

EDISON 23 Conference Program

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



EDISON 
2025

Virginia Tech, Blacksburg, Virginia, USA

July 20-25, 2025

PROGRAM

EDISON 23 Conference 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 Notario¹, J. M. Caridad^{1,2}, Ó. Castelló^{1,2}, S. M. López Baptista¹, T. Taniguchi³, K. Watanabe⁴ and H. G. Roskos⁵

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. Dewes¹, N. D. Cottam¹, M. Shiffa¹, J. Bradford¹, T. S. Cheng¹, S. V. Novikov¹, C. J. Mellor¹, O. Makarovskiy¹, K. Rahman¹, J. N. O’Shea¹, P. H. Beton¹, T. Ben², D. González², S. Lara-Avila³, J. Harknett⁴, M. T. Greenaway⁴ and A. Patané¹

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*

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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. Levy¹

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 nonequilibrium 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 β -Ga₂O₃”, J.

Boy¹, R. Mitdank¹, R. Ahrling¹, A. Popp³, Z. Galazka³ 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. Nicholls¹, A. K. Jain¹, S. N. Holmes², C. Chen³ and D. A. Ritchie³

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 Weissman^{1,2}, Laurel E.

Anderson¹, Artem V. Talanov^{1,3}, Zhongying Yan¹, Young J. Shin¹, Danial H.

Najafabadi¹, Mehdi Rezaee³, Xiaowen Feng⁴, Daniel G. Nocera⁴, Takashi Taniguchi⁵, Kenji Watanabe⁶, Brian Skinner⁷, Konstantin A. Matveev⁸ 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*

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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. Nichols², S. T. Pantelides^{2,3}, X.-G. Zhang⁴, R. D. Schrimpf³, D. M. Fleetwood³, C. G. Van de Walle⁵ and M. V. Fischetti¹

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 Zhu², Xiaoyue Zhou¹, Jensen Li¹, Kebin Fan² and Jingdi Zhang¹

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. Dewes¹, T. Klee², N. D. Cottam¹, J.J. Broughton², M. Shiffa¹, T. S. Cheng¹, S. V. Novikov¹, O. Makarovskiy¹, J.W.G. Tisch² and **A. Patané**¹

¹*School of Physics and Astronomy, University of Nottingham, Nottingham, NG7 2RD, UK*

²*Blackett Laboratory, Imperial College London, London SW7 2AZ, UK*

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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. Cleveland²,

Tory A. Welsch², Eric Y. Chen², D. Bruce Chase² and Matthew F. Doty²

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. Louscher¹, G. Fumero^{1,2} and J. K. Wahlstrand²

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. Sourabh¹,
V. R. Whiteside², M. Furis¹ and I. R. Sellers²

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. Burke¹, 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*

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4:41 – 4:59 pm, Mo4.4:

“Evidence of Valley Transfer and Hot Carrier Transfer in GaAs/Al_{0.16}Ga_{0.84}As Heterojunction Solar Cells”, **H. Ahmed**^{1,2}, V. R. Whiteside¹, D. K. Ferry³ and I. R. Sellers¹

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

²Department of Physics, University at Buffalo, Buffalo NY 14260, USA

³School 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 Secchi¹, Paolo Bordone^{1,2}, Daniel Loss⁴, Stefano Bosco⁵ and Filippo Troiani¹

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

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

³Università degli Studi di Milano, I-20133 Milano, Italy

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

⁵QuTech 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 Vorreiter¹, Jonathan Huang¹, Scott D. Liles¹, Joe Hillier¹, Ruoyu Li², Bart Raes², Stefan Kubicek², Julien Jussot², Sofie Beyne², Clement Godfrin², Danny Wan², Nard Dumoulin Stuyck^{1,3}, Will Gilbert^{1,3}, Chih-Hwan Yang^{1,3}, Andrew Dzurak^{1,3}, Kristiaan De Greve² and **Alexander Hamilton**¹

¹University of New South Wales, Sydney, Australia

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² imec, Leuven, Belgium

³Diraq, 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. Gupta¹, C. Wang¹, S. K. Singh¹, K.W. Baldwin¹, R. Winkler², L. N. Pfeiffer¹ and M. Shayegan¹

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 Ju¹

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. Shen¹, R. Kaji¹ and S. Adachi¹

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 He¹, Hamed Vakili², Ather Mahmood², Christian Binek², Peter A. Dowben², Alexey A. Kovalev² and Jonathan P. Bird¹

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. Yokoi¹, R. Somphonsane², H. Ramamoorthy², N. Arabchigavkani³, J. Fransson⁴, G.-H. Kim⁵, J. P. Bird³ and N. Aoki¹

¹*Department of Materials Science, Chiba University, Inage-ku, Chiba 263-8522, Japan*

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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. Beer¹, R. Xue¹, L. Deda¹, T. Struck¹, M. Volmer¹, 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. Barik¹, Q. Benichou¹, L. Pugliese¹, H. Chakraborti¹, R. Ayache¹, K. Watanabe², T. Taniguchi², N. Kumada³, H.-S. Sim⁴ and P. Roulleau¹

¹*SPEC, CEA, CNRS, Université 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*

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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 Yadav¹, Graham Lang¹, Nicholas W. G. Smith¹, Yannick Pleimling¹, Brenden A. Magill¹, Nozomi Nishizawa², Hiro Muneakata³ and Giti A. Khodaparast¹

¹Department of Physics, Virginia Tech, Blacksburg, VA 24061, USA

²Kitazato University, 5 Chome-9-1 Shirokane, Minato City, Tokyo 108-8641, Japan

³The 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 Dhariwal¹, Michael von Spakovsky² and William T. Reynolds Jr.¹

¹Department of Materials Science and Engineering, Virginia Tech, Virginia, USA

²Department of Mechanical Engineering, Virginia Tech, Virginia, USA

P3: “Linear Dichroism and Absorption Characterization of Solution-Cast Organic Semiconductor Thin Films”, Hilbi Akbar¹, Madalina Furis¹ and Hadi Afshari¹

¹Center For Quantum Research & Technology (CQRT), University of Oklahoma, Norman OK, USA

P4: “Twisted MoSe₂ 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: “Ni²⁺ mediated enhanced microstructural, optical, and electrical properties of 0.9KNbO₃-0.1BaNi_{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 Ti₃C₂ MXene quantum dots”, Nisha Hiralal Makani, Bailey Westgate, Shyla Soto, Joshua Abbott and Bhoj Gautam

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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. Zier¹, U. Panta¹, L. Chen¹ and D. A. Strubbe¹

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. Soto¹ 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. Soto¹ and N. López^{1,3}

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³*Instituto de Óptica - CSIC, C/ Serrano 121, 28006, Madrid, España*

P13: “[Kagome lattice: a platform for topological superconductivity](#)”, M. A. Mojarro¹ and Sergio E. Ulloa¹

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. Ragazzi¹, S. Cavazzoni¹, C. Benedetti³, P. Bordone^{1,2} and M. G. A. Paris³

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. Němec¹, T. Troha¹, V. Pushkarev¹, J. Maňák¹, V. Jurka¹, V. Novák¹, T. Ostatnický² and P. Kužel¹

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-Notario¹, Stephen R. Power³, Wojciech Knap^{4,5}, Manuel Pino⁶, Takashi Taniguchi⁷, Kenji Watanabe⁷, Jesús E. Velázquez-Pérez¹, Yahya M. Meziani¹ and Pablo Alonso-González⁸

¹*Departamento 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*

⁵*Centre for Advanced Materials and Technologies CEZAMAT, Warsaw University of Technology, Warsaw 02-822, Poland*

⁶*Departamento de Física Fundamental, Universidad de Salamanca, 37008 Salamanca, Spain*

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⁷Research Center for Electronic and Optical Materials, National Institute for Materials Science, Tsukuba305-0044, Japan

⁸Department of Physics, University of Oviedo, Oviedo 33006, Spain

P17: “AC Conductivity, and Transient Dynamics in $\text{Ge}_{1-x}\text{Sn}_x$ films investigated via Terahertz Spectroscopy”, H. Loh^{1,2}, S. Woodwyk¹, C. Sauers², G. Forcherio³, G. Grzybowski⁴, B. Claflin⁵ and A. D. Bristow¹

¹Department of Physics and Astronomy, West Virginia University, Morgantown, WV 26501-6315, USA

²Department of Mechanical, Materials and Aerospace Engineering, West Virginia University, Morgantown, WV 26501-6106, USA

³Naval Surface Warfare Center, Crane, IN 47522-5001, USA

⁴KBR, 3725 Pentagon Blvd Suite 210, Beavercreek Township, OH 45431, USA

⁵Air Force Research Laboratory, Wright-Patterson Airforce Base, OH 45433, USA

P18: “Electronic Characterization of GaN/AlGaN Multichannel Heterostructures”, M. Khajeh Hassanzadeh¹, M. A. Porter², R. Khatiwada¹, Y. Zhang² and J. J. Heremans¹

¹Department of Physics, Virginia Tech, Virginia, USA

²Center 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. Thapa¹, R. Khatiwada¹, P. Sharma¹, A. Gupta², L. N. Pfeiffer², M. Shayegan² and J. J. Heremans¹

¹Department of Physics, Virginia Tech, Virginia 24061, USA

²Department 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. Khatiwada¹, T. Anderson¹, A. Thapa¹, D. Balasooriya¹, A. Gupta², L. N. Pfeiffer², M. Shayegan² and J. J. Heremans¹

¹Department of Physics, Virginia Tech, Virginia 24061, USA

²Department of Electrical Engineering, Princeton University, New Jersey 08544, USA

P22: “Negative Differential Conductance in Laterally Gated $\text{In}_{0.8}\text{Ga}_{0.2}\text{As}$ Superlattices”, Shahabaj Mundaganur¹, Aarabj Mundaganur¹, Gregory R. Aizin² and Jonathan P. Bird¹

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

²Kingsborough 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. Anderson¹, R. Khatiwada¹, S. Davari², B. M. Bailey², H. O. H. Churchill², M. Chandra³, A. Gupta⁴, L. N. Pfeiffer⁴, M. Shayegan⁴ and J. J. Heremans¹

¹Department of Physics, Virginia Tech, VA, USA

²Department of Physics and MonARK Quantum Foundry, University of Arkansas, AR, USA

³nOhm Devices, MA, USA

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

P24: “Ballistic Phonon Transport in Homoepitaxial β -Ga₂O₃ Films”, R. Mitdank¹, R. Ahrling¹, J. Boy¹, A. Popp³, Z. Galazka³ 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 Kirina¹, T. Anderson², W. Thomas², A. Gholampour², V. Soghomonian², S. K. Kodambaka¹, K. Park² and J. J. Heremans²

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. Asatryan¹, L. Vardanyan², T. Ghukasyan¹ and A. Vartanian¹

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. Asatryan¹, L. A. Vardanyan², A. H. Movsisyan¹, A. A. Avetisyan¹, A. G. Stepanyan¹ and A. L. Vartanian¹

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 Bisafar¹ and F. Nemat²

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. Vartanian¹**

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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. Kikuchi¹, J.

Ishihara¹, M. Hiyama¹, S. Yamamoto¹, Y. Ohno² 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. Armenta¹, M. Zahradnik², M. Rebarz², S Espinoza², C. Emminger³, S. Vazquez-Miranda², J. Andreasson² and S. Zollner¹

¹*Department of Physics, New Mexico State University, New Mexico, USA*

²*ELI ERIC, Dolni Březany, 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. Yoshioka¹, S. Chatterjee¹, T. Wakamura¹ and N. Kumada¹

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. Troha¹, F. Klimovič², T. Ostatnický², P. Kužel¹ and H.

Němec¹

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

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²Charles 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. Kuhn¹, K. Jürgens¹ and D. Wigger²

¹Institute of Solid State Theory, University of Münster, Germany

²Department of Physics, University of Münster, Germany

11:41 – 11:59 am, We2.4:

“Robust Negative Differential Conductance at the Band Inflection of Ion-Gated TiS₃ Nanowires”, M. D. Randle¹, A. Kumar², A. Datta², A. Lipatov³, T. Paudel⁴, U. Singisetti², A. Sinitskii⁵, P. A. Dowben⁶, and J. P. Bird²

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

³Department of Chemistry, Biology & Health Sciences, South Dakota School of Mines & Technology, Rapid City, SD 57701, USA

⁴Department of Physics, South Dakota School of Mines & Technology, Rapid City, SD 57701, USA

⁵Department of Chemistry, University of Nebraska-Lincoln, Lincoln, NE 68588, USA

⁶Department 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

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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 Dhariwal¹, Michael von Spakovsky² 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. Koyama¹, J. Ishihara¹, T. Odagawa¹, S. Yamamoto¹ 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. Kostroun¹, T. Asaba², S. Thomas³, S. Savrasov⁴, J. Thompson³, E. Bauer³, F. Ronning³ 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*

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11:06 – 11:24 am, Th2.3:

“Substrate Temperature-Dependent Disorder and Transport Properties in Bi Thin Films”, **Yulia Kirina**¹, A. Gholampour², V. Soghomonian², S. K. Kodambaka¹ and J. J Heremans²

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. Tu¹, M. Kim², D. Kim², R. Ito³, D. Pomaranski⁴, J. Shim², H. Kozaki I. V. Borzenets⁵, A. Ludwig⁶, A. D. Wieck⁶, H.-S. Sim² 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. Sarguroh³, D. Gangloff⁴, 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*

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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. Harutyunyan¹ and V. Gudmundsson²

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. Paris⁵

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, Università 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 Bhowmick², Dhanalakshmi Sellan³, Kade Johnson⁴, Kenneth Mikolaichik⁴, Xuan Zhou^{4,5}, Amlan Das⁶, Chari Ramkumar⁷, Nicholas W. G. Smith¹ and Giti A. Khodaparast¹

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*

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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. Hammack¹ and L. V. Asryan²

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. Baranowski¹, S. M. Goodnick¹ and D. Vasileska¹

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. Nielsen¹, M. Dubajic², S. Stranks², M. Hanif¹, G. J. Conibeer¹ and S. P. Bremner¹

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. Sengupta¹, Z. Pei¹, C. Lander¹, C. Wickizer¹, L. Bumm², M. Furis² and Y. Shao¹

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 Talbert¹, Kalani Ellepola¹, Tharindu D. Rajapaksha², Mason Whittington² 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. Furis¹, V. Mapara¹, H. Afshari¹, H. Akhbar¹, S. Raybould¹, A. Ueno², T. Yoshida² and L. Bumm¹

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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
