# WINDS 2026

## Workshop on Innovative Nanoscale Devices and Systems

December 6–11, 2026 | Workshop Program

### Sunday, December 6, 2026

**15:00–18:00 Registration (also open each morning before sessions)**

**18:00–20:00 Welcome Reception (Location TBA)**

### Monday, December 7, 2026

**8:45–9:00 Opening Remarks — John Conley, Program Chair**

**MAM1: Keynote Session: Advanced Devices**
**Session Chair: John Conley, Oregon State University**

| Time | Speaker | Affiliation | Title |
|---|---|---|---|
| 9:00 | **Fahd Mohiyaddin** | Intel Corporation, Hillsboro, OR | ***(Invited)*** Design of High-Fidelity Spin Qubit Arrays with the Semiconductor Ecosystem at Intel |
| 9:30 | **Erin Cleveland** | Laboratory for Physical Sciences, College Park, MD | ***(Invited)*** Materials Characterization, Quantum Performance, and the LPS Qubit Collaboratory |
| 10:00 | **Richard New** | Western Digital, San Jose, CA | ***(Invited)*** Storage Technology at the Nanoscale |

**10:30–11:00 Coffee Break**

**MAM2: Low-Dimensional Materials – Fundamental Science A**
**Session Chair: Alexander Balandin, University of California, Los Angeles**

| Time | Speaker | Affiliation | Title |
|---|---|---|---|
| 11:00 | **Ahmet Avsar** | National University of Singapore | ***(Invited)*** Proximity Effects in Graphene under Designer Moiré Potentials |
| 11:30 | **Roger Lake** | University of California, Riverside | ***(Invited)*** Quantum Spin Singlet Ground State with Large Excitation Gap of the S=3/2 quasi-1D van der Waals materials $MoX_3$ (X = I, Br) |
| 12:00 | **Laszlo Forró** | École Polytechnique Fédérale de Lausanne (EPFL) / Univ. Notre Dame | Temperature and Pressure Dependence of Interlayer Transport in 4Hb-$TaS_2$ |
| 12:15 | **Naipeng Zhang** | National High Magnetic Field Laboratory | Unraveling Collective Magnetic Excitations in Twinned $Na_3Co_2SbO_6$ via Combined Magneto-Infrared and Raman Spectroscopy |
| 12:30 | **Fariborz Kargar** | Auburn University, Auburn, AL | Surface Acoustic Waves as Probes of Spin–Lattice Coupling in 2D Antiferromagnetic Semiconductors |
| 12:45 | **Jinyu Liu** | University of California, Irvine | Isotope-Controlled Topological Phase Transition in $HfTe_5$ |
| 13:00 | **Tomoki Machida** | University of Tokyo (Inst. of Industrial Science) | Subband engineering in van der Waals multiple quantum wells based on 2D materials |

**13:15–19:00 Ad Hoc Session**

**MPM: Ferroelectrics & Oxides**
**Session Chairs: John Conley, Oregon State University, & David Henry, Sandia National Labs**

| Time | Speaker | Affiliation | Title |
|---|---|---|---|
| 19:00 | **Patrick Hopkins** | University of Virginia / Laser Thermal, VA | ***(Invited)*** Laser-based and infrared thermometry: probing phonon thermal transport in wide bandgap semiconductors, ferroelectrics, and diamond |

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| **19:30** | **David Henry** | Sandia National Labs | Applications & Manufacturability of Ferroelectric HZO Memory |
| **19:45** | **Samantha T. Jaszewski** | Sandia National Labs | Reassessment of Total Ionizing Dose Effects in Ferroelectric Hafnium Zirconium Oxide Devices |
| **20:00** | **John Conley** | Oregon State University | Barrier heights and conduction in cycle stressed HZO |
| **20:15** | **Deep Jariwala** | University of Pennsylvania | Scaling and reliability of AlScN ferroelectric devices |
| **20:30** | **Sung-Jin Kim** | Chungbuk National University, Korea | Low-Thermal-Budget Oxygen-Plasma-Assisted Annealing of $TiO_2/TiO_x$ Memristors for Reliable Nonvolatile Switching |
| **20:45** | **Sambandamurthy Ganapathy** | Florida Institute of Technology (formerly Univ. at Buffalo) | Noise spectroscopy study of resistive switching oxide memristors |
| **21:00 Adjourn** | | | |

# Tuesday, December 8, 2026

**8:30–8:45 Announcements and Get Seated**

## TAM1: Spintronics / Quantum Materials

**Session Chair: TBD**

| Time | Speaker | Affiliation | Title |
|---|---|---|---|
| 8:45 | **Jaroslav Fabian** | University of Regensburg, Germany | ***(Invited)*** Electron spins in 2D |
| 9:15 | **Patrick Lenahan** | Pennsylvania State University | ***(Invited)*** Near-Zero-Field Magnetoresistance and Electrically Detected Magnetic Resonance: Tools for Quantum Sensing and Semiconductor Device Materials Physics |
| 9:45 | **Nobuhide Yokota** | Shizuoka University, Hamamatsu, Japan | Optical manipulation of electron spin precession in birefringent VCSELs |
| 10:00 | **Xuedong Hu** | University at Buffalo, SUNY | Super-Poissonian Squeezed Light in the Deep-Strong-Coupling Regime of the Quantum Rabi Model |

**10:15–11:00 Coffee Break + Group Photo!**

## TAM2: Quantum 1: Superconductivity & Topology

**Session Chair: Igor Žutić, University at Buffalo, SUNY**

| Time | Speaker | Affiliation | Title |
|---|---|---|---|
| 11:00 | **Nitin Samarth** | Pennsylvania State University | ***(Invited)*** Epitaxially engineered hybrid materials for quantum technologies |
| 11:30 | **Gleb Finkelstein** | Duke University | Supercurrent in a quantum Hall interferometer |
| 11:45 | **Leonid Rokhinson** | Purdue University | Multiple re-entrant superconducting states in a topological superconductor 2M-$WS_2$ |
| 12:00 | **Valla Fatemi** | Cornell University | ***(Invited)*** Two-Terminal and Multi-Terminal Josephson Junctions and Associated Phenomena |
| 12:30 | **Igor Žutić** | University at Buffalo, SUNY | Altermagnets: From Excitons to Superconducting Proximity Effects |
| 12:45 | **Detlev Grützmacher** | Forschungszentrum Jülich (PGI-9) | Induced superconductivity in magnetic topological insulator – superconductor hybrid devices |
| 13:00 | **Joseph Cuozzo** | University of Texas at El Paso | Bulk-dissociated topological superconductivity in hetero-dimensional superconducting metamaterials |

**13:15–19:00 Ad Hoc Session**

## TPM: Quantum 2: Topology & Skyrmions

**Session Chair: Igor Žutić, University at Buffalo, SUNY**

| Time | Speaker | Affiliation | Title |
|---|---|---|---|
| 19:00 | **Masayuki Hashisaka** | University of Tokyo (ISSP) | ***(Invited)*** Edge-State Coupling and Interference at a Quantum Hall Heterointerface |
| 19:30 | **Dusan Sarenac** | University at Buffalo, SUNY | Three-Dimensional Topological Transitions and Defect Pathways in Bulk Skyrmion Lattices |
| 19:45 | **Valeria Lauter** | Oak Ridge National Laboratory, TN | Interface-Induced Stability of Nontrivial Topological Spin Textures: Unveiling Room-Temperature Hopfions and Skyrmions |
| 20:00 | **Nidhish Thiruthukkal Puthenveettil** | University of California, Los Angeles | Near-Room-Temperature Phase Transition in Quasi-One-Dimensional $Bi_4I_4$ Topological Narrow-Gap Semiconductor |
| 20:15 | **David S. Brandao** | University at Buffalo | Evolution of microwave spectroscopy in topological planar Josephson junctions |
| 20:30 | **Yijie Lin** | National University of Singapore | Charge and Spin Transport in Two-dimensional $MnBi_2Te_4$ |
| 20:45 | **Robert Wolkow** | University of Alberta, Canada | PicoPerfect Scanner Enables Error-Free Printing of Atomic Quantum Devices |

**21:00 Adjourn**

# Wednesday, December 9, 2026

**8:45-9:00 Announcements & Get Seated**

## WAM1: Quantum Geometry & Optical Responses

**Session Chair: Igor Žutić, University at Buffalo, SUNY**

| Time | Speaker | Affiliation | Title |
|---|---|---|---|
| 9:00 | **Joel Moore** | University of California, Berkeley | ***(Invited)*** Quantum geometry of linear and nonlinear optical responses |
| 9:30 | **Constantin Schrade** | Louisiana State University, Baton Rouge | Real-space quantum geometry and spin control in altermagnetic textures |
| 9:45 | **Gerrit Bauer** | Tohoku University, Sendai, Japan | ***(Invited)*** Ferronics and Magnonics |
| 10:15 | **Konstantin Denisov** | University at Buffalo, SUNY | Proximity-induced phenomena in two-dimensional Dirac materials |

**10:30–11:00 Coffee Break**

## WAM2: Low Dimensional Materials – Fundamentals and Applications B

**Session Chair: Fariborz Kargar, Auburn University**

| Time | Speaker | Affiliation | Title |
|---|---|---|---|
| 11:00 | **Shafayat Hossain** | University of California, Los Angeles (UCLA) | ***(Invited)*** Unconventional Quantum States in a Quasi-2D Kagome Superconductor |
| 11:30 | **Stevan Nadj-Perge** | California Institute of Technology | Scanning tunneling microscopy signatures of unconventional superconductivity and strong correlations in twisted trilayer graphene |
| 11:45 | **Alexander Balandin** | University of California, Los Angeles | Collective Currents in Charge-Density-Wave Nanowires Probed by Raman and Broadband-Noise Spectroscopy |
| 12:00 | **Marcos Guimarães** | University of Cambridge, United Kingdom/University of Groningen, Netherlands | ***(Invited)*** Nonlinear Thermoelectricity at Room Temperature Through Low-Symmetry van der Waals Materials |
| 12:30 | **Abdennaceur Karoui** | North Carolina Central University | Coherence of electron states in system of double quantum rings nearly ideal symmetry |
| 12:45 | **Kazuhiko Matsumoto** | Osaka University, Japan | Machine Learning Application for Multi-Virus Detection using Graphene FET Biosensor Modified with Various Antibodies |
| 13:00 | **Artem Litvinenko** | Oakland University, Rochester, MI | Enhanced Phase Shift Keying Modulation Technique For Injection-Locked Spin-Torque Nano-Oscillators With Controlled Phase Slips |

**13:15–19:00 Ad Hoc Session**

## WPM: Conference Banquet

**19:00–21:00 Conference Banquet Dinner (Location TBA)**

# Thursday, December 10, 2026

**8:45–9:00 Announcements and Get Seated**

## ThAM1: Wide Bandgap Materials & Devices

**Session Chair: Kirstin Alberi, National Laboratory of the Rockies**

| Time | Speaker | Affiliation | Title |
|---|---|---|---|
| 9:00 | **Brooks Tellekamp** | National Laboratory of the Rockies | ***(Invited)*** Heterogeneous Epitaxial Integration of Transition Metal Carbides and Nitrides with Ultra-Wide Bandgap $AlGaN_2$ |
| 9:30 | **Rajat Chakraborty** | University of Illinois Urbana-Champaign | Three Terminal Diamond Photoconductive Semiconductor Switch for High Power Electronics |
| 9:45 | **Saulius Marcinkevicius** | KTH Royal Institute of Technology, Stockholm, Sweden | Strongly enhanced quantum efficiency of UV-emitting AlGaN layers and quantum wells |
| 10:00 | **Kai Fujimoto** | Hokkaido University, Sapporo, Japan | Characterization of Modulation-Doped InGaAs Nanowires for Vertical Gate-All-Around Tunnel FETs |
| 10:15 | **Soochang Yoo** | Chungbuk National University, Korea | Electric-Field-Assisted Thermal Treatment for High-Performance Solution-Processed $In_2O_3$ Thin-Film Transistors |

**10:30–11:00 Coffee Break**

## ThAM2: Energy Conversion & Quantum Transport

**Session Chairs: Stephen Goodnick, Arizona State University**

| Time | Speaker | Affiliation | Title |
|---|---|---|---|
| 11:00 | **Paul Thibado** | University of Arkansas, Fayetteville | Custom nanowatt sensor system powered by graphene energy harvesters |
| 11:15 | **Ghulam Nabi** | University of Gujrat, Pakistan | Unlocking the Potentials of MXenes ($Nb_2CTx$) Based 2D Nanostructures for Biosensing and Next Generation Energy Storage Applications |
| 11:30 | **Gerhard Klimeck** | Purdue University | Tracing highly non-parabolic material properties in high-bias non-equilibrium quantum transport simulations |
| 11:45 | **Ivan Okhmatovskii** | Purdue University | From RTD Structure to THz Power: A Simulation Framework for Optimizing RTD Oscillators |
| 12:00 | **Stephen Goodnick** | Arizona State University | Nonequilibrium Electron and Phonon Dynamics in Type-II Quantum Wells |
| 12:15 | **Fabian Faulstich** | Rensselaer Polytechnic Institute, Troy, NY | Quantum Embedding Simulations of Lithium-Ion Migration in Strongly Correlated Battery Materials |
| 12:30 | **Boris Nadgorny** | Wayne State University, USA | Magnetic Blocking at the Few-Nanometer Limit in Quasi-One-Dimensional $CrO_2/Cr_2O_3$ Nanorods |
| 12:45 | **Jean-Pierre Leburton** | University of Illinois Urbana-Champaign | A Nano Channel Electrolytic Amplifier for Blue Energy Harvest |

**13:00–19:00 Ad Hoc Session**

## ThPM: Low-Dimensional Materials – Fundamentals and Applications A

**Session Chair: Laszlo Forró, Notre Dame**

| Time | Speaker | Affiliation | Title |
|---|---|---|---|
| 19:00 | **Maxx Arguilla** | University of California, Irvine | ***(Invited)*** 1D Compositionally Driven Geometric Complexity in One-Dimensional van der Waals Crystals that Approach the Atomic Scale |
| 19:30 | **Jason Tresback** | Harvard University (Center for Nanoscale Systems) | Critical Utilization of Scan Probe Microscopy (SPM) Methods for 2d and Quantum Materials Research |
| 19:45 | **Maedeh Taheri** | University of California, Los Angeles | Giant Gate Response of the Electron-Lattice Condensate |
| 20:00 | **Johan Åkerman** | University of Gothenburg, Sweden | ***(invited)*** Nanosecond phase ordering in ultra-large spin Hall nano-oscillator lattices for unconventional computing |

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| **20:30** | **Jaeryeong Park** | Sungkyunkwan University, South Korea | $O_2$ Anneal Overcomes Contact-Limited Hole Injection in $WSe_2$ PMOS, with Layer-Dependent Efficacy |
| **20:45** | **Taiichi Otsuji** | ENSEMBLE3 Center, Warsaw, Poland | Dirac plasmons in graphene/topological insulator heterostructures for lasing and amplification of terahertz radiation |
| **21:00** | **Gil-Ho Kim** | Sungkyunkwan University (SKKU), Korea | Dual-gate reconfigurable transistor and PIN-diode operation in a van der Waals heterostructure device |
| **21:15 Adjourn** | | | |

# Friday, December 11, 2026

**8:30–8:45 Announcements and Get Seated**

## FAM1: Quantum Computing & Photonics

**Session Chair: TBD**

| Time | Speaker | Affiliation | Title |
|---|---|---|---|
| 8:45 | **Matt Eichenfield** | University of Colorado Boulder / Sandia National Labs / LightlogiQ | ***(Invited)*** All-CMOS Fabricated Photonic Integrated Circuits for Utility Scale Quantum Information Processing with Atomic Qubits |
| 9:15 | **Masashi Kawasaki** | RIKEN Center for Emergent Matter Science (CEMS), Japan | Gigantic topological Hall effect at oxide interfaces |
| 9:30 | **Alex Khitun** | University of California, Riverside | Magnonic Combinatorial Memory for High-density Data Storage |
| 9:45 | **Yoshihiro Iwasa** | RIKEN Center for Emergent Matter Science, Japan | ***(Invited)*** Quantum Geometric photocurrent in 2D materials |
| 10:15 | **Vasili Perebeinos** | University at Buffalo, SUNY | Nonlinear Optical Response in Low-Dimensional Quantum Materials |

**10:30–11:00 Coffee Break**

## FAM2: Charge Transport & Device Simulation

**Session Chair: TBD**

| Time | Speaker | Affiliation | Title |
|---|---|---|---|
| 11:00 | **Herbert Fotso** | University at Buffalo, SUNY | Protocol for Optimal Cavity-Enabled Gates (POCEG) |
| 11:15 | **Denis Mamaluy** | Sandia National Labs | Tunneling barriers as virtual contacts: exact multi-terminal quantum transport at any barrier thickness ($CBR^2$) |
| 11:30 | **Xujiao Gao** | Sandia National Labs | Comprehensive Study of Transport Mechanisms in Heavily Doped Junctions Toward Low-Power Thermometry |
| 11:45 | **Yasuhiro Tokura** | Japan Women's University, Tokyo | Zero-Bias Photo-Assisted Transport through a Centrosymmetric Quantum Dot with Asymmetric Tunnel Barriers |
| 12:00 | **Sneha Banerjee** | Sandia National Labs | Analytical Image-Charge Gate Tunneling Model for Efficient TCAD Simulation of Ultra-Scaled MOS Devices |
| 12:15 | **Juan Mendez** | Sandia National Labs | Quantum-Transport Simulations Uncover a Drain-Enhanced Gate-Drain Leakage Mechanism in GAAFETs |
| 12:30 | **Elena Rozhkova** | Argonne National Laboratory, Lemont, IL | Nanoarchitectonic Control of Charge Transfer at Semiconductor-Bio Heterointerfaces |
| 12:45 | **Austin Toro** | Purdue University | Enabling Rapid Device Exploration: nanoHUB Publishable Interactive GUI for NEMO Quantum Transport |
| 13:00 | **Dong Kyun Lim** | Sungkyunkwan University (SKKU), Korea | Cross-Step Tolerance Scaling of Retained Gate-Mask/Spacer Topography in Narrow-Pitch Transistors |

**13:15 Conference Ends**