23rd International Conference on Electron Dynamics in Semiconductors, Optoelectronics and Nanostructures

EDISON 23
2025

Virginia Tech, Blacksburg, Virginia, USA

July 20-25, 2025

PROGRAM

Sunday, July 20, 2025

4:30 pm to 9:00 pm: Registration at the Inn at Virginia Tech (registration remains open during the week)

5:00 pm to 9:00 pm: Welcome Reception at the Inn at Virginia Tech

Pick up your conference material at the registration desk, meet with colleagues over food and drinks, and relax from your travel.

Monday, July 21, 2025

**** 7:45 am to 8:15 am, Coffee and Refreshments ****

Session Mo1, 8:15 am to 10:00 am: Conference Opening Session

Session Chair: Jean J. Heremans (Virginia Tech)

8:15 – 8:30 am: Welcome and opening statement

8:30 – 9:05 am, Mo1.1: Invited

"Light–matter Interactions at Terahertz Frequencies in Graphene Transistors", **J. A. Delgado Notario**[1], J. M. Caridad[1,2], Ó. Castelló[1,2], S. M. López Baptista[1], T. Taniguchi[3], K. Watanabe[4] and H. G. Roskos[5]

[1]*Department of Applied Physics, University of Salamanca, Salamanca, Spain,*
[2]*Unidad de Excelencia en Luz y Materia Estructurada (LUMES), Salamanca, Spain*
[3]*Research Center for Materials Nanoarchitectonics, NIMS, Tsukuba, Japan*
[4]*Research Center for Electronic and Optical Materials, NIMS, Tsukuba, Japan*
[5]*Physikalisches Institut, Johann Wolfgang Goethe-Universität, Frankfurt am Main, Germany*

9:05 – 9:23 am, Mo1.2:

"Scalable two-dimensional semiconductors: From photo-gating to deep UV optoelectronics", **B. T. Dewes**[1], N. D. Cottam[1], M. Shiffa[1], J. Bradford[1], T. S. Cheng[1], S. V. Novikov[1], C. J. Mellor[1], O. Makarovskiy[1], K. Rahman[1], J. N. O'Shea[1], P. H. Beton[1], T. Ben[2], D. González[2], S. Lara-Avila[3], J. Harknett[4], M. T. Greenaway[4] and A. Patanè[1]

[1]*School of Physics and Astronomy, University of Nottingham, Nottingham, NG7 2RD, UK*
[2]*University Research Institute on Electron Microscopy and Materials, Universidad de Cádiz, Cádiz 11510, Spain*
[4]*Department of Microtechnology & Nanoscience, Chalmers University of Technology, Gothenburg, Sweden*

[4]*Department of Physics, Loughborough University, Loughborough LE11 3TU, UK*

9:23 – 9:58 am, Mo1.3: Invited

"Correlated Nanoelectronics and the Second Quantum Revolution", **J. Levy**[1]

[1]*Department of Physics and Astronomy, University of Pittsburgh, Pittsburgh, Pennsylvania, USA*

**** 10:00 am to 10:30 am, Coffee Break ****

Session Mo2, 10:30 am to 12:00 pm: Phononic and thermal nonequilbium effects

Session Chair: Long Ju (Massachusetts Institute of Technology)

10:30 – 11:05 am, Mo2.1: Invited

"Enhanced phonon-drag by nanoscale design of homoepitaxial ß-Ga_2O_3", J. Boy[1], R. Mitdank[1], R. Ahrling[1], A. Popp[3], Z. Galazka[3] and **S. F. Fischer**[1,2]

[1]*Novel Materials Group, Inst. Physik, Humboldt-Universität zu Berlin, 10099 Berlin, Germany*

[2]*Center for the Science of Materials Berlin, Humboldt-Universität zu Berlin, Germany*

[3]*Leibniz Institute of Crystal Growth, 12489 Berlin, Germany*

11:05 – 11:23 am, Mo2.2:

"The Heating and Cooling of Two-Dimensional Electrons at Low Temperatures", **J. T. Nicholls**[1], A. K. Jain[1], S. N. Holmes[2], C. Chen[3] and D. A. Ritchie[3]

[1]*Physics Department, Royal Holloway, University of London, Egham TW20 0EX, United Kingdom*

[2]*London Centre for Nanotechnology, University College London, 17-19 Gordon Street, London WC1H 0AH, United Kingdom*

[3]*Cavendish Laboratory, University of Cambridge, JJ Thomson Avenue, Cambridge, CB3 0HE, United Kingdom*

11:23 – 11:41 am, Mo2.3:

"Electronic Thermal Transport Measurement in Low-Dimensional Materials with Graphene Non-Local Noise Thermometry", **Jonah Waissman**[1,2], Laurel E. Anderson[1], Artem V. Talanov[1,3], Zhongying Yan[1], Young J. Shin[1], Danial H. Najafabadi[1], Mehdi Rezaee[3], Xiaowen Feng[4], Daniel G. Nocera[4], Takashi Taniguchi[5], Kenji Watanabe[6], Brian Skinner[7], Konstantin A. Matveev[8] and Philip Kim[1,3]

[1]*Department of Physics, Harvard University, Cambridge, MA, USA*

[2]*Institute of Applied Physics, The He-brew University of Jerusalem, Israel*

[3]*John A. Paulson School of Engineering and Applied Sciences, Harvard University, Cambridge, MA, USA*

[4]*Department of Chemistry and Chemical Biology, Harvard University, Cambridge, MA, USA*

[5]*International Center for Materials Nanoarchitectonics, National Institute for Materials Science, Tsukuba, Japan*
[6]*Research Center for Functional Materials, National Institute for Materials Science, Tsukuba, Japan*
[7]*Department of Physics, The Ohio State University, Columbus, OH, USA*
[8]*Materials Science Division, Argonne National Laboratory, Argonne, IL, USA*

11:41 – 11:59 am, Mo2.4:

"Thermalization and Effects of Radiation-Induced Charge Carriers in Semiconductors and GaN/$Al_{0.25}Ga_{0.75}N$ HEMTs", **D. O. Nielsen**[1], L. R. Nichols[2], S. T. Pantelides[2,3], X.-G. Zhang[4], R. D. Schrimpf[3], D. M. Fleetwood[3], C. G. Van de Walle[5] and M. V. Fischetti[1]
[1]*Department of Materials Science and Engineering, University of Texas at Dallas, Dallas, TX*
[2]*Department of Physics and Astronomy, Vanderbilt University, Nashville, TN*
[3]*Department of Electrical and Computer Engineering, Vanderbilt University, Nashville, TN*
[4]*Department of Physics, University of Florida, Gainesville, FL*
[5]*Materials Department, University of California Santa Barbara, Santa Barbara, CA*

12:00 pm to 1:30 pm Lunch Break

Session Mo3, 1:30 pm to 3:00 pm: Ultrafast optical and THz phenomena
Session Chair: Juan A. Delgado Notario (University of Salamanca)

1:30 – 1:48 pm, Mo3.1:

"Terahertz wave amplification by a time-boundary-modulated Huygens' metasurface", **Fu Deng**[1], Fengjie Zhu[2], Xiaoyue Zhou[1], Jensen Li[1], Kebin Fan[2] and Jingdi Zhang[1]
[1]*Department of Physics, Hong Kong University of Science and Technology, Kowloon, Hong Kong SAR, China*
[2]*School of Electronic Science and Engineering, Nanjing University, Nanjing 210023, China*

1:48 – 2:23 pm, Mo3.2: Invited

"Fast Ultraviolet-C Photonics: Sensing Laser Pulses on Femtosecond Timescales", B. T. Dewes[1], T. Klee[2], N. D. Cottam[1], J.J. Broughton[2], M. Shiffa[1], T. S. Cheng[1], S. V. Novikov[1], O. Makarovskiy[1], J.W.G. Tisch[2] and **A. Patanè**[1]
[1]*School of Physics and Astronomy, University of Nottingham, Nottingham, NG7 2RD, UK*
[2]*Blackett Laboratory, Imperial College London, London SW7 2AZ, UK*

2:23 – 2:41 pm, Mo3.3:

"Fano Resonance in Light Scattering on a Quantum Dot Coupled to Phonons", Rafał A. Bogaczewicz and **Paweł Machnikowski**

Institute of Theoretical Physics, Wrocław University of Science and Technology, Wrocław, Poland

2:41 – 2:59 pm, Mo3.4:

"Assessment of the trapping rates in biexponentially decaying photon emission from luminescent nanostructures", **Hanz Y. Ramirez-Gomez**[1], Jill M. Cleveland[2], Tory A. Welsch[2], Eric Y. Chen[2], D. Bruce Chase[2] and Matthew F. Doty[2]

[1]*Grupo de Fisica Teorica y Computacional & Grupo QUCIT, Escuela de Fisica, Universidad Pedagogica y Tecnologica de Colombia (UPTC), Tunja 150003, Boyaca, Colombia*

[2]*Department of Materials Science and Engineering, University of Delaware, Newark, DE 19716, USA*

**** 3:00 pm to 3:30 pm, Coffee Break ****

Session Mo4, 3:30 pm to 5:00 pm: Photovoltaics and perovskites

Session Chair: Levon V. Asryan (Virginia Tech)

3:30 – 4:05 pm, Mo4.1: Invited

"Coherent Many-body Interactions of Semiconductor Microcavities Exciton-Polaritons", **A. D. Bristow**[1,2], J. Paul[1,2], H. L. Louscher[1], G. Fumero[1,2] and J. K. Wahlstrand[2]

[1]*Department of Physics and Astronomy, West Virginia University, Morgantown, WV, USA*

[2]*National Institute of Standards and Technology, Gaithersburg MD, 20889, USA*

4:05 – 4:23 pm, Mo4.2:

"Hot Carriers in Metal Halide Perovskite Solar Cells", **H. Afshari**[1], S. Sourabh[1], V. R. Whiteside[2], M. Furis[1] and I. R. Sellers[2]

[1]*Department of Physics & Astronomy, University of Oklahoma, Norman OK 73019, USA*

[2]*Department of Electrical Engineering, University at Buffalo, Buffalo NY 14260, USA*

4:23 – 4:41 pm, Mo4.3:

"Heterostructure Nanowires for Effective Hot-Carrier Collection in Photovoltaics", **J. E. Escobar**[1,2], A. M. Burke[1], M. T. Borgström[1,2] and H. Linke[1,2]

[1]*NanoLund and Solid State Physics, Lund University, Sweden*

[2]*Wallenberg Initiative Materials Science for Sustainability, Sweden*

4:41 – 4:59 pm, Mo4.4:

"Evidence of Valley Transfer and Hot Carrier Transfer in GaAs/Al0.16Ga0.84As Heterojunction Solar Cells", **H. Ahmed**[1,2], V. R. Whiteside[1], D. K. Ferry[3] and I. R. Sellers[1]

[1]*Department of Electrical Engineering, University at Buffalo, Buffalo NY 14260, USA*

[2]*Department of Physics, University at Buffalo, Buffalo NY 14260, USA*

[3]*School of Electrical, Computer & Energy Engineering, Arizona State University, Tempe AZ 85287, USA*

5:10 pm onward:

Optional tour of the Virginia Tech Nanoscale Characterization and Fabrication Lab at the Corporate Research Center, sponsored by JEOL USA Inc. (https://www.jeolusa.com). Transportation is provided.

Tuesday, July 22, 2025

**** 8:00 am to 8:30 am, Coffee and Refreshments ****

Session Tu1, 8:30 am to 10:00 am: Quantum carrier dynamics and qubits

Session Chair: Saskia F. Fischer (Humboldt-Universität zu Berlin)

8:30 – 8:48 am, Tu1.1:

"Loss-DiVincenzo Hole-Spin Qubits beyond the Single-Particle Regime", **Gaia Forghieri**[1,2,3], Andrea Secchi[1], Paolo Bordone[1,2], Daniel Loss[4], Stefano Bosco[5] and Filippo Troiani[1]

[1]*Centro S3, CNR-Istituto di Nanoscienze, I-41125 Modena, Italy*

[2]*Università di Modena e Reggio Emilia, I-41125 Modena, Italy*

[3]*Università degli Studi di Milano, I-20133 Milano, Italy*

[4]*Department of Physics, University of Basel, Klingelbergstrasse 82, CH-4056 Basel, Switzerland*

[5]*QuTech and Kavli Institute of Nanoscience, Delft University of Technology, Delft, The Netherlands*

8:48 – 9:23 am, Tu1.2: Invited

"Fast semiconductor *hole* spin qubits fabricated on a 300 mm silicon foundry wafer", Isaac Vorreiter[1], Jonathan Huang[1], Scott D. Liles[1], Joe Hillier[1], Ruoyu Li[2], Bart Raes[2], Stefan Kubicek[2], Julien Jussot[2], Sofie Beyne[2], Clement Godfrin[2], Danny Wan[2], Nard Dumoulin Stuyck[1,3], Will Gilbert[1,3], Chih-Hwan Yang[1,3], Andrew Dzurak[1,3], Kristiaan De Greve[2] and **Alexander Hamilton**[1]

[1]*University of New South Wales, Sydney, Australia*

[2] *imec, Leuven, Belgium*
[3]*Diraq, Sydney, NSW, Australia*

9:23 – 9:58 am, Tu1.3: Invited

"Emergence of anisotropic fractional quantum Hall states in ultraclean GaAs 2D hole systems", **A. Gupta**[1], C. Wang[1], S. K. Singh[1], K.W. Baldwin[1], R. Winkler[2], L. N. Pfeiffer[1] and M. Shayegan[1]
[1]*Department of Electrical and Computer Engineering, Princeton University, Princeton, New Jersey, USA*
[2]*Department of Physics, Northern Illinois University, DeKalb, Illinois 60115, USA*

**** 10:00 am to 10:30 am, Coffee Break ****

Session Tu2, 10:30 am to 12:00 pm: Spin and topological physics

Session Chair: Paweł Machnikowski (Wrocław Univ. of Science and Technology)

10:30 – 11:05 am, Tu2.1: Invited

"Fractional Quantum Anomalous Hall Effect and Chiral Superconductivity in Graphene", **Long Ju**[1]
[1]*Department of Physics, Massachusetts Institute of Technology, Massachusetts, USA*

11:05 – 11:23 am, Tu2.2:

"Investigating the formation dynamics of the large nuclear field in bulk *n*-AlGaAs", **A. Shen**[1], R. Kaji[1] and S. Adachi[1]
[1]*Department of Applied Physics, Graduate School of Engineering, Hokkaido University, Japan*

11:23 – 11:41 am, Tu2.3:

"Non-Local Signatures of Topological Edge States Arising from Substrate-Induced Spin-Orbit Coupling in Graphene-on-Chromia", **Keke He**[1], Hamed Vakili[2], Ather Mahmood[2], Christian Binek[2], Peter A. Dowben[2], Alexey A. Kovalev[2] and Jonathan P. Bird[1]
[1]*Department of Electrical Engineering, University at Buffalo, Buffalo, NY 14260, USA*
[2]*Department of Physics and Astronomy, University of Nebraska Lincoln, Lincoln, NE 68588, USA*

11:41 – 11:59 am, Tu2.4:

"Mesoscopic Signatures of Spin Rotation in Graphene Coupled to High-Spin-Orbit-Coupling Substrates", **K. Yokoi**[1], R. Somphonsane[2], H. Ramamoorthy[2], N. Arabchigavkani[3], J. Fransson[4], G.-H. Kim[5], J. P. Bird[3] and N. Aoki[1]
[1]*Department of Materials Science, Chiba University, Inage-ku, Chiba 263-8522, Japan*

[2]*Department of Electronics Engineering, Faculty of Engineering, King Mongkut's Institute of Technology Ladkrabang, Bangkok, 10520 Thailand*
[3]*Department of Electrical Engineering, University at Buffalo, Buffalo, NY 14260, USA*
[4]*Department of Physics and Astronomy, Uppsala University, Box 534, SE-751 21, Uppsala, Sweden*
[5]*Electrical and Computer Engineering & SAINT, Sungkyunkwan University, Suwon 16419, Korea*

12:00 pm to 1:30 pm Lunch Break

Session Tu3, 1:30 pm to 3:00 pm: Quantum-coherent phenomena + poster talks
Session Chair: Tilmann Kuhn (University of Münster)

1:30 – 2:18 pm, Tu3.1: 4-minute short talks for posters **P1** to **P12**

2:22 – 2:40 pm, Tu3.2:
"Extending Conveyor Mode Electron Shuttling in Si/SiGe into the Second Dimension"**, M. Beer**[1], R. Xue[1], L. Deda[1], T. Struck[1], M. Volmer[1], H. Bluhm[1,2] and L. R. Schreiber[1,2]
[1]*JARA-FIT Institute for Quantum Information, Forschungszentrum Jülich GmbH and RWTH Aachen University, Aachen, Germany*
[2]*ARQUE Systems GmbH, 52074 Aachen, Germany*

2:40 – 2:58 pm, Tu3.3:
"Coherent Conversion from Photon Polarization to Ge Hole Spin State", **Y. Tokura**
Pure and Applied Sciences, University of Tsukuba, 1-1-1 Tsukuba, Ibaraki, Japan

**** 3:00 pm to 3:30 pm, Coffee Break ****

Session Tu4, 3:30 pm to 5:00 pm: Quantum-coherent phenomena + poster talks
Session Chair: Adbhut Gupta (Princeton University)

3:30 – 4:05 pm, Tu4.1: Invited
"Graphene Based Mach-Zehnder Interferometers", **Bikash C. Barik**[1], Q. Benichou[1], L. Pugliese[1], H. Chakraborti[1], R. Ayache[1], K. Watanabe[2], T. Taniguchi[2], N. Kumada[3], H.-S. Sim[4] and P. Roulleau[1]
[1]*SPEC, CEA, CNRS, Universite Paris-Saclay, CEA Saclay, 91191 Gif sur Yvette, Cedex France*
[2]*National Institute for Materials Science, 1-1 Namiki, Tsukuba 305-0044, Japan*
[3]*NTT Basic Research Laboratories, NTT Corporation, Atsugi, Japan*
[4]*Department of Physics, Korea Advanced Institute of Science and Technology, Daejeon 34141, Korea*

4:05 – 5:01 pm, Tu4.2: 4-minute short talks for posters **P13** to **P18**, **P20** to **P26** and **P28**

5:15 pm to 7:15 pm, Poster Session with Refreshments

P1: "Low Fluence Time-resolved Magneto-Optical Kerr Spectroscopy in Co/Pd Multilayers", Vipin Yadav[1], Graham Lang[1], Nicholas W. G. Smith[1], Yannick Pleimling[1], Brenden A. Magill[1], Nozomi Nishizawa[2], Hiro Munekata[3] and Giti A. Khodaparast[1]
[1]Department of Physics, Virginia Tech, Blacksburg, VA 24061, USA
[2]Kitazato University, 5 Chome-9-1 Shirokane, Minato City, Tokyo 108-8641, Japan
[3]The Institute of Innovative Research, Tokyo Institute of Technology, 4259-J3-15, Nagatsuta, Midori-ku, Yokohama 226-8503, Japan

P2: "Non-equilibrium Quantum Thermodynamic Model for Predicting Transport Properties", Deepak Dhariwal[1], Michael von Spakovsky[2] and William T. Reynolds Jr.[1]
[1]Department of Materials Science and Engineering, Virginia Tech, Virginia, USA
[2]Department of Mechanical Engineering, Virginia Tech, Virginia, USA

P3: "Linear Dichroism and Absorption Characterization of Solution-Cast Organic Semiconductor Thin Films", Hilbi Akbar[1], Madalina Furis[1] and Hadi Afshari[1]
[1]Center For Quantum Research & Technology (CQRT), University of Oklahoma, Norman OK, USA

P4: "Twisted $MoSe_2$ Homobilayer Behaving as a Heterobilayer", Arka Karmakar
Institute of Experimental Physics, Faculty of Physics, University of Warsaw, 02-093 Warsaw, Poland

P5: "Graphene-based Field-Effect Transistor Biosensors for Photosensory Biomolecular Detection", Kalani H. Ellepola, Kinley Koch, Tharindu D. Rajapaksha, James Li, Nusrat Jahan, Poojan Koirala and Vinh Q. Nguyen
Department of Physics and Center for Soft Matter and Biological Physics, Virginia Tech, Blacksburg VA 24061, USA

P6: "Low-Dimensional Excitons in Ultrathin Exfoliated Molecular Crystalline Thin Films", H. Afshari, S. Raybould, H. Akbar, L. Seeley, L. Bumm and M. Furis
Homer L. Dodge Physics & Astronomy Department and Center for Quantum Research & Technology (CQRT), University of Oklahoma, Norman OK 73019, USA

P7: "Ni^{2+} mediated enhanced microstructural, optical, and electrical properties of $0.9KNbO_3$-$0.1BaNi_{0.5}Nb_{0.5}O_3$-δ electro ceramics for photovoltaic applications", Ankit Chahar
Jawaharlal Nehru University New Delhi, India

P8: "Mechanical Exfoliation and Optoelectronic Characterization of 1,4,8,11,15,18,22,25-Octabutoxyphthalocyanine Thin Films", S. M. Raybould, L. Seeley, N. Akbar, H. Afshari, M. I. Furis and L. A. Bumm
Homer L. Dodge Department of Physics & Astronomy and Center for Quantum Research & Technology, University of Oklahoma, Norman OK 73019, USA

P9: "Effect of synthetic routes on optical characteristics of Ti_3C_2 MXene quantum dots", Nisha Hiralal Makani, Bailey Westgate, Shyla Soto, Joshua Abbott and Bhoj Gautam

Department of Chemistry, Physics, and Materials Science, Fayetteville State University, Fayetteville, North Carolina 28301, USA

P10: "A Multiscale Theoretical Framework for Ultrafast Laser-Excited Graphene", T. Zier[1], U. Panta[1], L. Chen[1] and D. A. Strubbe[1]
[1]*Department of Physics, University of California Merced, Merced, CA, USA*

P11: "Modelling and Optimization of Multiband Solar Cells Using Multi-Stacked Diodes", R. Ramadan[1,2], B. Soto[1] and N. López[1,3]
[1]*Universidad Autónoma de Madrid, C/ Francisco Tomás y Valiente 7, 28049, Madrid, España*
[2]*Department of Physics, Faculty of Science, Minia University, Minia 61519, Egypt*
[3]*Instituto de Óptica - CSIC, C/ Serrano 121, 28006, Madrid, España*

P12: "Advanced Multiband Photodetectors for Multi-Detection Using Stacked Diodes with Highly Mismatched Materials", R. Ramadan[1,2], B. Soto[1] and N. López[1,3]
[1]*Universidad Autónoma de Madrid, C/ Francisco Tomás y Valiente 7, 28049, Madrid, España*
[2]*Department of Physics, Faculty of Science, Minia University, Minia 61519, Egypt*
[3]*Instituto de Óptica - CSIC, C/ Serrano 121, 28006, Madrid, España*

P13: "Kagome lattice: a platform for topological superconductivity", M. A. Mojarro[1] and Sergio E. Ulloa[1]
[1]*Department of Physics and Astronomy and Nanoscale and Quantum Phenomena Institute, Ohio University, Athens OH, USA*

P14: "Quantum Transport Using Chiral Quantum Walks", G. Ragazzi[1], S. Cavazzoni[1], C. Benedetti[3], P. Bordone[1,2] and M. G. A. Paris[3]
[1]*Dipartimento di Scienze Fisiche, Informatiche e Matematiche, Università di Modena e Reggio Emilia, Modena, Italy*

P15: "Nanoscale terahertz response of charges in semiconductors", H. Němec[1], T. Troha[1], V. Pushkarev[1], J. Maňák[1], V. Jurka[1], V. Novák[1], T. Ostatnický[2] and P. Kužel[1]
[1]*Institute of Physics of the Czech Academy of Sciences, Prague, Czech Republic*
[2]*Charles University, Faculty of Mathematics and Physics, Prague, Czech Republic*

P16: "Terahertz Photoresponse in Graphene Moiré Superlattices", José M. Caridad[1,2], Juan A. Delgado-Notario[1], Stephen R. Power[3], Wojciech Knap[4,5], Manuel Pino[6], Takashi Taniguchi[7], Kenji Watanabe[7], Jesús E. Velázquez-Pérez[1], Yahya M. Meziani[1] and Pablo Alonso-González[8]
[1]*Departmento de Física Aplicada, Universidad de Salamanca, 37008 Salamanca, Spain*
[2]*Unidad de Excelencia en Luz y Materia Estructurada (LUMES), Universidad de Salamanca*
[3]*School of Physical Sciences, Dublin City University, Glasnevin, Dublin 9, Ireland*
[4]*CENTERA Labs, Polish Academy of Sciences, Warsaw 01-142, Poland*
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[6]*Departamento de Física Fundamental, Universidad de Salamanca, 37008 Salamanca, Spain*

[7]Research Center for Electronic and Optical Materials, National Institute for Materials Science, Tsukuba305-0044, Japan
[8]Department of Physics, University of Oviedo, Oviedo 33006, Spain

P17: "AC Conductivity, and Transient Dynamics in $Ge_{1-x}Sn_x$ films investigated via Terahertz Spectroscopy", H. Loh[1,2], S. Woodwyk[1], C. Sauers[2], G. Forcherio[3], G. Grzybowski[4], B. Claflin[5] and A. D. Bristow[1]
[1]Department of Physics and Astronomy, West Virginia University, Morgantown, WV 26501-6315, USA
[2]Department of Mechanical, Materials and Aerospace Engineering, West Virginia University, Morgantown, WV 26501-6106, USA
[3]Naval Surface Warfare Center, Crane, IN 47522-5001, USA
[4]KBR, 3725 Pentagon Blvd Suite 210, Beavercreek Township, OH 45431, USA
[5]Air Force Research Laboratory, Wright-Patterson Airforce Base, OH 45433, USA

P18: "Electronic Characterization of GaN/AlGaN Multichannel Heterostructures", M. Khajeh Hassanzadeh[1], M. A. Porter[2], R. Khatiwada[1], Y. Zhang[2] and J. J. Heremans[1]
[1]Department of Physics, Virginia Tech, Virginia, USA
[2]Center for Power Electronics Systems, Virginia Tech, Virginia, USA

P19: "On the Deformation Potential Constant of the Conduction Band in Si MOS-like Structures", N. Mori
Division of Electrical, Electronic and Infocommunications Engineering, Osaka University, Suita, Osaka, 565–0871, Japan

P20: "Quantification of Electron Temperature in GaAs/AlGaAs Quantum Wells Using Mesoscopic Multiparallel Aperture Geometries", A. Thapa[1], R. Khatiwada[1], P. Sharma[1], A. Gupta[2], L. N. Pfeiffer[2], M. Shayegan[2] and J. J. Heremans[1]
[1]Department of Physics, Virginia Tech, Virginia 24061, USA
[2]Department of Electrical Engineering, Princeton University, New Jersey 08544, USA

P21: "Nonequilibrium Electron Transport in Transverse Magnetic Focusing on a GaAs/AlGaAs 2D Electron System", R. Khatiwada[1], T. Anderson[1], A. Thapa[1], D. Balasooriya[1], A. Gupta[2], L. N. Pfeiffer2, M. Shayegan[2] and J. J. Heremans[1]
[1]Department of Physics, Virginia Tech, Virginia 24061, USA
[2]Department of Electrical Engineering, Princeton University, New Jersey 08544, USA

P22: "Negative Differential Conductance in Laterally Gated $In_{0.8}Ga_{0.2}As$ Superlattices", Shahabaj Mundaganur[1], Aarbaj Mundaganur[1], Gregory R. Aizin[2] and Jonathan P. Bird[1]
[1]Department of Electrical Engineering, University at Buffalo, Buffalo, NY 14260, USA
[2]Kingsborough College & the Graduate Center of CUNY, Brooklyn, NY 11235, USA

P23: "Obligate Electronic Mixing and Frequency Multiplication in Mesoscopic Devices with Nonequilibrium Two-Dimensional Carrier Transport", T. Anderson[1], R. Khatiwada[1], S. Davari[2], B. M. Bailey[2], H. O. H. Churchill[2], M. Chandra[3], A. Gupta[4], L. N. Pfeiffer[4], M. Shayegan[4] and J. J. Heremans[1]
[1]Department of Physics, Virginia Tech, VA, USA
[2]Department of Physics and MonARK Quantum Foundry, University of Arkansas, AR, USA
[3]nOhm Devices, MA, USA

[4]*Department of Electrical and Computer Engineering, Princeton University, NJ, USA*

P24: "Ballistic Phonon Transport in Homoepitaxial ß-Ga_2O_3 Films", R. Mitdank[1], R. Ahrling[1], J. Boy[1], A. Popp[3], Z. Galazka[3] and S. F. Fischer[1,2]
[1]*Novel Materials Group, Inst. Physik, Humboldt-Universität zu Berlin, 10099 Berlin, Germany*
[2]*Center for the Science of Materials Berlin, Humboldt-Universität zu Berlin, Germany*
[3]*Leibniz Institute of Crystal Growth, 12489 Berlin, Germany*

P25: "Characteristics of Bismuth Nanowires Fabricated by Templated Deposition", Yulia Kirina[1], T. Anderson[2], W. Thomas[2], A. Gholampour[2], V. Soghomonian[2], S. K. Kodambaka[1], K. Park[2] and J. J. Heremans[2]
[1]*Department of Materials Science and Engineering, Virginia Tech, Virginia, USA*
[2]*Department of Physics, Virginia Tech, Virginia, USA*

P26: "Polaronic Corrections to Electron Energy and Effective Mass in Wurtzite Quantum Wires Subjected to Electric and Magnetic Fields", A. Asatryan[1], L. Vardanyan[2], T. Ghukasyan[1] and A. Vartanian[1]
[1]*Department of Solid State Physics, Institute of Physics, Yerevan State University, Yerevan, Armenia*
[2]*Center of Sciences & Advanced Technologies, Yerevan, Armenia*

P27: "The Effect of Rashba Spin-Orbit Coupling on Electron Mobility in Wurtzite and Zinc-Blende Crystalline Nanowire due to Phonon Scattering", A. L. Asatryan[1], L. A. Vardanyan[2], A. H. Movsisyan[1], A. A. Avetisyan[1], A. G. Stepanyan[1] and A. L. Vartanian[1]
[1]*Department of Solid State Physics, Institute of Physics, Yerevan State University, Yerevan, Armenia*
[2]*Center of Sciences & Advanced Technologies, Yerevan, Armenia*

P28: "Twisted Trilayer Graphene: Unraveling the Interplay of Moiré Structures and Quantum Chaos", R. Habibpour Bisafar[1] and F. Nemati[2]
[1]*Departments of Physics, Condensed Matter Group, Faculty of physics, Tabriz University, Iran*
[2]*Department of Physics, Faculty of science and new technologies, Urmia University of Technology, Iran*

Wednesday, July 23, 2025

**** 8:00 am to 8:30 am, Coffee and Refreshments ****

Session We1, 8:30 am to 10:00 am: Spintronics and magnetization dynamics

Session Chair: Jonathan P. Bird (University at Buffalo)

8:30 – 8:48 am, We1.1:
"Determining the Rashba Spin-Orbit Coupling Parameter in Monolayer Graphene by Considering the Effect of Kohn Anomalies", **A. L. Vartanian**[1]

[1]*Department of Solid State Physics, Institute of Physics, Yerevan State University, Yerevan, Armenia*

8:48 – 9:23 am, We1.2: Invited

"Novel properties due to crystal symmetry in altermagnets", **Junwei Liu**

Department of Physics, Hong Kong University of Science and Technology, Hong Kong, China

9:23 – 9:41 am, We1.3:

"Novel Optical Evaluation of Spin-Orbit Parameters via Programmable Spin Helix Patterning in a GaAs/AlGaAs Two-Dimensional Electron Gas", **K. Kikuchi**[1], J. Ishihara[1], M. Hiyama[1], S. Yamamoto[1], Y. Ohno[2] and M. Kohda[1,3-5]

[1]*Graduate School of Engineering, Tohoku University, Sendai, Japan*
[2]*Graduate School of Pure and Applied Sciences, University of Tsukuba, Tsukuba, Japan*
[3]*Center for Science and Innovation in Spintronics, Tohoku University, Sendai, Japan*
[4]*Division for the Establishment of Frontier Sciences of Organization for Advanced Studies, Tohoku University, Sendai, Japan*
[5]*Quantum Materials and Applications Research Center, National Institutes for Quantum Science and Technology, Gunma, Japan*

9:41 – 9:59 am, We1.4:

"Band Filling and Relaxation Effects in the Transient Dielectric Function of Ge", **C. A. Armenta**[1], M. Zahradnik[2], M. Rebarz[2], S Espinoza[2], C. Emminger[3], S. Vazquez-Miranda[2], J. Andreasson[2] and S. Zollner[1]

[1]*Department of Physics, New Mexico State University, New Mexico, USA*
[2]*ELI ERIC, Dolni B˘režany, Czechia*
[3]*Department of Physics, Leipzig University, Leipzig, Germany*

**** 10:00 am to 10:30 am, Coffee Break ****

Session We2, 10:30 am to 12:00 pm: Ultrafast phenomena and chalcogenides

Session Chair: Amalia Patanè (University of Nottingham)

10:30 – 11:05 am, We2.1: Invited

"Ultrafast Photocurrent Response in Various van der Waals Materials", K. Yoshioka[1], S. Chatterjee[1], T. Wakamura[1] and **N. Kumada**[1]

[1]*NTT Basic Research Laboratories, NTT Corporation, Atsugi, Japan*

11:05 – 11:23 am, We2.2:

"Rapid expansion of photo-generated electron-hole plasma in direct gap semiconductors", **T. Troha**[1], F. Klimovič[2], T. Ostatnický[2], P. Kužel[1] and H. Němec[1]

[1]*Institute of Physics of the Czech Academy of Sciences, Prague, Czech Republic*

[2]*Charles University, Faculty of Mathematics and Physics, Prague, Czech Republic*

11:23 – 11:41 am, We2.3:
"Optical spectra of moiré exciton-polaritons in twisted TMDC bilayers: The role of Markovian vs. non-Markovian electron-phonon scattering", **T. Kuhn**[1], K. Jürgens[1] and D. Wigger[2]
[1]*Institute of Solid State Theory, University of Münster, Germany*
[2]*Department of Physics, University of Münster, Germany*

11:41 – 11:59 am, We2.4:
"Robust Negative Differential Conductance at the Band Inflection of Ion-Gated TiS_3 Nanowires", M. D. Randle[1], A. Kumar[2], A. Datta[2], A. Lipatov[3], T. Paudel[4], U. Singisetti[2], A. Sinitskii[5], P. A. Dowben[6], and **J. P. Bird**[2]
[1]*Advanced Device Laboratory, RIKEN, 2-1 Hirosawa, Wako, Saitama, 351-0198, Japan*
[2]*Department of Electrical Engineering, University at Buffalo, Buffalo, NY 14260, USA*
[3]*Department of Chemistry, Biology & Health Sciences, South Dakota School of Mines & Technology, Rapid City, SD 57701, USA*
[4]*Department of Physics, South Dakota School of Mines & Technology, Rapid City, SD 57701, USA*
[5]*Department of Chemistry, University of Nebraska-Lincoln, Lincoln, NE 68588, USA*
[6]*Department of Physics & Astronomy, University of Nebraska-Lincoln, Lincoln, NE 68588, USA*

12:00 pm to 12:30 pm Lunch Break

1:00 pm – 6:00 pm, Conference Excursion:
Visit to the Chateau Morrisette Winery and stops on the scenic Blue Ridge Parkway (https://en.wikipedia.org/wiki/Blue_Ridge_Parkway).

Thursday, July 24, 2025

**** 8:00 am to 8:30 am, Coffee and Refreshments ****

Session Th1, 8:30 am to 10:00 am: Non-equilibrium thermal and phonon transport
Session Chair: Vsevolod Ivanov (Virginia Tech)

8:30 – 9:05 am, Th1.1: Invited
"Leveraging non-equilibrium many-body dynamics for quantum thermal machines", **Irene D'Amico**

Department of Physics, University of York, York YO10 5DD, UK

9:05 – 9:23 am, Th1.2:
"A Non-equilibrium Model for Transport Properties and Energy Loss in Magnetite", **Deepak Dhariwal**[1], Michael von Spakovsky[2] and William T. Reynolds Jr.[1]
[1]Department of Materials Science and Engineering, Virginia Tech, Virginia, USA
[2]Department of Mechanical Engineering, Virginia Tech, Virginia, USA

9:23 – 9:58 am, Th1.3: Invited
"Graphite thermal functional device based on phonon hydrodynamics", **M. Nomura**
Institute of Industrial Science, The University of Tokyo, Tokyo 153-8505, Japan

**** 10:00 am to 10:30 am, Coffee Break ****

Session Th2, 10:30 am to 12:00 pm: Quantum materials and topological materials
Session Chair: Masahiro Nomura (The University of Tokyo)

10:30 – 10:48 am, Th2.1:
"Selective Growth of High-Purity Layered Tin Sulfides by Chemical Vapor Deposition", **K. Koyama**[1], J. Ishihara[1], T. Odagawa[1], S. Yamamoto[1] and M. Kohda[1,2,3,4]
[1]Department of Materials Science, Tohoku University, Sendai, Japan
[2]Center for Science and Innovation in Spintronics, Tohoku University, Sendai, Japan
[3]Division for the Establishment of Frontier Science, Tohoku University, Sendai, Japan
[4]Quantum Materials and Applications Research Center, National Institutes for Quantum Science and Technology, Gunma, Japan

10:48 – 11:06 am, Th2.2:
"Apparent violation of the Mott relation in a noncentrosymmetric kagome ferromagnet", B. Kostroun[1], T. Asaba[2], S. Thomas[3], S. Savrasov[4], J. Thompson[3], E. Bauer[3], F. Ronning[3] and **V. Ivanov**[1,5,6]
[1]Department of Physics, Virginia Tech, Virginia, USA
[2]Department of Physics, University of Virginia, Virginia, USA
[3]Los Alamos National Laboratory, New Mexico, USA
[4]Department of Physics, University of California Davis, California, USA
[5]National Security Institute, Virginia Tech, Virginia, USA
[6]Center for Quantum Information Science and Engineering, Virginia Tech, Virginia, USA

11:06 – 11:24 am, Th2.3:

"Substrate Temperature-Dependent Disorder and Transport Properties in Bi Thin Films", **Yulia Kirina**[1], A. Gholampour[2], V. Soghomonian[2], S. K. Kodambaka[1] and J. J Heremans[2]

[1]*Department of Materials Science and Engineering, Virginia Tech, Virginia, USA*

[2]*Department of Physics, Virginia Tech, Virginia, USA*

11:24 – 11:42 am, Th2.4:

"Growth of self-integrated atomic quantum wires and junctions of a Mott semiconductor", **T. Asaba**

Department of Physics, University of Virginia, Virginia, USA

11:42 – 12:00 pm, Th2.5:

"Effects of disorder and hydrogenation in intrinsic magnetic topological materials", **Kyungwha Park**

Department of Physics, Virginia Tech, Blacksburg, Virginia, USA

12:00 pm to 1:30 pm Lunch Break

Session Th3, 1:30 pm to 3:00 pm: Spin interactions and photonics

Session Chair: Alan D. Bristow (West Virginia University)

1:30 – 2:05 pm, Th3.1: Invited

"Electrical Control of the Kondo Screening Cloud and Coupling between Distant Spins", N. H. Tu[1], M. Kim[2], D. Kim[2], R. Ito[3], D. Pomaranski[4], J. Shim[2], H. Kozaki I. V. Borzenets[5], A. Ludwig[6], A. D. Wieck[6], H.-S. Sim[2] and **M. Yamamoto**[1,4]

[1]*Centre for Emergent Matter Science (CEMS), RIKEN, Saitama, Japan*

[2]*Department of Physics, KAIST, Daejeon, South Korea*

[3] *The National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Japan*

[4]*Quantum-Phase Electronics Center and Department of Applied Physics, The University of Tokyo*

[5]*Physics & Astronomy Department, Texas A&M University, Texas, United States*

[6]*Lehrstuhl für Angewandte Festkörperphysik, Ruhr-Universität Bochum, Germany*

2:05 – 2:23 pm, Th3.2:

"Controlling Electron-Nuclear Entanglement in Optically-Active Spin-Photon Interfaces", **I. E. Gnasso**[1,2], K. S. Sarguroh[3], D. Gangloff[4], S. E. Economou[1,2] and E. F. Barnes[1,2]

[1]*Department of Physics, Virginia Tech, Virginia, USA*

[2]*Virginia Tech Center for Quantum Information Science and Engineering, Virginia, USA*

[3]*Department of Engineering Science, University of Oxford, Oxford, United Kingdom*
[4]*Cavendish Laboratory, University of Cambridge, Cambridge, UK*

2:23 – 2:41 pm, Th3.3:
"Non-Linear Magneto-Optical Properties of Quasi-2D Electron Gas in Periodically Modulated GaAs Nanostructures", **V. Mughnetsyan**[1], A. Harutyunyan[1] and V. Gudmundsson[2]
[1]*Department of Solid State Physics, Yerevan State University, Alex Manoogian 1, 0025 Yerevan, Armenia*
[2]*Science Institute, University of Iceland, Dunhaga 3, IS-107 Reykjavik, Iceland*

2:41 – 2:59 pm, Th3.4:
"Critical Metrology of Minimally Accessible Spin Chains", **Simone Cavazzoni**[1], Paolo Bordone[1,2], Berihu Teklu[3,4] and Matteo G.A. Paris[5]
[1]*Dipartimento di Scienze Fisiche, Informatiche e Matematiche, Università di Modena e Reggio Emilia, I-41125 Modena, Italy*
[2]*Centro S3, CNR-Istituto di Nanoscienze, I-41125 Modena, Italy*
[3]*Center for Cyber-Physical Systems (C2PS), Khalifa University, Abu Dhabi 127788, United Arab Emirates*
[4]*Department of Mathematics, College of Computing and Mathematical Sciences, Khalifa University, 127788 Abu Dhabi, United Arab Emirates*
[5]*Quantum Technology Lab, Dipartimento di Fisica Aldo Pontremoli, Universit`a degli Studi di Milano, I-20133 Milano, Italy*

**** 3:00 pm to 3:30 pm, Coffee Break ****

Session Th4, 3:30 pm to 5:00 pm: THz phenomena, photonics and phononics in semiconductors

Session Chair: Jeremy Levy (University of Pittsburgh)

3:30 – 4:05 pm, Th4.1: Invited
"Coherent light-matter coupling in semiconductor nanostructure-terahertz optical resonator hybrid systems", **K. Kuroyama**[1]
[1]*Institute of Industrial Science, The University of Tokyo, Tokyo, Japan*

4:05 – 4:23 pm, Th4.2:
"Probing Structural and Optical Properties in Shock-Compressed GaAs", **Brenden A. Magill**[1], Mithun Bhowmick[2], Dhanalakshmi Sellan[3], Kade Johnson[4], Kenneth Mikolaichik[4], Xuan Zhou[4,5], Amlan Das[6], Chari Ramkumar[7], Nicholas W. G. Smith[1] and Giti A. Khodaparast[1]
[1]*Department of Physics, Virginia Tech, Blacksburg, Virginia 24061, United States*
[2]*Department of Mathematical and Physical Sciences, Miami University Regionals, 4200 N University Blvd. Middletown, OH 45042, United States*

[3]*School of Chemical Sciences, University of Illinois at Urbana-Champaign, 600 S. Mathews Ave., Urbana, IL 61801, United States*
[4]*Department of Physics and Astronomy, The University of Texas at San Antonio, One UTSA Circle, San Antonio, TX 78249, United States*
[5]*Department of Mechanical Engineering, Center for Advanced Measurements in Extreme Environments, The University of Texas at San Antonio, One UTSA Circle, San Antonio, TX 78249, United States*
[6]*Cornell High Energy Synchrotron Source, Cornell University, Ithaca, NY, 14850, United States*
[7]*Department of Physics, Geology & Engineering Technology, Northern Kentucky University, Nunn Drive, Highland Heights, KY 41099, United States*

4:23 – 4:41 pm, Th4.3:
"Effects of Carrier Dynamics in Quantum Dots on High-Speed Operation of Semiconductor Lasers with Double Asymmetric Barrier Layers", C. Hammack[1] and **L. V. Asryan**[2]
[1]*Department of Electrical Engineering, University of Texas at Arlington, Arlington, Texas, USA*
[2]*Department of Materials Science and Engineering, Virginia Tech, Blacksburg, Virginia, USA*

4:41 – 4:59 pm, Th4.4:
"Monte Carlo Simulation of Hot Phonon Blockade in Type-II MQW Structures", **I. Baranowski**[1], S. M. Goodnick[1] and D. Vasileska[1]
[1]*Ira A. Fulton School of Engineering, Arizona State University, Arizona, USA*

4:59 – 5:17 pm, Th4.5:
"From Flakes to Devices: Automated 2D Heterostructure Fabrication at MonArk Quantum Foundry", **Dharmraj Kotekar-Patil**[1,2], Shiva Davari[1,2], Loc Duong[1,3], Tim Faltermeier[1,4], Josue A. Goss[1,2], Amirhossein Hasani[1,4], Jane Peabody[1,4], Samuel Wyss[1,4], Nicholas J. Borys[1,4,5] and Hugh O. H. Churchill[1,2]
[1]*MonArk NSF Quantum Foundry*
[2]*Department of Physics, University of Arkansas, Fayetteville, AR*
[3]*Department of Physics, University of Maine, Orono, ME*
[4]*Department of Physics, Montana State University, Bozeman, MT*
[5]*Department of Physics, University of Utah, Salt Lake City, UT*

6:00 pm to 9:00 pm, Conference Dinner at the Inn at Virginia Tech

Friday, July 25, 2025

**** 8:00 am to 8:30 am, Coffee and Refreshments ****

Session Fr1, 8:30 am to 9:41 am: Phonons and excitons, photodetectors

Session Chair: Ian R. Sellers (University at Buffalo)

8:30 – 9:05 am, Fr1.1: Invited

"Linking phonon dynamics and optoelectronic properties in III-V phonon cavities and perovskites", **M. P. Nielsen**[1], M. Dubajic[2], S. Stranks[2], M. Hanif[1], G. J. Conibeer[1] and S. P. Bremner[1]

[1]*School of Photovoltaics and Renewable Energy Engineering, UNSW Sydney, Sydney, Australia*

[2]*Department of Chemical Engineering and Biotechnology, University of Cambridge, Philippa Fawcett Drive, Cambridge, CB3 0AS United Kingdom*

9:05 – 9:23 am, Fr1.2:

"Theoretical Modeling of Exciton Absorption of Crystalline Phthalocyanine Thin Films", **S. Sengupta**[1], Z. Pei[1], C. Lander[1], C. Wickizer[1], L. Bumm[2], M. Furis[2] and Y. Shao[1]

[1]*Department of Chemistry & Biochemistry, University of Oklahoma, Norman, OK 73019*

[2]*Homer L. Dodge Department of Physics, University of Oklahoma, Norman, OK 73019*

9:23 – 9:41 am, Fr1.3:

"Graphene Field-Effect Transistors on *p*-doped Semiconductors for Photodetection", **Nusrat Jahan**[1,2], Brady Talbert[1], Kalani Ellepola[1], Tharindu D. Rajapaksha[2], Mason Whittington[2] and Nguyen Q. Vinh[1,2]

[1]*Department of Physics and Center for Soft Matter and Biological Physics, Virginia Tech, Blacksburg, VA 24061, USA*

[2]*Department of Mechanical Engineering, Virginia Tech, Blacksburg, Virginia 24061, USA*

**** 9:41 am to 10:10 am, Coffee Break ****

Session Fr2, 10:10 am to 11:15 am: Excitons and Conference Closing Session

Session Chair: Jean J. Heremans (Virginia Tech)

10:10 – 10:45 am, Fr2.1: Invited

"Dynamics of Exciton Delocalization in Low Dimensional Small Molecule Semiconductors", M. Furis[1], V. Mapara[1], **H. Afshari**[1], H. Akhbar[1], S. Raybould[1], A. Ueno[2], T. Yoshida[2] and L. Bumm[1]

[1]*Homer L. Dodge Physics & Astronomy Department, University of Oklahoma, Oklahoma, 73019, USA*
[2]*Department of Organic Materials Science, Yamagata University, Yonezawa, Japan*

10:45 – 11:15 am, Fr2.2: EDISON Young Researcher Awards and Closing Session