



INNOVATIVE NANOSCALE DEVICES AND SYSTEMS

Mauna Lani Hotel, Waikoloa, Big Island, Hawaii
DECEMBER 7 - 12, 2025

PROGRAM



Applied Physics Letters

Program

- *The Sessions are in the **Mauna Lani Ballroom***
- *Registration will be open each day starting on Sunday 15:00-18:00h, Monday starting 7:30h and the remaining days starting at 8:00h.*

Sunday, December 7th

15.00 – 18.00h	Registration
18:00 – 20:00h	WINDS Reception, Kilohana Beach

Monday, December 8th

8:30 – 08:45h	Opening Remarks Detlev Grützmacher (Forschungszentrum Jülich, General Chair) Stephen Goodnick (AZ State University, Local Arrangements)
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Keynote Session – Advances in Quantum Computing Session Chair: Detlev Grützmacher	
8:45-9:20h keynote	Heike Riel (IBM Research Quantum Europe, Rüschlikon, Switzerland) <i>Advancing Toward Quantum Advantage</i>
9:20-9:50h invited	Seigo Tarucha (RIKEN Center for Emergent Matter Science, Wako, Saitama, Japan) <i>High-Fidelity Qubit Gates and Phase Noise in Silicon Multi-Qubit Devices</i>
9:50-10:20h invited	Jason Petta (UCLA, Center for Quantum Science & Engineering, Los Angeles, USA) <i>Demonstration of an Always-On Exchange-Only Spin Qubit</i>
10:20-10:45	Coffee Break

1D and 2D Materials: Correlated Phenomena

Session Chair: Laszlo Forro

10:45h-11:15h invited	Michael Crommie (University of California, Berkeley, USA) <i>Imaging Wigner Crystals in 2D Devices</i>
11:15-11:45h invited	Stevan Nadj-Perge (Caltech, Eng. & Appl Sci., Pasadena, USA) <i>Superconductivity in Bilayer Graphene Stabilized by Spin-Orbit Coupling</i>
11:45-12:00	Alexander Balandin (UCLA, Center for Quantum Science & Engineering, Los Angeles, USA) <i>Ultra-Low-Noise of the Strongly Correlated Current in Quasi-1D Charge-Density-Wave Nanowires</i>
12:00-12:15h	Beata Kardynal (FZ Jülich, Peter Grünberg Institute, Germany) <i>Linear Dichroism of Photoluminescence and Magnetization of CrCl₃</i>
12:15-12:30h	Siyuan Dai (Auburn Univ., Samuel Linn Col.of Eng. Alabama, USA) <i>Mode Conversion of Hyperbolic Phonon Polaritons in van der Waals Terraces</i>
12:30-12:45h	Yixiao Wang, (Uni. of Maryland, Quantum Technology Center, USA) <i>Magnetic Origin of the Shear Motion Between Atomic Layers</i>
12:45-13:00h	Kirstin Alberi (National Renewable Energy Laboratory, Golden, USA) <i>Strategies for Utilizing Impurities to Tune the Properties of Topological Semimetals</i>
13:00-19.00h	Ad hoc session

Spins: Control and Manipulation

Session Chair: Michael Crommie

19:00-19:30h invited	Makoto Kohda (Tohoku University, Sendai, Japan) <i>Control of Helical Spin Textures in Semiconductors Towards Spin-Based Wave Parallel Computing</i>
19:30-19:45h	Andrei Slavin (Oakland University, Rochester, Michigan, USA) <i>Resonant Parametric Excitation and Reception of Ultra-Short Spin Waves</i>
19:45-20:00h	Roman Adam (FZ-Jülich, Peter Grünberg Institute, Germany) <i>Exchange Coupled Spintronic Emitters for Enhanced THz Control</i>
20:00-20:15h	Nobuhide Yokota (Shizuoka University, Hamamatsu, Japan) <i>Manipulation of Electron Spins in Polarization-Bistable Vertical-Cavity Surface-Emitting Lasers</i>
20:15-20:30h	Anna Delin (KTH, AlbaNova University Center, Stockholm, Sweden) <i>Anisotropic Spin Caloritronic Effects in van der Waals Insulators</i>
20:30-20:45h	Tomoaki Kameda (Kwansei Gakuin University, Sanda Hyogo, Japan) <i>Spin Transport Phenomena in Janus Transition Metal Dichalcogenides</i>
20:45-21:00h	Gerhard Klimeck (nanoHub)
21:00h	Adjourn

Tuesday, December 9th

Quantum Materials and Quantum Information	
Session Chair: Seigo Tarucha	
8:30-9:00h invited	Laszlo Forro (Univ. of Notre Dame, Stavropoulos Center for Complex Quantum Matter, USA) <i>Aging of High-T_c Superconductors with Defects</i>
9:00-9:15h	Yosuke Sato (ISSP, The University of Tokyo, Japan) <i>The Scaling Dimension of Anyons in Fractional Quantum Hall States Observed in GaAs Quantum Well</i>
9:15-9:30h	Igor Zutic (Univ. at Buffalo, State Univ. of New York, Buffalo, USA) <i>Superconducting Spintronics and Giant Shot Noise: Josephson Effect with Only One Superconductor</i>
9:30-9:45h	Detlev Grützmacher (FZ-Jülich, Peter Grünberg Institute, Germany) <i>Phase Coherence and Superconductive Coupling in Topological Insulator-Based Nanostructures</i>
9:45-10:00h	Martin Stehno (Univ. Würzburg, Inst. Topological Insulat, Germany) <i>Probing HgTe Quantum Well Josephson Junctions at Microwave Frequencies</i>
10:00- 10:15h	Christian Schäfer (FZ-Jülich, Peter Grünberg Institute, Germany) <i>Frustrated Frustration and Strong Vortex Pinning in Nb-Pt-Nb Josephson Junction Arrays</i>
10:15-10:30h	Zizwe Chase (University of Illinois Chicago, USA) <i>A Single Layered Aluminum Metasurface with FW-BIC in the Terahertz Regime</i>
10:30-11:00h	Coffee Break

Qubits and Quantum Control

Session Chair: Jason Petta

11:00-11:30h invited	Dominik Zumbühl (Univ. Basel, NCCR SPIN, Switzerland) <i>Spin-Orbit Qubits in Silicon and Germanium</i>
11:30-12:00h invited	Mack Kira (University of Michigan, Ann Arbor, USA) <i>Lightwave Electronics with Quantum Materials</i>
12:00-12:15h	Felix Motzoi (FZ-Jülich, Peter Grünberg Institute, Germany) <i>Universal Pulses for Superconducting Qudit Ladder Gates</i>
12:15-12:30h	Xuedong Hu (University at Buffalo) <i>Hole Spin Qubit Properties in a Ge Planar Quantum Dot</i>
12:30-12:45h	Kouichi Semba (National Institute of Information and Communication Technology, Tokyo, Japan) <i>Superconducting Flux Qubit with a Ferromagnetic Josephson π-Junction</i>
12:45-13:00h	Leonid Rokhinson (Purdue University, West Lafayette, USA) <i>Characterization of Superconducting Germanide and Germanosilicide Films of Pd, Pt, Rh and Ir Formed by Solid-Phase Epitaxy</i>
13:00-19.00h	Ad hoc session

Energy Efficient Devices and Systems

Session Chair: Kirsten Alberi

19:00-19:30h invited	Qing-Tai Zhao (FZ-Jülich, Peter Grünberg Institute, Germany) <i>An Energy Efficient Cryogenic Single Transistor Non-Volatile Memory</i>
19:30-19:45h	Denis Mamaluy (Sandia National Laboratories, Albuquerque, USA) <i>Predictive Quantum Transport Simulations for Co-Designing Next-Generation of Energy-Efficient AI Systems</i>
19:45-20:00h	Jonas Brown (UCLA, Dep. Materials Sci.and Eng, Los Angeles, USA) <i>Charge-Density-Wave Quantum Oscillator Networks</i>
20:00-20:15h	M. David Henry (Sandia National Labs, Albuquerque NM, USA) <i>Multistate NVM Stability of HZO Ferroelectric Tunnel Junctions</i>
20:15-20:30h	Samantha Jazsewski (Sandia National Labs, Albuquerque, USA) <i>Effects of Displacement Damage on the Structural and Electrical Properties of Ferroelectric Hafnium Zirconium Oxide Capacitors</i>
20:30-20:45h	Jon Ihlefeld (University of Virginia, Charlottesville, USA) <i>Nanoscale Distributions of Oxygen Vacancies and Their Impact on Oxygen Migration in Ferroelectric Hafnium Zirconium Oxide</i>
20:45-21:00h	John Conley (Oregon State Univ., School of EECS, Corvallis, USA) <i>Impact of Dielectric Thickness and Adhesion Metal Thickness on Metal/Insulator/Metal (MIM) Interface Barriers</i>
21:00h	Adjourn

Wednesday, December 10th

1D and 2D Materials: Multiferroics and Magnetism	
Session Chair: Stevan Nadj-Perge	
8:30-9:00h invited	Alexander Sinitskii (University of Nebraska-Lincoln, Lincoln, USA) <i>Semiconducting and Ferroelectric Quasi-1D Materials for Electronic and Optoelectronic Applications</i>
9:00-9:30h invited	Shinichiro Seki (Univ. of Tokyo, Dep. of Appl. Phys., Japan) <i>Antiferromagnets with Broken Time-Reversal Symmetry</i>
9:30-9:45h	Ti Xie (University of Maryland, College Park, USA) <i>High-Efficiency Optical Training of Itinerant Two-Dimensional Magnets</i>
9:45-10:00h	Daiki Sekine (National Institutes for Quantum Science and Technology, Takasaki, Gunma, Japan) <i>Domain-Dependent Photoluminescence of a Two-Dimensional Layered Semiconductor SnS</i>
10:00-10:15h	Shanchuan Liang (University of Maryland, College Park, USA) <i>Electric Control of 2D Magnetism in van der Waals Multiferroic Heterostructures</i>
10:15-10:30h	Wencan Jin (Auburn University, Department of Physics, USA) <i>Origin of Large Effective Phonon Magnetic Moments in Monolayer MoS₂</i>
10:30h	Group Photo
10:30-11:00h	Coffee Break

Semiconductor Devices for Next Generation Photonics and Electronics

Session Chair: Akira Oiwa

11:00-11:15h	<i>Thomas Fromherz (Johannes Kepler Univ. Linz, Austria) Si/SiGe/Si Double Hetero Structure Diodes for Efficient Si Photonics</i>
11:15-11:30h	<i>Saulius Marcinkevicius (KTH, AlbaNova Univ. Center, Stockholm, Sweden) Origin of the Reduced Efficiency of GaN Micro-LEDs</i>
11:30-11:45h	<i>Gerhard Klimeck (Purdue Univ., West Lafayette, USA) Triple-Barrier Resonant Tunneling Diode Optimization for high Peak-to-Valley Ratios to increase THz Radiation Power</i>
11:45-12:00h	<i>Stephen Goodnick (Arizona State University, Tempe, USA) First Principles Modeling of High Field Transport in Nitride Semiconductors</i>
12:00-12:15h	<i>Siddhant Gangwal (Arizona State University, Tempe, USA) Modeling and Simulation Framework to Investigate Carrier Densities and Hole Mobility for GeSn/Ge Heterostructure Devices</i>
12:15-12:30h	<i>Juan Mendez (Sandia National Laboratories, Albuquerque, USA) Study of Transport Mechanisms in Atomic Precision Advanced Manufacturing Enabled pn Junction Devices</i>
12:30-12:45h	<i>Junji Yuhara (Nagoya Univ., Grad. School of Engineering, Japan) Atomic Segregation Epitaxy of Germanene on Ag(111) Thin Films on Ge(111)</i>
12:45-13:00h	<i>Joon Soo Kim (Sungkyunkwan University, Suwon, Korea) Transition-Aware Patch Modeling for Low-Concentration Gas Identification</i>
13:00-13:15h	<i>Hyung Koun Cho (Adv.Mat. Sci. & Eng., Sungkyunkwan Univ., Korea) Photoelectrochemical Redox-Assisted Deposition of Rh₂P Nanoparticles on Cu-based Photocathodes for Solar Hydrogen Production with Glycerol Oxidation in Acidic Media</i>

13:15-18.30h	Ad hoc session
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18:30-21:00h	Conference Banquet <i>Kekaha Lawn</i>
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Thursday, December 11th

Semiconductor Quantum Dots and Wires	
Session Chair: Karl Unterrainer	
8:30-9:00h invited	Armando Rastelli (Johannes Kepler Univ. Linz, Austria) <i>Semiconductor Quantum Dots as Sources of Highly Entangled and Indistinguishable Photons</i>
9:00-9:30h Invited	Mark Eriksson (Univ. of Wisconsin-Madison, Dep. of Physics., USA) <i>Direct Measurement of the Energy Spectrum of a Quantum Dot Molecule</i>
9:30-9:45h	Akira Oiwa (The Univ. of Osaka, SANKEN, Japan) <i>Demonstration of Charge Sensing in an InAs Gate-Defined Quadruple Quantum Dot</i>
9:45-10:00h	Herbert Fotso (Univ. at Buffalo SUNY, Buffalo, USA) <i>Optimized Photon-Mediated Operations in Quantum Information Processing</i>
10:00-10:15h	Igor Filikhin (North Carolina Cent. Univ., Dep. of Math&Phys., USA) <i>Quantum Sensing with InAs/GaAs Double Quantum Dot</i>
10:15-10:30h	Hayk Harutyunyan (Emory University, Atlanta, USA) <i>Nonlinear Nanophotonics Enabled by Bound States in the Continuum</i>
10:30-11:00h	Coffee Break

Two-Dimensional Materials: Spin, Orbital, and Photonic properties

Session Chair: Alexander Sinitskii

11:00-11:30h invited	Mark van Schilfgaarde (Nat. Renewable Energy Lab., Golden, USA) <i>Proximity-Driven Exciton-Spin Engineering in van der Waals Heterostructures</i>
11:30-11:45h	Jaroslav Fabian (Univ. of Regensburg, Dep. of Physics, Germany) <i>Emergence of Radial Rashba Spin-Orbit Coupling in 2D</i>
11:45-12:00h	Hamideh Sharifpour (University of Virginia, Charlottesville, USA) <i>Simulating Tunable Non-Linear Optical Conductivity in Topological Insulators</i>
12:00-12:15h	Taiichi Otsuji (Tohoku University, Sendai, Japan) <i>Graphene/Black-Arsenic-Phosphorus 2D Heterostructures for Terahertz Detection and Emission</i>
12:15-12:30h	Zahra Ebrahim Nataj (University of California Los Angeles, USA) <i>Probing Spin-Lattice Interactions in NiPS₃ Through Brillouin-Mandelstam Spectroscopy of Surface Acoustic Phonons</i>
12:30-12:45h	Hui Zhao (The University of Kansas, Lawrence, USA) <i>Transient Absorption Study of α-RuCl₃ and its Heterostructures with 2D Semiconductors</i>
12:45-13:00h	Hyeongwoo Lee (Pohang Univ. of Science and Technology, Korea) <i>Giant Amplification of Interlayer Exciton Flux Enabled by Extreme Exciton Localization</i>
13:00-19.00h	Ad hoc session

1D and 2D Materials: Transport, Semimetals and Topology

Session Chair: Shinichiro Seki

19:00-19:30h invited	Jeanie Lau (The Ohio State University, Columbus, USA) <i>Giant Tunability of Electronic Properties of High Mobility Two-Dimensional Semiconductors</i>
19:30-20:00h invited	Luis Jauregui (University of California, Irvine, USA) <i>Engineering Topology and Interactions in HfTe_5</i>
20:00-20:15h	Wanyi Nie (University at Buffalo, Dep. of Physics, (USA) <i>Charge Transfer Between Chiral Perovskite Host and Organic Molecules</i>
20:15-20:30h	Kazuhiko Matsumoto (Univ. Osaka, SANKEN, Japan) <i>Extremely Stable Detection of Virus Using Graphene FET Bio-Sensor by Reducing Gate Leakage Current Using SiO_2 Passivation Layer</i>
20:30	Adjourn

Friday, December 12th

Novel Concepts for Information Processing Session Chair: Qing-Tai Zhao	
8:30-9:00h invited	Jayakanth Ravichandran (Univ. of Southern CA, Los Angeles, USA) <i>Complex Chalcogenides: from Mid-Infrared Photonics to Neuromorphic Devices</i>
9:00-9:30h invited	Karl Unterrainer (TU Wien, Photonics Institute, Austria) <i>Quantum Cascade Random Lasers for On-Chip Machine Learning</i>
9:30-9:45h	Alex Khitun (University of California – Riverside, CA, USA) <i>Magnonic Combinatorial Device Based on Three Coupled Ring Oscillators</i>
9:45-10:00h	Deepak Singh (Dept. of Physics, Univ. of Missouri, Columbia, USA) <i>Novel Design of Neuro-Inspired Chip for Synchronous Processing</i>
10:00-10:15h	Mariia Stepanova (Univ. of California, Irvine, USA) <i>Intercalation Tuning of Phonon-Polaritons in Van der Waals Crystal by Zerovalent Metals</i>
10:15-10:30h	Xi Chen (University of California - Riverside, USA) <i>Achieving Large and Anisotropic Spin-Mediated Thermal Transport in Textured Quantum Magnets</i>
10:30-11:00h	Coffee Break

Energy Harvesting

Session Chair: Stephen Goodnick

11:00-11:30h invited	Emily Warren (Nat. Renewable Energy Laboratory, Golden, USA) <i>Three Terminal Photoelectrodes to Enable Light-Driven Fuel Production Under Variable and Diurnal Conditions</i>
11:30-11:45h	Lado Filipovic (TU Wien, Institute for Microelectronics, Austria) <i>Carrier Dynamics in Hot Carrier Solar Cell Absorbers</i>
11:45-12:00h	Yasuhiro Tokura (University of Tsukuba, Japan) <i>Full-Counting Statistics of Quantum Heat across Capacitively Coupled Quantum Dots</i>

Interface Phenomena

Session Chair: Armando Rastelli

12:00-12:15h	Wencan Jin (Auburn University, Dep. of Physics, USA) <i>Hybrid Magnon-Phonon Cavity Realized in a Magnetoelastic Heterostructure</i>
12:15-12:30h	Nancy Haegel (Nat. Renewable Energy Laboratory, Golden, USA) <i>Novel Metallic Ceramic Substrates and Interface Design for UWBG Semiconductors</i>
12:30-12:45h	Gleb Finkelstein (Duke University, Durham, USA) <i>Thermal Properties of the Superconductor – Quantum Hall Interfaces</i>
12:45-13:00h	Nataliya Demarina (FZ-Jülich, Peter Grünberg Institute, Germany) <i>In situ Preparation of GaAs(001)/Al₂O₃ Interfaces by Atomic Layer Deposition: Chemistry, Carrier Recombination and Fermi Level Pinning</i>
13:00-13:15	Closing Remarks

