



# INNOVATIVE NANOSCALE DEVICES AND SYSTEMS

*FAIRMONT ORCHID, KAMUELA, HI (ISLAND OF  
HAWAII - "BIG ISLAND")*

DECEMBER 1 – 6, 2024

## PROGRAM



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# Program

- General sessions are in Promenade Ballroom
- Registration will be open each day in Promode 3 Foyer starting on Sunday from 15:00-18:00, Monday starting 60 minutes before the AM1 session, and remaining days starting 30 minutes before the AM1 session.

## Sunday, December 1

15:00-18:00	Registration at Promenade 3 Foyer
18:00-20:00	Gala Reception at Ballroom Courtyard

## Monday, December 2

08:15-08:30	<b>Opening remarks</b> Akira Oiwa (Osaka University, General Chair) and Stephen Goodnick (Arizona State University, Local Arrangements)
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<b>MAM1: Keynote Session -Topology &amp; Quantum technology-</b> Session Chairs: Akira Oiwa (Osaka University)	
08:30-09:00 (Invited)	Yoshinori Tokura (RIKEN/The University of Tokyo, Japan) <i>Emergent electromagnetic induction in topological magnets</i>
09:00-09:30 (Invited)	Daniel Loss (University of Basel, Switzerland) <i>Domain wall qubits on magnetic racetracks</i>

<b>MAM2: Energy conserving &amp; Nanophotonics</b> Session Chairs: Kirstin Alberi (National Renewable Energy Laboratory)	
09:30-10:00 (Invited)	Nancy Haegel (National Renewable Energy Laboratory, USA) <i>Photovoltaics: Nanoscale Science for Terawatt Scale</i>
10:00-10:15	Woochul Lee (University of Hawaii at Manoa, USA) <i>Solar-driven Interfacial Water Evaporation using Carbon/CuS core-shell nanoparticles</i>
10:15-10:30	Victor Klimov (Los Alamos National Laboratory, USA) <i>Type-(I+II) Quantum Dots as Universal Gain Media for Liquid- and Solid-State Lasers</i>
10:30-11:00	Coffee break

<b>MAM3: 2D/1D Special Session I (Microscopy &amp; Photonics)</b>	
Session Chairs: Alexandar Balandin (UCLA)	
11:00-11:30 (Invited)	Matthew Rosenberger (University of Notre Dame, USA) <i>Atomic Force Microscopy for Routine, Fast, and Reliable Defect Quantification in 2D Materials</i>
11:30-12:00 (Invited)	Han Htoon (Los Alamos National Laboratory, USA) <i>Creation and Control of Quantum Light Emitters in 2D Flatland</i>
12:00-12:15	Naoya Arakawa (Chuo University, Japan) <i>Optically tunable spin Hall effect in periodically driven monolayer transition-metal dichalcogenides</i>
12:15-12:30	Huan Zhao (Oak Ridge National Laboratory, USA) <i>Telecom Quantum Emitters from 2D Materials</i>
12:30-19:00	Ad hoc session

<b>MPM: Quantum Science Special Session I (Magnetic excitons &amp; Superconductivity)</b>	
Session Chairs: Igor Žutić (University at Buffalo, SUNY)	
19:00-19:30 (Invited)	Swagata Acharya (National Renewable Energy Laboratory, USA) <i>Ab-initio approaches for describing spin flip excitons, color centers and other magnetic excitons in bulk and layered magnets</i>
19:30-20:00 (Invited)	Cui-Zu Chang (Pennsylvania State University, USA) <i>Interface-Induced Superconductivity in Quantum Anomalous Hall Insulators</i>
20:00-20:15	Gleb Finkelstein (Duke University, USA) <i>Gate-tunable Josephson junctions in the 2D superconductor <math>KTaO_3</math></i>
20:15-20:30	Wolfgang Belzig (University of Konstanz, Germany) <i>Interface-created triplet superconductivity in superconductor-helium magnet van der Waals bilayers)</i>
20:30-20:45	Denis Kochan (Slovak Academy of Sciences, Slovakia) <i>Magnetoelectric phenomena of non-centrosymmetric superconductors</i>
20:45-21:00	Igor Filikhin (North Carolina Central University, USA) <i>Electron state coupling in binary quantum systems nearly ideal symmetric</i>
21:00	Adjourn

## Tuesday, December 3

<b>TAM1: Quantum computing &amp; Quantum technology</b>	
Session Chairs: Tomoki Machida (The University of Tokyo)	
08:30-09:00 (Invited)	Michihisa Yamamoto (The University of Tokyo/RIKEN, Japan) <i>Electron wave engineering for quantum computations and simulations.</i>
09:00-09:15	William Coish (McGill University, Canada) <i>Quantum computing with pulses of classical light</i>
09:15-09:30	Yasuhiro Tokura (University of Tsukuba, Japan) <i>Germanium Hole Electric Dipole Spin Resonance with in-plane magnetic field</i>
09:30-09:45	Akira Oiwa (Osaka University, Japan) <i>Fabrication and Transport Measurements of Gate-defined Quantum Dot Structures Formed in a Bull's-eye Optical Cavity</i>
09:45-10:00	Kouichi Semba (The University of Tokyo, Japan) <i>Probabilistic methods prove useful for optimal quantum circuit synthesis</i>
10:00-10:15	Sahel Ashhab (Advanced ICT Institute, Japan) <i>High-frequency suppression of coupling between a qubit and a multimode resonator</i>
10:15-10:30	Robert Wolkow (University of Alberta, Canada) <i>Progress Toward an Atom-Defined Silicon Quantum Primary Thermometer</i>
10:30-11:00	Coffee break

<b>TAM2: Spintronics</b>	
Session Chairs: Valeria Lauter (Oak Ridge National Laboratory)	
11:00-11:15	Aleksandr Khitun (University of California – Riverside, USA) <i>Magnonic Combinatorial Memory: from proposal to device</i>
11:15-11:30	Igor Žutić (University at Buffalo, SUNY, USA) <i>Controlling the helicity of light by electrical magnetization switching</i>
11:30-11:45	Kirill Belashchenko (University of Nebraska-Lincoln, USA) <i>Spin splitting effect in ferromagnets and in altermagnetic MnTe</i>
11:45-12:00	Viktor Sverdlov (Institute for Microelectronics, Austria) <i>Magnetic Field Free SOT-MRAM Switching</i>
12:00-12:15	Yasuhiro Utsumi (Mie University, Japan) <i>Electronic and spin states of a finite p-orbital helical atomic chain exhibiting chirality-induced spin selectivity</i>
12:15-12:30	Konstantin Klyukin (Auburn University, USA) <i>Effect of hydrogen insertion on electronic and magnetic properties of functional materials: insights from first principles simulations</i>
12:30-12:45	Cheng Gong (University of Maryland, College Park, USA) <i>High-efficiency Optical Control of Spin Textures in 2D Magnets</i>
12:45-13:00	Group photo

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13:00-19:00	Ad hoc session
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<b>TPM: 2D/1D Special Session II (Materials &amp; Photonics)</b>	
Session Chairs: Taiichi Otsuji (Tohoku University) and Tomoki Machida (The University of Tokyo)	
19:00-19:30 (Invited)	Gwan-Hyoung Lee (Seoul National University, Republic of Korea) <i>Hypotaxy of Wafer-scale Single Crystal Transition Metal Dichalcogenides</i>
19:30-20:00 (Invited)	Yasumitsu Miyata (Tokyo Metropolitan University, Japan) <i>In-plane heterostructures based on 2D materials for advanced electronics</i>
20:00-20:15	Tomohiro Tamaya (The University of Tokyo, Japan) <i>Shear-Strain Controlled High-Harmonic Generation in Graphene</i>
20:15-20:30	Zizwe Chase (University of Illinois at Chicago, USA) <i>Phase Change-based Metasurfaces For Active Beam Steering of Terahertz Waves</i>
20:30-20:45	Taiichi Otsuji (Tohoku University, Japan) <i>Active controlling the instability and PT symmetry of graphene Dirac plasmons for current-injection terahertz laser transistors</i>
20:45	Adjourn

## Wednesday, December 4

<b>WAM1: Topology &amp; Chirality</b>	
Session Chair: Valeria Lauter (Oak Ridge National Laboratory)	
08:45-09:15 (Invited)	Jelena Klinovaja (University of Basel, Switzerland) <i>Topological Interlayer Superconductivity in a van der Waals Heterostructure</i>
09:15-09:30	Yinong Zhou (Auburn University, USA) <i>Quantum Phases in Topological and Chiral Mater</i>
09:30-09:45	Kazushi Aoyama (Osaka University, Japan) <i>Chiral symmetry breaking and spin-wave propagation in breathing-Kagome antiferromagnets at zero field</i>
09:45-10:00	Leonid Rokhinson (Purdue University, USA) <i>A platform for braiding Majorana modes with magnetic skyrmions</i>
10:00-10:30 (Invite)	Dmitry Ovchinnikov (University of Kansas, USA) <i>Pauli limit violation in atomically thin topological superconductor candidate</i>
10:30-11:00	Coffee break

<b>WAM2: 2D/1D Special Session III (Transport)</b>	
Session Chairs: Fariborz Kargar (Auburn University)	
11:00-11:30 (Invited)	Jooheon Kang (Sungkyunkwan University, Republic of Korea) <i>2D Material Inks for electronically-active scalable vdW heterostructure</i>
11:30-11:45	Alexandar Balandin (UCLA, USA) <i>The Noise of the Charge Density Waves in Quasi-1D NbSe<sub>3</sub> van der Waals Nanowires – Contributions of Electrons and Collective Current</i>
11:45-12:00	Tomoki Machida (The University of Tokyo, Japan) <i>Subband resonant tunneling in van der Waals junctions of transition metal dichalcogenides</i>
12:00-12:15	Louis Gaudreau (University of Ottawa, Canada) <i>Spin Polarized Transport in Monolayer WSe<sub>2</sub> Quantum Structures at zero field</i>
12:15-12:30	Laszlo Forro (University of Notre Dame, USA) <i>Surprises in Transition Metal Dichalcogenides Revealed by Interlayer Charge Transport</i>
12:30-12:45	Jordan Teeter (UCLA, USA) <i>The One-Dimensional Atomic Chain Limit in van der Waals Crystals</i>
12:45-19:00	Ad hoc session

18:30-20:30	Conference banquet at Plantation Estates
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## Thursday, December 5

<b>RAM1: 2D/1D Special Session IV (Optoelectronics, Phononics &amp; Sensing)</b>	
Session Chair: Taiichi Otsuji (Tohoku University)	
08:30-09:00 (Invited)	Jun Xiao (University of Wisconsin-Madison, USA) <i>High-performance THz optoelectronics enabled by 2D quantum materials</i>
09:00-09:15	Ryzhii Victor (Tohoku University, Japan) <i>Resonant terahertz detection using an array of interdigital graphene micro- and nanoribbon transverse plasmonic cavities</i>
09:15-09:45 (Invited)	Aditya Sood (Princeton University, USA) <i>Probing electron-phonon and phonon-phonon coupling in van der Waals bilayers using femtosecond electron diffraction</i>
09:45-10:00	Fariborz Kargar (Auburn University, USA) <i>Acoustic Phonons Frequencies and Group Velocities in Quasi-Two-Dimensional MPS3 Antiferromagnetic Semiconductors</i>
10:00-10:15	Kazuhiko Matsumoto (Osaka University, Japan) <i>High Sensitive Detection of SARS-CoV-2 by Graphene FET Using PBS and Acetate Buffer with and without Polylysine (PLL)</i>
10:15-10:30	Dylan Tua (University at Buffalo, SUNY, USA) <i>2D Transition-Metal-Dichalcogenide (MoSe<sub>2</sub>) Based Integrated Sensor for On-Chip Detection of Thermal Fluxes</i>
10:30-11:00	Coffee break

<b>RAM2: Neuromorphic &amp; Memory</b>	
Session Chairs: John Conley (Oregon State University) and David Henry (Sandia National Labs)	
11:00-11:15	Deepak Singh (University of Missouri, USA) <i>Neuromorphic computer development in artificial magnetic lattice</i>
11:15-11:30	Xiaodong Yan (University of Arizona, USA) <i>Moiré Synaptic Transistors for Neuromorphic Computing</i>
11:30-11:45	Michael David Henry (Sandia National Laboratories, USA) <i>Multistate Resistance Stability for 5 Bit, 32 State Ferroelectric (Hf,Zr)O<sub>2</sub> Tunnel Junctions</i>
11:45-12:00	Deep Jariwala (University of Pennsylvania, USA) <i>AlScN for High Temperature Non-Volatile Memory Devices</i>
12:00-12:15	John F. Conley, Jr. (Oregon State University, USA) <i>Light-Activated Threshold Field Resistive Switching in ALD High Entropy Zr<sub>x</sub>Ta<sub>y</sub>O<sub>z</sub></i>
12:15-12:30	Kai Nakajima (Tohoku University, Japan) <i>Composition Dependence on Stress Corrosion Cracking of CrMnFeCoNi-based High-Entropy Alloys by Machine Learning Molecular Dynamics Simulation</i>

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12:30-12:45	Takuya Tozawa (Tohoku University, Japan) <i>Neural Network Molecular Dynamics Study on Tribochemical Reaction of Zinc Dialkyl Dithiophosphate Lubricant Additives at the Friction Interface of Automotive Engines</i>
12:45-19:00	Ad hoc session

<b>RPM: Beyond CMOS</b>	
Session chairs:	
19:00-19:15	Dragica Vasileska (Arizona State University, USA) <i>Modeling Electrostatics and Mobility in GeSn/Ge Heterostructures</i>
19:15-19:30	Juan Mendez (Sandia National Laboratories, USA) <i>Predictive Quantum Simulations for state-of-the-art and beyond CMOS device technologies</i>
19:30-19:45	Kentaro Ao (Mie University, Japan) <i>A generalized Landauer's principle in the memristor</i>
19:45-20:00	Seungjin Kim (Samsung Electronics Co., Republic of Korea) <i>Improvement of pattern missing in DRAM capacitors using extreme ultraviolet lithography process</i>
20:00-20:15	Mohammad Istiaque Rahaman (University of Notre Dame, USA) <i>Experimental study of back-action and correlated electron transport in coupled single-electron box and single-electron transistor</i>
20:15-20:30	Xujiao Gao (Sandia National Laboratories, USA) <i>Quantum Simulation of Band-To-Band Epitaxial Area Tunneling Transistors (BEATS)</i>
20:30-20:45	Denis Mamaluy (Sandia National Laboratories, USA) <i>Phenomenological inelastic scattering model for electron transport in mesoscopic devices</i>
20:45-21:00	Ilkwon Oh (Ajou University, Republic of Korea) <i>Elucidating the Effect of a Gallium Element in Ultrathin IGZO-based Electronic Devices Grown by Atomic Layer Deposition</i>
21:00	Adjourn



## Friday, December 6

<b>FAM1: Quantum Science Special Session II (Topology &amp; Interface)</b>	
Session Chair:	
08:30-09:00 (Invited)	Dimitrie Culcer (The University of New South Wales, Australia) <i>Topology, disorder and the orbital Hall effect in chiral fermion systems</i>
09:00-09:30 (Invited)	Wolfgang Belzig (University of Konstanz, Germany) <i>Higher-dimensional topology in multi-terminal superconducting structures</i>
09:30-9:45	Masashi Kawasaki (University of Tokyo, Japan) <i>Topological Hall effect at oxide interfaces</i>
9:45-10:00	Kirstin Alberi (National Renewable Energy Laboratory, USA) <i>Electron transport Behavior of Weyl Semimetal Thin Films</i>
10:00-10:15	Detlev Grützmacher (Peter Grünberg Institute PGI-9, Germany) <i>Quantum-optical Characterization of Single-photon Sources based on Chlorine-doped ZnSe/ZnMgSe quantum wells</i>
10:15-10:45	Coffee break

<b>FAM2: Wide bandgap, Oxides &amp; Polymers</b>	
Session Chairs: Kirstin Alberi (National Renewable Energy Laboratory)	
10:45-11:00	Gerhard Klimeck (Purdue University, USA) <i>Quantum Transport Dominated by Quantum Effects in Contacts – NEGF's Underappreciated Fundamental Capability</i>
11:00-11:15	Mira Baraket (ATLANT 3D, Denmark) <i>Direct Processing by <math>\mu</math>DALP™. Precision Coatings for Next Gen Devices</i>
11:15-11:30	Saulius Marcinkevicius (AlbaNova University, Sweden) <i>Hole injection through V-defects in long wavelength GaN LEDs</i>
11:30-11:45	Dylan Wright (UCLA, USA) <i>Brillouin – Mandelstam Spectroscopy of Acoustic Phonons in Silicon-Doped Aluminum Nitride Thin Films</i>
11:45-12:00	GiYoong Chung (Sungkyunkwan University, Republic of Korea) <i>Improvement of Electrical Properties and Low-Temperature Development of Sol-gel Processed In-Ga-Zn-O Thin-Film Transistors Using UV-DI</i>
12:00-12:15	Keaki Watanabe (Tohoku University, Japan) <i>Tensile Simulation of SiO<sub>2</sub>/TiO<sub>2</sub> Composite Films by Reactive Molecular Dynamics Method</i>
12:15-12:30	Hong-Gyu Park (Changwon National University, Republic of Korea) <i>Development of low-power, high-efficiency smart windows using dye-doped liquid crystals and oxide alignment layers for zero-energy buildings</i>
12:30-12:45	Kaito Mori (Tohoku University, Japan) <i>Large Scale Reactive Molecular Dynamics Simulation for Design of 3D Network Structures of Carbon Supports in Cathode Catalyst Layer of Polymer Electrolyte Fuel Cells</i>
12:45-13:00	Marius Orłowski (Virginia Tech, USA) <i>Highly Conductive nm-thin Organic Polymer Electrodes</i>

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13:00	Closing Remarks / Conference Ends
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