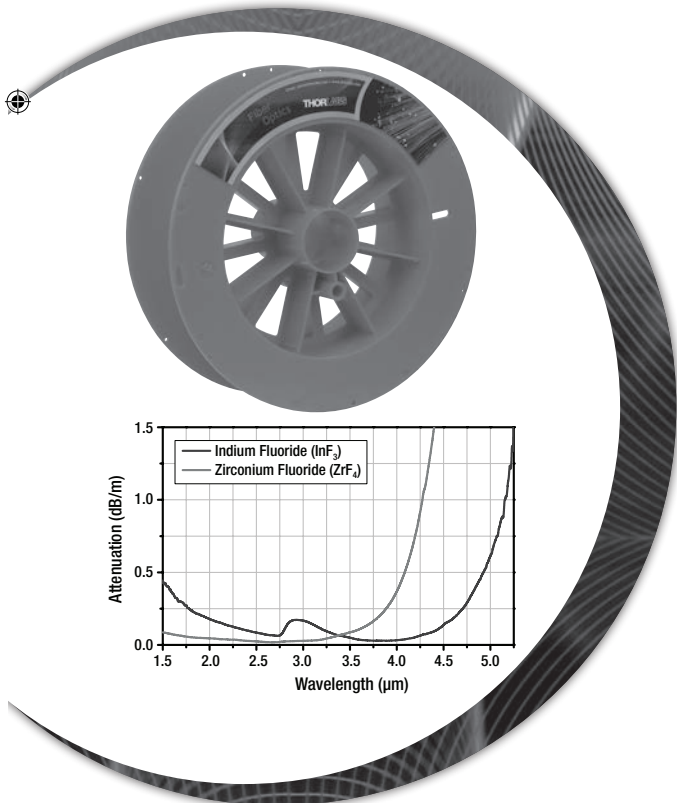
### Mid-IR Quantum Cascade and Interband Cascade Lasers

Thorlabs' new line of Quantum Cascade Lasers (QCLs) and Interband Cascade Lasers (ICLs) are designed for the mid-IR (3 - 12  $\mu\text{m}$ ) wavelength range. Available in both single mode Fabry-Perot (FP) and single longitudinal mode distributed feedback (DFB) varieties, these ICLs and QCLs are ideal for integration into product solutions aimed at improving chemical sensing, infrared countermeasures, and free-space optical communications. CW output powers up to 750 mW will be available in the coming weeks.



Mid-IR C-Mount Laser Package

Back



### Mid-IR Fiber

With the acquisition of IRphotonics' iGuide™ MIR fiber, Thorlabs will begin to draw fluoride-based fiber at our facility in Newton, NJ. Both bare fiber and MIR patch cables will be added to our stocked product portfolio in the coming months. Custom patch cables using these fibers will also be available with the same 24-hour turn around guarantee offered for our silica fibers. These MIR fibers are all made from fluoride glass and provide higher transmission in the MIR wavelength range than competing technologies while also effectively transmitting UV, visible, and NIR light. The extremely low hydroxyl ion content provides high transmission up to 5.0  $\mu\text{m}$ .

### MIR Fiber Features

- Fiber Types Available:
  - ZrF<sub>4</sub> Fibers (UV to 4.3  $\mu\text{m}$ )
  - InF<sub>3</sub> Fibers (UV to 5.0  $\mu\text{m}$ )
- Single Mode, Multimode, Doped, and High-Power-Screened Options Available
- Core Sizes Ranging from 85  $\mu\text{m}$  to 600  $\mu\text{m}$  for Multimode Fiber
- Numerical Aperture Ranging from 0.1 to 0.35
- Transparent in UV, VIS, NIR, and MIR Regions

[www.thorlabs.com](http://www.thorlabs.com)

# Friday Posters

Presenter	Poster Authors	Poster Title
Kristen Anand	Kristen Anand, Catherine Jan, and Olav Solgaard	Microscopy and spatially determined optical actuation through multimode optical fibers
Ross Audet	Ross M. Audet, Elizabeth H. Edwards, Yiwen Rong, James S. Harris, and David A.B. Miller	Germanium quantum well modulators on silicon substrates for optical interconnects
Adam Backer	Adam S. Backer, Mikael P. Backlund, Matthew D. Lew and W. E. Moerner	Single-Molecule Orientation Measurements with a Quadrated Pupil
Michal Bajcsy	M. Bajcsy, A. Rundquist, A. Majumdar, T. Sarmiento, K. Fischer, K. Lagoudakis, A. Hristov, J. Vuckovic	Photonic-crystal cavities with embedded quantum dots as non-classical light sources
Robert Chen	Robert Chen, Suyog Gupta, Yijie Huo, Hai Lin, Theodore I. Kamins, James S. Harris Jr.	Enabling Technologies for Group-IV Lasers Based on GeSn Alloys
Christoph Kohstall	Christoph Kohstall, Brannon Klopfer, Catherine Kealhofer, Gunnar Skulason, Joshua Francis, Mark Kasevich	Quantum Electron Microscope
Marissa Lee	Marissa K. Lee, Jarrod Williams, Robert J. Twieg, Jianghong Rao, and W. E. Moerner	Activation of Nitro-Aryl Fluorogens in Live Bacterial Cells for Enzymatic Turnover Activated Localization Microscopy
Kenneth Leedle	Kenneth Leedle, Seonghyun Paik, Altamash Janjua, Mark J. Schnitzer, James S. Harris	Towards a photonic crystal waveguide mode-locked laser
Xin Lei	Xin Lei, Lele Wang, Keith Mathieson, Ted Kamins, Daniel Palanker, James Harris	Photovoltaic Retinal Prosthesis for Restoring Sight to the Blind
Matthew Lew	Matthew D. Lew*, Mikael P. Backlund*, Adam S. Backer, Steffen J. Sahl, Ginni Grover, Anurag Agrawal, Rafael Piestun, and W. E. Moerner	The Double-Helix Microscope simultaneously measures single-molecule orientation and 3D position, reducing dipole-induced localization errors
Yanying Li	Yanying Li, Raphael Clady, Shruti V. Thombare, Timothy W. Schmidt, Mark L. Brongersma, Paul C. McIntyre	Ultrafast Transient Absorption of Photo-excited Ge Nanowires
Victor Liu	Victor Liu and Shanhui Fan	Efficient computational electromagnetics for nanophotonic device design
Steven Madsen	Steven Madsen and Robert Sinclair	Synthesis and Characterization of Au Nanoparticles for SERS imaging
Wolfgang Nitsche	Wolfgang H. Nitsche, Na Young Kim, Georgios Roumpos, Sven Hoefling, Alfred Forchel, Yoshihisa Yamamoto	Observation of the Berezinskii-Kosterlitz-Thouless transition in an exciton-polariton condensate

# Friday Posters

<b>Presenter</b>	<b>Poster Authors</b>	<b>Poster Title</b>
Jessica Piper	Jessica Piper and Shanhui Fan	Critical coupling in planar film stacks
Marina Radulaski	Marina Radulaski, Sonia Buckley, Jelena Vuckovic	Nonlinear Optics in Photonic Crystal Cavities
Charles Rudy	Charles W. Rudy, Alireza Marandi, Konstantin L. Vodopyanov, and Robert L. Byer	Octave-Spanning Supercontinuum Generation in Tapered Chalcogenide Fiber
Steffen Sahl	Steffen J. Sahl, Lucien E. Weiss, Willianne I. M. Vonk, Lana Lau, Judith Frydman, W. E. Moerner	Quantitative Optical Microscopy of Intra-Cellular Huntingtin Aggregation
Sonny Vo	Sonny Vo, David Fattal, Zhen Peng, Tho Tran, Ray Beausoleil	Novel 3D Display Technology

# Sunday Posters

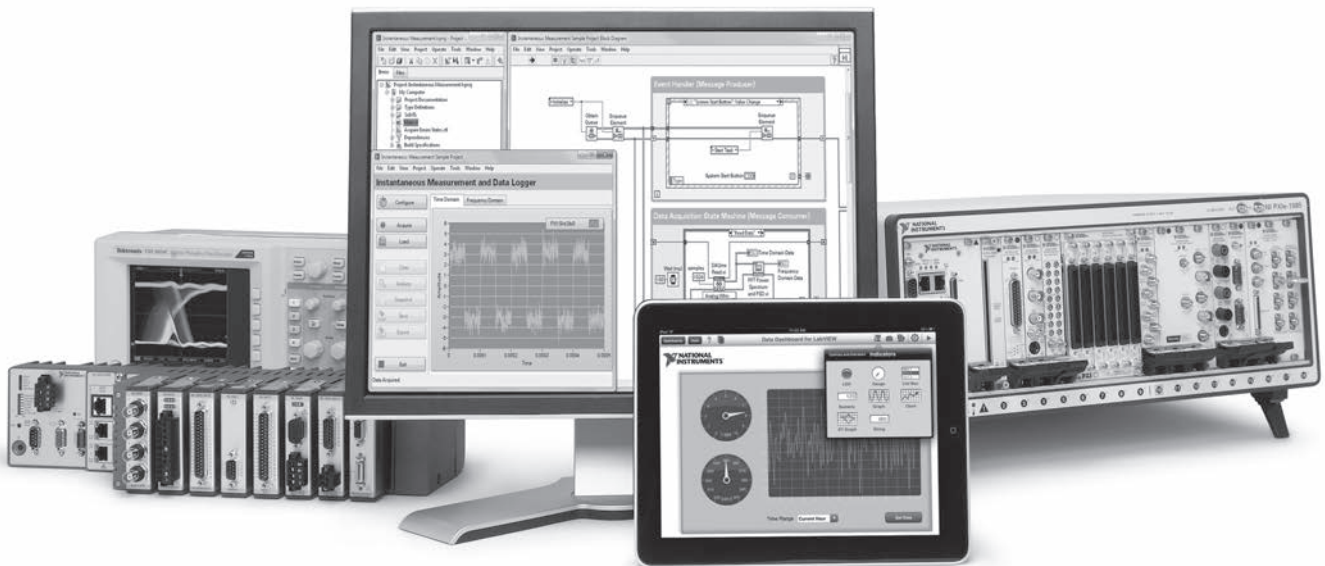
Presenter	Poster Authors	Poster Title
Christine Amwake	Christine Amwake, Nathan Loewke, Sunil Pai, Smruti Phadnis, Bertha Chen, Tom Baer, Olav Solgaard, Renee Reijo Pera	Applying Time-Lapse Quantitative Phase Imaging to Study Human Stem Cells
Samuel Bockenhauer	Samuel Bockenhauer, Quan Wang, W. E. Moerner	Pigment-protein dynamics in the peridinin-chlorophyll-protein
Chia-Ming Chang	Chia-Ming Chang, and Olav Solgaard	silicon photonics for optical interconnects, sensing and electron acceleration
Krishna C. Balram	Krishna C. Balram and David A.B. Miller	Nanoscale planar multispectral image sensors
Kevin Fischer	Kevin Fischer, Konstantinos G. Lagoudakis, Arka Majumdar, Michal Bajcsy, Armand Rundquist, Erik D. Kim, Jelena Vuckovic	Bimodal photonic crystal cavity interface for quantum dot spin
Ryan Hamerly	Ryan Hamerly, Nikolas Tezak, Dodd Gray, Dmitri Pavlichin, Hideo Mabuchi	Coherent Low-Power Nonlinear Signal Processing
Catherine Jan	Catherine Jan, Insun Park, Kristen J.B. Anand, Olav Solgaard	Sensor Multiplexing Using a Multimode Fiber
Yousif Kelaita	Yousif Kelaita, Thomas Babinec, Jelena Vuckovic	Nanometallic Resonators for Cavity Quantum Electrodynamics
Patrick Landreman	P. Landreman, M. Brongersma	Launching Surface Plasmon Polaritons with Semiconductor Nanowires
Lana Lau	Lana Lau, Yin Loon Lee, Steffen Sahl, Lucien Weiss, Tim Stearns, and W. E. Moerner	Resolving Structural Features in Biological and Biomedical Applications with STED Super-resolution Microscopy
Yu-Wei Lin	Yu-Wei Lin, C. R. Phillips, M. M. Fejer	Adiabatic Conversion of the second order nonlinearity
Peter McMahon	Peter McMahon, Kristiaan De Greve, David Press, Thaddeus Ladd, Christian Schneider, Sven Hoeffling, Alfred Forchel, Yoshihisa Yamamoto	Quantum Nondemolition Measurements for Quantum Dot Spin Qubits
Aaswath Raman	Aaswath Raman and Shanhui Fan	Broadband Nanophotonics: Applications to Photovoltaics & Thermal Emission
Armand Rundquist	Armand Rundquist, Arka Majumdar, Michal Bajcsy, Jelena Vuckovic	Photonic Crystal Coupled Cavities for Quantum Optics
Toby Sachs-Quintana	Eric T. Hoke, Isaac V. Kauvar, Matthew T. Lloyd, Alexandre M. Nardes, William R. Mateker, Craig H. Peters, Michael D. McGehee, Nikos Kopidakis	The role of electron affinity in determining whether fullerenes catalyze or inhibit photooxidation of polymers for solar cells



# Sunday Posters

<b>Presenter</b>	<b>Poster Authors</b>	<b>Poster Title</b>
Limor Spector	Limor S. Spector, Maxim Artamonov, Alvaro Magana, Shungo Miyabe, Simon Petretti, Piero Decleva, Todd Martinez, Alejandro Saenz, Tamar Seideman, Markus Guehr, and Philip H. Bucksbaum <sup>1,2</sup>	Angle dependence of molecular high harmonic emission in three dimensions
Nikolas Tezak	Nikolas Tezak, Yeong-Dae Kwon, H. Nina Amini, Michael Armen, Hideo Mabuchi	Coherent optical reservoir computing
Nina Vaidya	Nina Vaidya, Olav Solgaard	AGILE: Axially Graded Index LEns as a solar concentrator
Song Wang	Song Wang, Joe Farrell, Simon Petretti, Johann Forster, Brian McFarland, Mateo Negro, Yulian Vanne, Piero Declava, Limor Spector, Alejandro Saenz, Phil Bucksbaum and Markus Greiner	Strong Field Ionization to Multiple Electronic States in Water
Livia Zarnescu	Livia Zarnescu, Helge Sudkamp, Thomas Baer, Audrey Ellerbee	Full-Field Optical Coherence Microscopy of Early Embryo Development

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# Saturday Activities Information

Sonoma Valley is a popular and beautiful tourist destination. Saturday afternoon is deliberately left free for you to explore the region with other SUPR attendees. The planning committee has organized a winery tour (see us at the registration desk for info/availability!) and compiled information on other fun activities below:

**Free hours: Saturday, Apr. 13 (1:15 PM to 5:30 PM)**

## I. Exploring the Wine in Wine Country (21 and over)

### **Wine tasting (Sonoma and Napa Counties)**

Sonoma recommendations: Benzinger, Buena Vista, Imagery, Chateau St Jean

Napa recommendations: Mondavi, Pine Ridge, Artesa

Cost: variable – should range between \$5-\$20, though this is generally waived with the purchase of a bottle.

### **Beer tasting & tours at Lagunitas Brewing Company (Petaluma):**

Free tours Saturday and Sunday at 1 pm, 3 pm, 5 pm. Meet in the Lagunitas tap room at 1280 N. McDowell Boulevard, Petaluma, CA 94954.

Website: <http://lagunitas.com/taproom/>

### **Champagne tasting at Gloria Ferrer (Sonoma)**

Champagne tasting and tour of champagne caves. Cost varies, \$20 for basic tour and tasting. 23555 Carneros Hwy. 121, Sonoma California; (707) 933-1917

## II. Other Fun Activities (all ages)

**Traintown (Sonoma)** *\*Highly recommended by SUPR committee member ( Sonoma native) Marissa*

“The most well-developed scale railroad in the Americas” – this is quarter scale railroad which gives 20 minute rides through tunnels, over bridges, and with a stop at a petting zoo. Other fairground-type rides are also available.

Cost: Free admission and parking, \$5.75 to ride the train.

More details: Open Friday, Saturday, Sunday from 10 AM – 5 PM. Located at 20264 Broadway, Sonoma; phone: 707-938-3912; website: [www.traintown.com](http://www.traintown.com)

### **Tour of Sonoma Mission, Sonoma Barracks, and Vallejo’s Home (Sonoma)**

The Sonoma Mission is the northernmost Franciscan Mission in California and the birthplace of the California State Bear Flag. The Mission and the Barracks are next to each other in the historic Sonoma Plaza, and General Vallejo’s home is about a mile west.

The Mission and Barracks are located at 363 3rd St West, Sonoma

Hours: 10 AM – 5 PM, daily.

[http://www.parks.ca.gov/?page\\_id=479](http://www.parks.ca.gov/?page_id=479)

### **Petaluma Adobe State Historic Park (Petaluma)**

Main residence of Rancho Petaluma, which was General Mariano Guadalupe Vallejo's 66,000 working range from 1834-1846. \$3 admission fee. Open Saturday and Sunday from 10am-5pm.

3325 Adobe Road, Petaluma

*April 13th is Sheep Shearing Day*

### **Q-Zar Laser Tag (Rohnert Park)**

Laser tag, open Friday 3pm – 11pm, Saturday: 9am – 11pm, Sunday: 9am – 9pm

\$7-\$18, depending on how many games

5195 Redwood Drive, Rohnert Park; (707) 585-8000

<http://www.escapesonoma.com/>

## **III. The Great Outdoors**

### **Jack London State Historic Park (Sonoma)**

Park and museum on the site of Jack London's (writer of "Call of the Wild") former home. Visitors can tour the museum, or go on a hike through the redwoods. The longest hike is 7 miles round-trip and goes to the top of Sonoma Mountain.

Open Thursday to Monday from 9-5 with \$10 entry fee.

2400 London Ranch Road, Glen Ellen CA 95442

<http://www.jacklondonpark.com>

### **Crane Creek Regional Park (Rohnert Park)**

128 acre park with rolling grassland meadows and buckeye trees. Trails for hiking, biking, and horse-back riding.

Open daily sunrise to sunset.

\$7 admission fee for vehicles

Dogs allowed on leash

Located at 5000 Pressley Road, Rohnert Park

### **Sugarloaf Ridge State Park (Sonoma)**

25 miles of hiking trails including a 2,729 foot park summit with views of the North Bay.

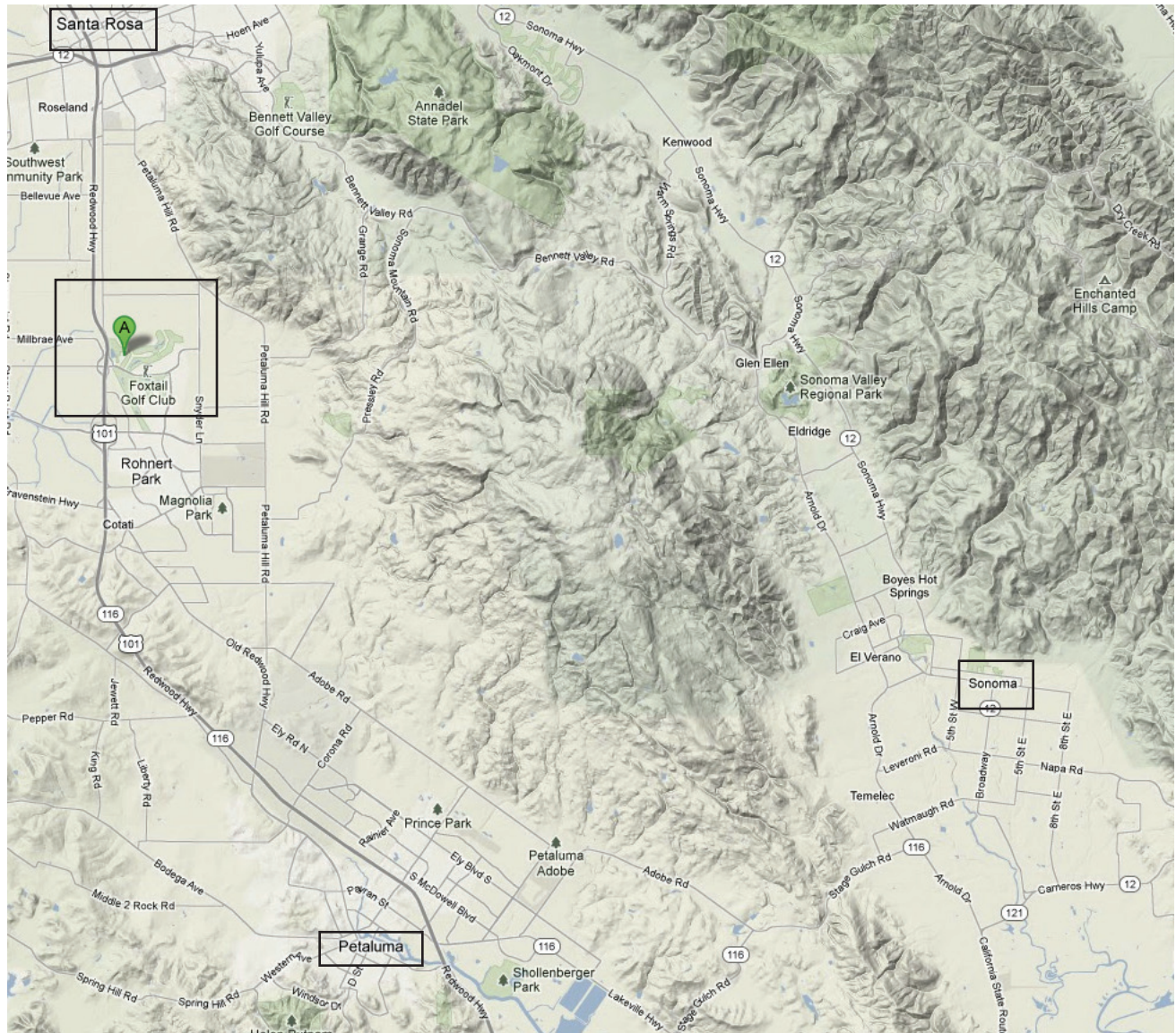
[http://sugarloafpark.org/Sugarloaf\\_Ridge\\_State\\_Park/Sugarloaf.html](http://sugarloafpark.org/Sugarloaf_Ridge_State_Park/Sugarloaf.html)

Guided 10 mile hike the entire day of Saturday April 13th: <http://www.sonic.net/~fmi/daveandbill.html>

### **Activities in and around the Russian River**

<http://www.russianriver.com/site/cms/pages/activities.php>

# Sonoma County Map



## Sonoma County Public Transit:

**Routes 44 & 48** run on weekends between Santa Rosa, Rohnert Park (where our hotel is located) and Petaluma. There is a bus stop located conveniently very nearby the hotel on Roberts Lake Road. Service is approximately every half hour between 2-6pm on weekends.

Please refer to <http://www.sctransit.com> for the schedules and maps. From Santa Rosa you can transfer to Route 30 to reach Oakmont and Sonoma.

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Livia Zarnescu	liviaz@stanford.edu	Bioengineering	Audrey Ellerbee

# Notes



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