

## DAVID JAMES HILTON, PH. D

Associate Professor

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### PROFESSIONAL EXPERIENCE

October 2013 – <i>current</i>	Associate Professor of Physics (tenured) Associate Professor of Electrical Engineering (tenured) University of Alabama at Birmingham
August 2011 – September 2013	Assistant Professor of Electrical Engineering (tenure-track) University of Alabama at Birmingham
August 2007 – September 2013	Assistant Professor of Physics (tenure-track) University of Alabama at Birmingham
July 2006 – July 2007	Postdoctoral Research Associate Department of Electrical Engineering Rice University
Sept 2002 – July 2006	Postdoctoral Research Associate Center for Integrated Nanotechnologies Los Alamos National Lab

### EDUCATION

<b>Degree</b>	<b>Program</b>	<b>Date</b>	<b>University</b>
Ph.D.	Applied Physics	Aug. 2002	Cornell University
M.S.	Applied Physics	May 2001	Cornell University
M.S.	Optics	Feb. 1999	University of Rochester
B.S.	Optics	May 1997	University of Rochester

### GRADUATE AND POSTDOCTORAL ADVISORS

Prof. Chung L. Tang, Professor (emeritus), Department of Electrical Engineering, Cornell University, ct51@cornell.edu  
Dr. Antoinette (Toni) J. Taylor, Deputy Associate Director, Chemistry, Life, and Earth Sciences Directorate, Los Alamos National Lab, ttaylor@lanl.gov  
Prof. Junichiro Kono, Professor, Department of Electrical Engineering, Rice University, kono@rice.edu

## EXTRAMURAL FUNDING

Total Extramural Funding = \$4,657,911 with \$2,440,313 to UAB

1. "Ultrafast Spectroscopy of Pnictides in High Magnetic Field: Strongly Nonequilibrium Physics in the 25 Tesla Split Florida-Helix Magnet" (DE-SC0019137), Department of Energy, Basic Energy Sciences, PI: Prof. **David J. Hilton** and Prof. Ilias E. Perakis, Funds: \$635,964, Period: 1-September-2018 to 31-August-2021.
2. "Understanding valley spin coupling and Two-dimensional exciton gases in layered materials at extreme magnetic fields" (DE-SC0012635), Department of Energy, Basic Energy Sciences, PI: Prof. Denis Karaiskaj, co-PI: Prof. **David J. Hilton** and Prof. Jie Shan, Funds: \$1,285,782 (\$462,255 to UAB), Period: 1-September-2014 to 31-August-2018. (completed)
3. "Exploring Two-dimensional Electron Gases at Extreme Magnetic Fields with Optical and Terahertz 2DFT spectroscopy" (DMR-1409473), National Science Foundation, PI: Prof. Denis Karaiskaj, co-PI: Prof. **David J. Hilton**, Funds: \$450,000 (\$235,289 to UAB), Period: 1-Sept.-2014 to 31-August-2018. (completed)
4. "CAREER: THz Magnetospectroscopy of Two-dimensional Systems" (DMR-1056827), National Science Foundation, PI: Prof. **David J. Hilton**, Funds: \$600,000, Period: 1-August-2011 to 31-July-2017. (completed)
5. "MRI: Development of a Free-Space Ultrafast Spectroscopy System for Chemistry, Materials Science, and Biophysics Research And Education In The 25-T Split-Coil Helix" (DMR-1229217), National Science Foundation, PI: Dr. Steve McGill, co-PI: Prof. **David J. Hilton**, Prof. Madalina Furis, and Prof. Greg Scholes, Funds: \$1,423,300 (\$244,940 to UAB), Period: 1-Sept.-2012 to 31-August-2016. (completed)
6. "Development of a High Power, Broadly Tunable Terahertz Facility at University of Alabama at Birmingham" (EPS-1158862), National Science Foundation, PI: Prof. **David J. Hilton**, Funds: \$105,000, Period: 1-September-2012 to 30-August-2015. (completed)
7. "Time-domain THz spectroscopy of astrophysical dust/ice analogs" (NNX09AI28G), NASA, PI: Prof. Perry Gerakines and Prof. **David J. Hilton**, Funds: \$461,450, Period: 15-May-2008 to 1-November-2013. (completed)

## SCHOLARSHIP

### PUBLICATIONS (PEER-REVIEWED)

- \* B. Barman, A. G. Linn, A. L. O'Beirne, J. A. Curtis, J. Holleman, C. Garcia, J. L. Reno, S. A. McGill, V. Turkowski, D. Karaiskaj, **D. J. Hilton**, "Using Quantum Confinement to Suppress Superradiant Emission in High-mobility Two-dimensional Electron Gases," submitted for publication in *Nano Letters* (2018).
- \* Jagannath Paul, Christopher Stevens, Ryan P. Smith, Prasenjit Dey, Varun Mapara, Dimitry Semenov, Stephen A. McGill, Robert A. Kaindl, **David J. Hilton**, and Denis Karaiskaj, "Coherent Two-dimensional Fourier transform spectroscopy using a 25 Tesla resistive magnet," submitted for publication in *Review of Scientific Instruments* (2018).

1. Christopher Stevens, Jagannath Paul, Timothy Cox, Prasana Sahoo, Humberto Gutier-

- rez, Volodymyr Turkowski, Dmitry Semenov, Stephen McGill, Myron Kapetanakis, Ilias E. Perakis, **David J. Hilton**, and Denis Karaiskaj, “Biexcitons in monolayer transition metal dichalcogenides tuned by magnetic fields,” *Nature Communications* **9**, 3720 (2018). [[10.1038/s41467-018-05643-1](https://doi.org/10.1038/s41467-018-05643-1)]
2. Jeremy A. Curtis, Ashlyn D. Burch, Biplob Barman, A. Garrison Linn, Luke M. McClintock, Aidan L. O’Beirne, Matt J. Stiles, John L. Reno, Stephen A. McGill, Denis Karaiskaj, and **David J. Hilton**, “Broadband Ultrafast Terahertz Spectroscopy in the 25 Tesla Split-Florida Helix,” *Review of Scientific Instruments* **89**, 073901 (2018). [[10.1063/1.5023384](https://doi.org/10.1063/1.5023384)]
  3. Christopher Stevens, Prasenjit Dey, Jagannath Paul, Zefang Wang, Haoxiang Zhang, Aldo Romero, Jie Shan, **David J. Hilton**, and Denis Karaiskaj, “The role of electron-phonon interactions on the coherence lifetime of monolayer transition metal dichalcogenides,” *Solid State Communications* **266**, 30-33 (2017). [[10.1016/j.ssc.2017.08.017](https://doi.org/10.1016/j.ssc.2017.08.017)]
  4. Svenja Vollmar, **David J. Hilton** and Hans Christian Schneider, “Generalized Elliott-Yafet spin-relaxation time for arbitrary spin mixing,” *Physical Review B* **96**, 075203 (2017). [[10.1103/PhysRevB.96.075203](https://doi.org/10.1103/PhysRevB.96.075203)]
  5. Jagannath Paul, Christopher Stevens, Haoxiang Zhang, Prasenjit Dey, Dinesh McGinty, Stephen McGill, Ryan P. Smith, John L. Reno, Volodymyr Turkowski, Ilias Perakis, **D. J. Hilton**, and Denis Karaiskaj, “Coulomb induced coupling of Landau levels in intrinsic and modulation-doped quantum wells,” *Physical Review B* **95**, 245314 (2017). [[10.1103/PhysRevB.95.245314](https://doi.org/10.1103/PhysRevB.95.245314)]
  6. Jeremy A. Curtis, Takahisa Tokumoto, Anthony T. Hatke, Judy G. Cherian, John L. Reno, Stephen A. McGill, Denis Karaiskaj, and **David J. Hilton**, “Cyclotron decay time of a Two-dimensional electron gas from 0.4 to 100 K,” *Physical Review B* **93**, 155437 (2016). [[10.1103/PhysRevB.93.155437](https://doi.org/10.1103/PhysRevB.93.155437)]
  7. J. Paul, C. E. Stevens, C. Liu, A. H. Romero, J. Shan, **D. J. Hilton**, and D. Karaiskaj, “Strong quantum coherence between Fermi liquid Mahan excitons,” *Physical Review Letters* **116**, 127402 (2016). [[10.1103/PhysRevLett.116.127402](https://doi.org/10.1103/PhysRevLett.116.127402)]
  8. P. Dey, J. Paul, Z. Wang, C. E. Stevens, C. Liu, A. H. Romero, J. Shan, **D. J. Hilton**, and D. Karaiskaj, “Optical Coherence in Atomic-Monolayer Transition-Metal Dichalcogenides Limited by Electron-Phonon Interactions,” *Physical Review Letters* **116**, 127402 (2016). [[10.1103/PhysRevLett.116.127402](https://doi.org/10.1103/PhysRevLett.116.127402)]
  9. N. F. Brady, K. Appavoo, M. Seo, J. Nag, R. P. Prasankumar, R. F. Haglund Jr., and **D. J. Hilton**, “Heterogeneous nucleation and growth dynamics in the light-induced phase transition in vanadium dioxide,” *Journal of Physics: Condensed Matter* **28**, 125603 (2016). [[10.1088/0953-8984/28/12/125603](https://doi.org/10.1088/0953-8984/28/12/125603)]
  10. J. Paul, P. Dey, T. Tokumoto, J. Reno, **D. J. Hilton**, and D. Karaiskaj, “Exploring Two-dimensional electron gases with Two-dimensional Fourier transform spectroscopy,” *The Journal of Chemical Physics* **141**, 134505 (2016). [[10.1063/1.4896777](https://doi.org/10.1063/1.4896777)]
  11. P. Dey, J. Paul, G. Moody, C. E. Stevens, N. Glikin, Z. D. Kovalyuk, Z. R. Kudrynskyi, A. H. Romero, A. Cantarero, **D. J. Hilton**, and D. Karaiskaj, “Biexciton formation and exciton coherent coupling in layered GaSe,” *The Journal of Chemical Physics*, **142**, 212422 (2015). [[10.1063/1.4917169](https://doi.org/10.1063/1.4917169)]

12. Jeremy A. Curtis, Takahisa Tokumoto, Nicholas K. Nolan, Luke M. McClintock, Judy G. Cherian, Stephen A. McGill, and **David J. Hilton**, "Ultrafast Pump-probe Spectroscopy in Gallium Arsenide at 25 Tesla," *Optics Letters* **39**, 5772 (2014). [[10.1364/OL.39.005772](https://doi.org/10.1364/OL.39.005772)]
13. Kannatassen Appavoo, Nathaniel F. Brady, Bin Wang Minah Seo, Joyeeta Nag, Rohit P. Prasankumar, Sokrates T. Pantelides, **David J. Hilton**, and Richard F. Haglund, "Ultrafast Phase Transition via Catastrophic Phonon Collapse Driven by Plasmonic Hot-Electron Injection," *Nano Letters* **14**, 1127 (2014). [[10.1021/nl4044828](https://doi.org/10.1021/nl4044828)]
14. N. F. Brady, J. M. Montgomery, G. Tsoi, T. Gebre, S. T. Weir, Y. K. Vohra, and **D. J. Hilton**, "Equation of state and electrical resistivity of the heavy fermion superconductor CeCoIn<sub>5</sub> to 51 GPa," *European Physical Journal B* **86**, 334 (2013). [[10.1140/epjb/e2013-40563-7](https://doi.org/10.1140/epjb/e2013-40563-7)]
15. **D. J. Hilton**, "Cyclotron Resonance Spectroscopy in a High Mobility Two Dimensional Electron Gas using Characteristic Matrix Methods," *Optics Express* **22**, 29717 (2012). [[10.1364/OE.20.029717](https://doi.org/10.1364/OE.20.029717)]
16. Dmitry V. Martyshekin, Anton V. Fedorov, Anitha Arumugam, **David J. Hilton**, Vladimir V. Fedorov, and Sergey B. Mirov, "Mid-IR volumetric Bragg grating based on LiF color center crystals," *Optical Materials Express* **2**, 1209 (2012). [[10.1364/OME.2.001209](https://doi.org/10.1364/OME.2.001209)]
17. T. Arikawa, X. Wang, **D. J. Hilton**, J. Reno, W. Pan, J. Kono, "Terahertz Coherent Control of a Landau-Quantized Two-dimensional Electron Gas," *Physical Review B* **84**, 241307 (2011). [[10.1103/PhysRevB.84.241307](https://doi.org/10.1103/PhysRevB.84.241307)]
18. X. Wang, **D. J. Hilton**, J. Reno, D. M. Mittleman, and J. Kono, "Direct Measurement of Cyclotron Coherence Times of High-mobility Two-dimensional Electron Gases," *Optics Express* **18**, 12354 (2010). [[10.1364/OE.18.012354](https://doi.org/10.1364/OE.18.012354)]
19. Lei Ren, Cary L. Pint, Layla G. Booshehri, William D. Rice, Xiangfeng Wang, **David J. Hilton**, Kei Takeya, Iwao Kawayama, Masayoshi Tonouchi, Robert H. Hauge, and Junichiro Kono, "Carbon Nanotube Terahertz Polarizer," *Nano Letters* **9**, 2610 (2009). [[10.1021/nl900815s](https://doi.org/10.1021/nl900815s)]
20. **D. J. Hilton**, R. P. Prasankumar, E. J. Schelter, V. K. Thorsmølle, S. A. Trugman, A. P. Shreve, J. L. Kiplinger, D. E. Morris, and A. J. Taylor, "Ultrafast Spectroscopy of the Uranium(IV) and Thorium(IV) (Bis)ketimide Complexes (C<sub>5</sub>Me<sub>5</sub>)<sub>2</sub> An[-N=C(Ph)(CH<sub>2</sub>Ph)]<sub>2</sub> (An = Th, U)," *Journal of Physical Chemistry A* **112**, 7840 (2008). [[10.1021/jp800392b](https://doi.org/10.1021/jp800392b)]
21. **D. J. Hilton**, R. P. Prasankumar, S. Fourmaux, A. Cavalleri, D. Brassard, M. El Khakani, J. C. Kieffer, A. J. Taylor, and R. D. Averitt, "Enhanced photosusceptibility near T<sub>c</sub> for the light-induced insulator-to-metal phase transition in vanadium dioxide," *Physical Review Letters* **99**, 226401 (2007). [[10.1103/PhysRevLett.99.226401](https://doi.org/10.1103/PhysRevLett.99.226401)]
22. X. Wang, **D. J. Hilton**, L. Ren, D. M. Mittleman, J. Kono, and J. Reno, "Time-Domain Cyclotron Resonance of a High-mobility 2D Electron Gas," *Optics Letters* **32**, 1845 (2007). [[10.1364/OL.32.001845](https://doi.org/10.1364/OL.32.001845)]
23. C. A. Meserole, G. L. Fisher, **D. J. Hilton**, Q. X. Jia, D. J. Funk, and A. J. Taylor, "Fe(001) thin films for x-ray diffraction and terahertz emission studies," *Journal of Vacuum*

Science and Technology A **24**, 1509 (2006). [[10.1016/j.apsusc.2007.02.029](https://doi.org/10.1016/j.apsusc.2007.02.029)]

24. **D. J. Hilton**, R. P. Prasankumar, S. A. Trugman, A. J. Taylor, and R. D. Averitt, "On photo-induced phenomena in complex materials: probing quasiparticle dynamics using infrared and far-infrared pulses," (invited), *Journal of the Physical Society of Japan* **75**, 011006 (2006). [[10.1143/JPSJ.75.011006](https://doi.org/10.1143/JPSJ.75.011006)]
25. R. P. Prasankumar, A. Scopatz, **D. J. Hilton**, A. J. Taylor, R. D. Averitt, J. Zide, A. C. Gossard, "Carrier dynamics in self-assembled ErAs nanoislands in GaAs measured by optical pump-terahertz probe spectroscopy," *Applied Physics Letters* **86**, 201107 (2005). [[10.1063/1.1923174](https://doi.org/10.1063/1.1923174)]
26. **D. J. Hilton**, R. D. Averitt, C. A. Meserole, G. L. Fisher, D. J. Funk, J. D. Thompson, A. J. Taylor, "Terahertz emission via ultrashort pulse excitation of magnetic metal films," *Optics Letters* **28**, 1805 (2004). [[10.1364/OL.29.001805](https://doi.org/10.1364/OL.29.001805)]
27. V. K. Thorsmølle, R. D. Averitt, X. Chi, **D. J. Hilton**, D. L. Smith, A. P. Ramirez, A. J. Taylor, "Ultrafast conductivity dynamics in pentacene probed using terahertz spectroscopy," *Applied Physics Letters* **84**, 891 (2004). [[10.1063/1.1644046](https://doi.org/10.1063/1.1644046)]
28. **D. J. Hilton** and C. L. Tang. "Optical orientation and femtosecond relaxation of spin-polarized holes in GaAs," *Physical Review Letters* **89**, 146601 (2002). [[10.1103/PhysRevLett.89.146601](https://doi.org/10.1103/PhysRevLett.89.146601)]
29. F. Ganikhanov, K. C. Burr, **D. J. Hilton**, and C. L. Tang. "Femtosecond optical-pulse-induced absorption and refractive-index changes in gallium arsenide," *Physical Review B* **60**, 8890 (1999). [[10.1103/PhysRevB.60.8890](https://doi.org/10.1103/PhysRevB.60.8890)]

## PROCEEDINGS (NOT PEER-REVIEWED)

30. C. E. Stevens, P. Dey, J. Paul, Z. Wang, H. Zhang, A. H. Romero, J. Shan, **D. J. Hilton**, and D. Karauskaj "The role of electron-phonon interactions on the coherence lifetime of monolayer transition metal dichalcogenides," Proceedings of the 33rd International Conference on the Physics of Semiconductors, Beijing, China, July 31- August 5, 2016.
31. N. F. Brady, K. Appavoo, M. Seo, J. Nag, R. P. Prasankumar, R. F. Haglund, and **D. J. Hilton**, "Nondegenerate Pump-probe Spectroscopy of the Insulator-to-Metal Phase Transition in VO<sub>2</sub>," Proceedings of the XVIIIth International Conference on Ultrafast Phenomena, Lausanne, Switzerland, July 8-13, 2012. [[10.1051/epjconf/20134103006](https://doi.org/10.1051/epjconf/20134103006)]
32. J. A. Curtis, B. R. Sangala, and **D. J. Hilton**, "Measurement of Decoherence Lifetimes in a High Mobility Two-dimensional Electron Gas," Proceedings of the XVIIIth International Conference on Ultrafast Phenomena, Lausanne, Switzerland, July 8-13, 2012. [[10.1051/epjconf/20134104029](https://doi.org/10.1051/epjconf/20134104029)]
33. K. Appavoo, N. F. Brady, M. Seo, J. Nag, R. P. Prasankumar, **D. J. Hilton**, and R. F. Haglund, "Ultrafast Phase Transition in VO<sub>2</sub> Driven by Interfacial Electron Injection," Proceedings of the XVIIIth International Conference on Ultrafast Phenomena, Lausanne, Switzerland, July 8-13, 2012. [[10.1051/epjconf/20134103026](https://doi.org/10.1051/epjconf/20134103026)]
34. B. R. Sangala, P. A. Gerakines, and **D. J. Hilton**, "Terahertz Time-domain Spectroscopy of  $\alpha$ -Nitrogen Ice," International Conference on Infrared, Millimeter, and THz Waves, Houston, TX, October 2-7, 2011. [[10.1109/irmmw-THz.2011.6104817](https://doi.org/10.1109/irmmw-THz.2011.6104817)]
35. J. A. Curtis, J. D. Moore, T. Tokumoto, J. G. Cherian, X. Wang, J. Reno, A. Belyanin,

J. Kono, S. A. McGill, and **D. J. Hilton**, “The THz Magnetoconductivity Tensor in a High Mobility Two-dimensional Electron Gas,” International Conference on Infrared, Millimeter, and THz Waves, Houston, TX, October 2-7, 2011.  
[10.1109/irmmw-THz.2011.6104958]

## BOOKS AND BOOK CHAPTERS

36. **D. J. Hilton**, “Ultrafast Pump-probe Spectroscopy,” Chapter 9 in *Optical Techniques for Solid-State Materials Characterization*, edited by R. P. Prasankumar and A. J. Taylor, (CRC Press, New York, 2011), pp. 6674. (ISBN: 978-1439815373).
37. **D. J. Hilton**, T. Arikawa, and J. Kono, “Cyclotron Resonance,” in *Characterization of Materials*, edited by Elton N. Kaufmann, (Wiley-Interscience, New Jersey, 2012), pp. 2136. (ISBN: 978-0471266969).

## PRESENTATIONS (INVITED)

1. **D. J. Hilton**, “Quantum Confinement and Superradiant Emission in a Landau-quantized Electron Gas,” Southeast Ultrafast, Georgia Tech, 14-15 August 2018. (invited)
2. **D. J. Hilton**, “Terahertz Spectroscopy of Two-dimensional Materials at High Magnetic Field,” Southeast Ultrafast, Clemson University, 18-19 January 2017. (invited)
3. **D. J. Hilton**, “Many-body excitations in Two-dimensional materials studied using terahertz time-domain spectroscopy,” Southeast Ultrafast, North Carolina State University, 15 January 2016. (invited)
4. **D. J. Hilton**, “Ultrafast spectroscopy in high magnetic fields using the 25 Tesla Split Florida Helix,” SPIE: Spintronics VIII, San Diego, CA, 9 August 2015. [9551-29] (invited)
5. **D. J. Hilton**, “Ultrafast Spectroscopy in High Magnetic Field using the Split Florida Helix,” Southeast Ultrafast, Florida State University, 14 January 2015. (invited)
6. **D. J. Hilton**, “Ultrafast Dynamics of the VO<sub>2</sub> Insulator-to-Metal Transition Observed by Nondegenerate Pump-Probe Spectroscopy,” Southeast Ultrafast, 9 January, 2014. (invited)
7. **D. J. Hilton**, “Ultrafast Dynamics in Vanadium Dioxide: Separating Spatially Segregated Mixed Phase Dynamics in the Time-domain,” Southeast Section of the American Physical Society Meeting, Roanoke, VA, October 2011. (invited)
8. **D. J. Hilton**, “Time resolved conductivity dynamics in vanadium dioxide,” Southeast Ultrafast, Fayetteville, AR, 11-12 January, 2008. (invited)
9. **D. J. Hilton**, R. P. Prasankumar, R. D. Averitt, and A. J. Taylor, “Terahertz spectroscopy of strategic materials,” Ultrashort Pulse Laser Materials Interaction Workshop, Boulder, CO, 22-23 September, 2005. (invited)
10. **D. J. Hilton**, R. D. Averitt, C. A. Meserole, G. L. Fisher, D. J. Funk, J. D. Thompson, and A. J. Taylor, “Remote Terahertz Generation,” Ultrashort Pulse Laser Materials Interaction Workshop, Boulder, CO, 21-26 September, 2004. (invited)

## PRESENTATIONS (COLLOQUIUM)

11. **David J. Hilton**, "*Materials in Extreme Environments: Unlocking New Materials Physics in High Magnetic Fields*," University of Alabama, March 21, 2018.
12. **David J. Hilton**, "*Terahertz Spectroscopy of Two-dimensional Materials at High Magnetic Fields*," University of West Florida, January 19, 2018.
13. **David J. Hilton**, "*Materials in Extreme Environments: Unlocking New Materials Physics in High Magnetic Fields*," Vanderbilt University, November 3, 2017.
14. **David J. Hilton**, "*Terahertz Spectroscopy of Two-dimensional Materials at High Magnetic Fields*," Samford University, November 3, 2017.
15. **David J. Hilton**, "*Terahertz Spectroscopy of Two-dimensional Materials at High Magnetic Fields*," Troy University, October 3, 2017.
16. **David J. Hilton**, "*Terahertz Spectroscopy of Two-dimensional Materials at High Magnetic Fields*," University of Central Florida, Sept 29, 2017.
17. **David J. Hilton**, "*Terahertz Spectroscopy of Two-dimensional Materials at High Magnetic Fields*," University of Alabama, Nov 20, 2016.
18. **David J. Hilton**, "*Ultrafast Magnetospectroscopy of High mobility Two-dimensional Electron Gasses*," Auburn University, April 3, 2015.
19. **David J. Hilton**, "*Ultrafast Spectroscopy in High Magnetic Fields*," Vanderbilt University, November 19, 2014.
20. **David J. Hilton**, "*Inhomogenous Nucleation and Growth in the Insulator-to-metal Phase Transition in Vanadium Dioxide*," University of South Florida, October 17, 2014.
21. **David J. Hilton**, "*The Role of Disorder on Nucleation and Growth Dynamics Beyond the Homogenous Limit on the Photoinduced Insulator-to-Metal Phase Transition in Vanadium Dioxide*," Department of Materials Science, University of Alabama at Birmingham, February 4, 2014.
22. **David J. Hilton**, "*Coherent Control in a High-mobility Two-dimensional Electron Gas*," University of Vermont, February 27, 2013.
23. **David J. Hilton**, "*Coherent Control in a High-mobility Two-dimensional Electron Gas*," Middle Tennessee State University, February 8, 2013.
24. **David J. Hilton**, "*Terahertz Time-domain Spectroscopy in Landau-quantized High-mobility 2D Electron Gas Systems*," NHMFL, Florida State University, November 30, 2012.
25. **David J. Hilton**, "*Ultrafast THz Magnetospectroscopy of a Landau-quantized High-mobility 2DEG*," Tulane University, September 12, 2012.
26. **David J. Hilton**, "*New Frontiers in Electronic Materials*," Theodore Haddin Arts and Sciences Forum, University of Alabama at Birmingham, Birmingham, AL, August 31, 2012.
27. **David J. Hilton**, "*Ultrafast Photoinduced Phase Transition in Vanadium Dioxide*," University of Alabama at Birmingham, Department of Chemistry Colloquium, April 5, 2012.
28. **David J. Hilton**, "*Ultrafast Photoinduced Phase Transition in Vanadium Dioxide*," Uni-

versity of Alabama at Huntsville, Department of Physics Colloquium, March 27, 2012.

29. **David J. Hilton**, "*Cyclotron Resonance in High-mobility 2DEG's*," University of Alabama at Huntsville, Department of Electrical Engineering, March 8, 2011.
30. **David J. Hilton**, "*Ultrafast THz Magnetospectroscopy in High-mobility Two-dimensional Systems*," Department of Physics - Condensed Matter Seminar, Vanderbilt March 25, 2011.
31. **David J. Hilton**, "*Ultrafast Terahertz Spectroscopy*," The University of Alabama Department of Physics Colloquium, June 19, 2009.
32. **David J. Hilton**, "*Ultrafast Terahertz Spectroscopy of the Photoinduced Phase Transition in VO<sub>2</sub>*," Department of Physics/Condensed Matter Seminar, Vanderbilt University, February 22, 2008.
33. **David J. Hilton**, "*Ultrafast Spectroscopy of Complex Materials*," University of Alabama at Birmingham, Department of Physics, Sept 13, 2007.
34. **David J. Hilton**, "*Photoinduced Phase Transition in Vanadium Dioxide*," University of Alabama at Birmingham, Faculty Candidate Talk, February 1-2, 2007.
35. **D. J. Hilton**, "*Terahertz Spectroscopy of Ultrafast Demagnetization in Ferromagnetic Iron*," JILA/University of Colorado, Boulder, CO, January 16, 2006.
36. **D. J. Hilton**, "*Terahertz Spectroscopy of the Metal Insulator Transition in Vanadium Dioxide*," Sandia National Labs, Albuquerque, NM, January 5, 2006.
37. **D. J. Hilton**, "*Terahertz Emission Spectroscopy of Ultrafast Demagnetization in Ferromagnetic Iron*," Duke University, Raleigh, NC, December 20, 2005.
38. **D. J. Hilton**, "*Ultrafast Terahertz Technology for Remote Sensing*," Aerospace Corporation, March 22, 2005.
39. **David J. Hilton**, "*Terahertz Spectroscopy of Ultrafast Demagnetization in Ferromagnetic Iron*," IBM/Yorktown Heights, November 1, 2005.
40. **David J. Hilton**, "*Ultrafast Demagnetization in Ferromagnetic Iron*," Sandia National Labs, May 3, 2005.
41. **David J. Hilton**, "*Ultrafast Terahertz Technology for Remote Sensing*," Aerospace Corporation, March 22, 2005.

## PRESENTATIONS (CONTRIBUTED)

### 2017

42. Ashlyn D. Burch, J.A. Curtis, A.G. Linn, B. Barman, M.J. Stiles, J.L. Reno, S.A. McGill, D. Karaiskaj, and **D.J. Hilton** "*A Comparative Study of Cyclotron Decay in Two-dimensional Electron Gas Samples*," APS March Meeting, New Orleans, LA, March 13-17, 2017. [L27.00007]
43. B. Barman, A.L. O'Beirne, A.G. Linn, J.A. Curtis, J. Holleman, C. Garcia, T. Tokumoto, J.L. Reno, S.A. McGill, D. Karaiskaj, and **D.J. Hilton** "*THz Time-Domain Magnetospectroscopy of GaAs 2DEG in the 25 T Split-Florida Helix*," APS March Meeting, New Orleans, LA, March 13-17, 2017. [L27.00008]

### 2016

44. C. E. Stevens, P. Dey, J. Paul, Z. Wang, H. Zhang, A. H. Romero, J. Shan, **D. J. Hilton**, and D. Karaiskaj “*The role of electron-phonon interactions on the coherence lifetime of monolayer transition metal dichalcogenides*,” The 33rd International Conference on the Physics of Semiconductors, Beijing, China, July 31- August 5, 2016. [Tu-D1.3]
45. J. A. Curtis, B. Barman, T. Tokumoto, L. M. McClintock, J. L. Reno, D. Karaiskaj, S. A. McGill, and **D. J. Hilton**, “*Development of a Gas Plasma-Based THz Time-Domain Spectrometer for the 25 T Florida Split Helix Magnet System*,” Physical Phenomena in High Magnetic Fields, Tallahassee, FL, January 6-9, 2016.

#### 2015

46. Aidan L. O’Beirne, Luke M. McClintock, Jeremy A. Curtis, Richard F. Haglund, and **David J. Hilton**, “*Terahertz time-domain reflection spectroscopy of the insulator-to-metal phase transition in vanadium dioxide*,” Annual Meeting of the Southeast Section of the American Physical Society, Mobile, AL, November 19-20, 2015.
47. J. A. Curtis, T. Tokumoto, N. K. Nolan, L. M. McClintock, J. G. Cherian, S. A. McGill, and **D. J. Hilton**, “*Ultrafast Pump-probe Spectroscopy in Gallium Arsenide at 25 Tesla*,” Conference on Lasers and Electrooptics, San Jose, CA, May 13, 2015. [FW3B.3]
48. J. Paul, P. Dey, C. E. Stevens, T. Tokumoto, J. L. Reno, **D. J. Hilton**, and D. Karaiskaj, “*Correlation between heavy-hole and light-hole Mahan Excitons in a two-dimensional electron gas*,” APS March Meeting, San Antonio, TX, March 4, 2015. [L15.00004]
49. J. Paul, P. Dey, C. E. Stevens, Z. D. Kovalyuk, Z. R. Kudrynskyi, A.H. Romero, A. Cantarero, **D. J. Hilton**, J. Shan, and D. Karaiskaj, “*Optical Two Dimensional Fourier Transform Spectroscopy of Layered Metal Dichalcogenides*,” APS March Meeting, San Antonio, TX March 4, 2015. [D2.00009]

#### 2014

50. J. A. Curtis, T. Tokumoto, N. K. Nolan, L. M. McClintock, J. G. Cherian, S. A. McGill, and **D. J. Hilton** “*Time-Resolved Pump-Probe Spectroscopy of (100)-oriented GaAs in High Magnetic Field*,” Semiconductors in High Magnetic Field, Panama City Beach Florida, USA, 3-8 August 2014.
51. Nathaniel F. Brady, Kannatassen Appavoo, Rohit Prasankumar, Richard Haglund, and **David Hilton**, “*Disorder-dominated Ultrafast Dynamics in Vanadium Dioxide*,” APS March Meeting, Denver, CO March 5, 2014. [Q47.00015]
52. Nathaniel F. Brady, Kannatassen Appavoo, Rohit P. Prasankumar, Richard F. Haglund, and **David J. Hilton**, “*The Role of Disorder on Nucleation and Growth Dynamics Beyond the Homogenous Limit on the Photoinduced Insulator-to-Metal Phase Transition in Vanadium Dioxide*,” Southeast Ultrafast, Louisiana State University, Baton Rouge, LA, January 10-11, 2014.

#### 2013

53. Nicholas Nolan, Jeremy Curtis, Takahisa Tokumoto, Judy G. Cherian, Stephen A. McGill, and **David J. Hilton**, “*Ultrafast Pump-probe Spectroscopy in the Florida Split Helix Magnet*,” Annual Meeting of the Southeast Section of the American Physical Society, Bowling Green, KY, Nov. 21, 2013.
54. Jeremy A. Curtis, Takahisa Tokumoto, Nicholas Nolan, Judy G. Cherian, Stephen A.

McGill, and **David J. Hilton**, “*Time-resolved Pump Probe Spectroscopy of (100)-GaAs to  $\pm 25 T$* ,” Fundamental Optical Processes in Semiconductors, Kodiak Island, AK, August 12-16, 2013.

55. Jeremy Curtis, Andrew Steigerwald, John Reno, **David J. Hilton**, and Norman H. Tolk, “*Resolving sub-phonon wavelength superlattices using photoacoustic spectroscopy*,” APS March Meeting, Baltimore, MD, 2013, Feb 19-23, 2013. [Z23.00014]
56. **D. J. Hilton**, “*Analysis of Cyclotron Resonance Spectroscopy in a Landau-quantized 2DEG using Characteristic Matrix Methods*,” APS March Meeting, Baltimore, MD, 2013, Feb 19-23, 2013. [C22.00010]
57. Kannatassen Appavoo, Nathaniel F. Brady, Bin Wang, Minah Seo, Joyeeta Nag, Rohit P. Prasankumar, Sokrates T. Pantelides, **David J. Hilton**, and Richard F. Haglund, “*Plasmonic electron injection drives ultrafast phase transition by catastrophic phonon collapse I: experiment*,” APS March Meeting, Baltimore, MD, 2013, Feb 19-23, 2013. [M20.00002]
58. Bin Wang, Kannatassen Appavoo, Nathaniel F. Brady, Minah Seo, Joyeeta Nag, Rohit P. Prasankumar, **David J. Hilton**, Richard F. Haglund, and Sokrates T. Pantelides, “*Plasmonic electron injection drives ultrafast phase transition by catastrophic phonon collapse II: theory*,” APS March Meeting, Baltimore, MD, 2013, Feb 19-23, 2013. [M20.00003]
59. Bagvanth R. Sangala, Perry A. Gerakines, and **D. J. Hilton**, “*Terahertz Time-Domain Spectroscopy of Nitrogen Ice*,” APS March Meeting, Baltimore, MD, 2013, Feb 19-23, 2013. [Y43.00008]
60. N. F. Brady, K. Appavoo, Y. K. Vohra, R. F. Haglund, and **D. J. Hilton**, “*High Pressure Crystalline Structure and Resistance of Vanadium Dioxide to 13.5 GPa*,” APS March Meeting, Baltimore, MD, 2013, Feb 19-23, 2013. [G39.00011]

## 2012

61. L. M. McClintock, J. A. Curtis, and **D. J. Hilton**, “*Construction of a THz-Time Domain Spectrometer in Reflection Geometry*,” Annual Meeting of the Southeast Section of the American Physical Society, Tallahassee, FL, Nov 14-16, 2012. [CC.00003]
62. N. F. Brady, K. Appavoo, M. Seo, J. Nag, R. P. Prasankumar, R. F. Haglund, Jr., and **D. J. Hilton**, “*Nondegenerate Pump-probe Spectroscopy of the Insulator-to-Metal Phase Transition in VO<sub>2</sub>*,” XVIIIth International Conference on Ultrafast Phenomena, Lausanne, Switzerland, July 8-13, 2012.
63. J. A. Curtis, B. R. Sangala, and **D. J. Hilton**, “*Measurement of Decoherence Lifetimes in a High Mobility Two-dimensional Electron Gas*,” XVIIIth International Conference on Ultrafast Phenomena, Lausanne, Switzerland, July 8-13, 2012.
64. K. Appavoo, N. F. Brady, M. Seo, J. Nag, R. P. Prasankumar, **D. J. Hilton**, and R. F. Haglund, Jr., “*Ultrafast Phase Transition in VO<sub>2</sub> Driven by Interfacial Electron Injection*,” XVIIIth International Conference on Ultrafast Phenomena, Lausanne, Switzerland, July 8-13, 2012.
65. Dmitri V. Martyshev, Anton V. Fedorov, Anitha Arumugam, Vladimir V. Fedorov, **David J. Hilton**, Sergey B. Mirov, “*Characterization of photorefractive materials based on LiF color center crystals for mid-IR volumetric Bragg gratings*,” Conference on

Lasers and Electrooptics, San Jose, CA, USA, 6-11, May, 2012.

66. J. A. Curtis, J. D. Moore, T. Tokumoto, J. G. Cherian, X. Wang, J. Reno, A. Belyanin, J. Kono, S. A. McGill, and **D. J. Hilton**, "Decoherence in a Two-dimensional Electron Gas," Science and Technology Open House, Tuskegee University, Tuskegee, AL, April 13-14, 2012.
67. B. R. Sangala, P. A. Gerakines, and **D. J. Hilton**, "Terahertz Time-domain spectroscopy of  $N_2$  and  $CO_2$  ice mixtures," Science and Technology Open House, Tuskegee University, Tuskegee, AL, April 13-14, 2012.
68. N. F. Brady, K. Appavoo, M. Seo, P. Upadhaya, J. Nag, R. F. Haglund, R. P. Prasankumar, and **D. J. Hilton**, "Ultrafast Pump Probe Transmission Spectroscopy of  $VO_2$ ," APS March Meeting, Boston, MA, February 27 – March 2, 2012. [D5.00005]
69. N. F. Brady, K. Appavoo, M. Seo, J. Nag, R. P. Prasankumar, R. F. Haglund, and **D. J. Hilton**, "Ultrafast Dynamics of  $VO_2$  Grown on Different Substrates with Nondegenerate Pump-Probe Spectroscopy," Gordon Research Conference: Ultrafast Phenomena in Cooperative Systems, Galveston, TX, February 19-24, 2012.
70. Kannatassen Appavoo, Nathaniel F. Brady, Minah Seo, Joyeeta Nag, Rohit Prasankumar, **David Hilton**, and Richard F. Haglund, "Dynamics of ultrafast electron injection on phase-changing vanadium dioxide," Gordon Research Conference: Ultrafast Phenomena in Cooperative Systems, Galveston, TX, February 19-24, 2012.
71. Dmitri V. Martyshkin, Anton V. Fedorov, Anitha Arumugam, **David J. Hilton**, Vladimir V. Fedorov, and Sergey B. Mirov, "Photorefractive material for mid-IR applications based on LiF color center crystal," Advances in Optical Materials, Rancho Bernardo Inn, San Diego, California, Feb 1-3, 2012.
72. Anitha Arumugam, Anton V. Fedorov, Dmitri V. Martyshkin, Vladimir V. Fedorov, **David J. Hilton**, and Sergey B. Mirov, "Mid-IR volumetric Bragg grating based on LiF color center crystals," SPIE Photonics West, San Francisco, California, 24-26 January 2012.

## 2011

73. N. F. Brady, K. Appavoo, M. Seo, J. Nag, R. P. Prasankumar, R. F. Haglund, **D. J. Hilton**, "Substrate Effects on the Ultrafast Dynamics of the  $VO_2$  Insulator-to-Metal Transition Observed by Nondegenerate Pump-Probe Spectroscopy," Frontiers in Optics, San Jose, CA, October 17-18, 2011.
74. J. A. Curtis, J. D. Moore, T. Tokumoto, J. G. Cherian, X. Wang, J. Reno, A. Belyanin, J. Kono, S. A. McGill, and **D. J. Hilton**, "The THz Magnetoconductivity Tensor in a High Mobility Two-dimensional Electron Gas," International Conference on Infrared, Millimeter, and THz Waves, Houston, TX, October 2-7, 2011.
75. B. R. Sangala, P. A. Gerakines, and **D. J. Hilton**, "Terahertz Time-domain Spectroscopy of  $\alpha$ -Nitrogen Ice," International Conference on Infrared, Millimeter, and THz Waves, Houston, TX, October 2-7, 2011.
76. Takashi Arikawa, Xiangfeng Wang, **David J. Hilton**, John Reno, Wei Pan, and Junichiro Kono, "Terahertz Coherent Control of Many-electron Qubits in a Quantum

*Hall System*," CLEO/QELS Postdeadline Baltimore, Maryland, May 1, 2011 [PDPC5]

77. N. F. Brady, G. Tsoi, T. Gebre, Y. K. Vohra, **D. J. Hilton**, "High-pressure resistivity of  $\text{CeCoIn}_5$  at low temperatures using four-point probe technique and finite element analysis," APS March Meeting, Dallas, TX, March 21-25, 2011. [B22.00007]
78. J. A. Curtis, J. D. Moore, T. Tokumoto, J. G. Cherian, X. Wang, J. Reno, A. Belyanin, J. Kono, S. A. McGill, and **D. J. Hilton**, "Temperature Dependence of Cyclotron Decoherence Time in a High Mobility Two-dimensional Electron Gas," APS March Meeting, Dallas, TX, March 21-25, 2011. [T12.00014]
79. B. R. Sangala, P. A. Gerakines, and **D. J. Hilton**, "Terahertz Time-domain Spectroscopy of ices of  $\text{N}_2$  and Ar," APS March Meeting, Dallas, TX, March 21-25, 2011. [Y45.00008]
80. T. Arikawa, X. Wang, J. Kono, **D. J. Hilton**, J. Reno, and W. Pan, "Terahertz Coherent Control of Cyclotron Resonance in the Quantum Hall Regime," APS March Meeting, Dallas, TX, March 21-25, 2011. [X11.00012]

## 2010

81. N. F. Brady, G. Tsoi, A. T. Gebre, E. Palm, S. Tozer, T. Murphy, Y. K. Vohra, **D. J. Hilton**, "High-pressure Electrical and Structural Characterization of  $\text{CeCoIn}_5$ ," APS March Meeting, Portland, OR, March 15-19, 2010. [J38.00002]
82. Jeremy Curtis, Jon Moore, Takahisa Tokumoto, Judy Cherian, Junichiro Kono, Alexey Belyanin, Stephen McGill, and **David Hilton**, "The Terahertz Frequency Hall Conductivity of a High-mobility Two-dimensional Electron Gas," APS March Meeting, Portland, OR, March 15-19, 2010. [T25.00012]
83. J. A. Curtis, J. D. Moore, T. Tokumoto, J. G. Cherian, X. Wang, J. Reno, A. Belyanin, J. Kono, S. A. McGill, and **D. J. Hilton**, "The THz Frequency Hall Conductivity of a High-mobility Two-dimensional Electron Gas," Frontiers in Optics, Rochester, NY, October 24-28, 2010.
84. J. A. Curtis, J. D. Moore, T. Tokumoto, J. G. Cherian, X. Wang, J. Reno, A. Belyanin, J. Kono, S. A. McGill, and **D. J. Hilton**, "The THz Frequency Hall Conductivity of a High-mobility Two Dimensional Electron Gas," Southeastern Section: American Physical Society, Baton Rouge, LA, October 20-23, 2010.
85. **David J. Hilton**, "Complex Materials at UAB," Gordon Research Conference: Ultrafast Phenomena in Cooperative Systems, Galveston, TX, March 2010.

## 2009

86. Michael Krauß, **David J. Hilton**, and Hans Christian Schneider, "Excitation and doping dependence of hole-spin relaxation in bulk GaAs," APS March Meeting, Pittsburg, PA, March 16-20, 2009. [H22.00005]
87. L. Ren, X. Wang, L. Booshehri, **D. J. Hilton**, J. Kono, C. Pint, R. Hauge, D. Rana, K. Takeya, I. Kawayama, and M. Tonouchi, "Anisotropic Terahertz Response of Highly Aligned Single-Walled Carbon Nanotubes," APS March Meeting, Pittsburg, PA, March 16-20, 2009. [P24.00011]

## 2008

88. Perry Gerakines and **David J. Hilton**, "*Time-domain THz Spectroscopy of Astrophysical Dust and Ice Analogs in the Laboratory*," Far-Infrared Astronomy from Space: A Community Workshop about the Future, Pasadena, CA, May 28-30 2008.
89. **David J. Hilton**, "*Terahertz Time-domain Magnetospectroscopy of High-mobility Two-dimensional Electron Gas Systems*," Gordon Research Conference: Ultrafast Phenomena in Cooperative Systems, Il Cioccio, Italy, 2008.
90. **David J. Hilton**, "*Ultrafast Spectroscopy of Complex Materials*," Alabama EPSCoR Annual Conference, Montgomery, AL, July 22-24, 2008.

## 2007

91. E. H. Haroz, **D. J. Hilton**, W. D. Rice, J. Kono, H. K. Schmidt, R. H. Hauge, K. J. Yee, Y. S. Lim, and S. K. Doorn, "*Ultrafast Spectroscopy of Phonons in Single-walled Carbon Nanotubes*," Workshop on Nanotube Optics and Nanospectroscopy, Ottawa, Canada, June 4-7, 2007.
92. L. Ren, **D. J. Hilton**, and J. Kono, "*Terahertz Dynamic Conductivity of metallic Single-Walled Carbon Nanotubes*," Workshop on Nanotube Optics and Nanospectroscopy, Ottawa, Canada, June 4-7, 2007.
93. **D. J. Hilton**, R. P. Pransankumar, S. Fourmaux, A. Cavalleri, D. Brassard, M. A. El Khakani, J. C. Kieffer, A. J. Taylor, and R. D. Averitt, "*Softening of the Insulating Phase near  $T_c$  for the Light-Induced Insulator-to-Metal Phase Transition in Vanadium Dioxide*," Strongly Correlated Electron Systems, Houston, TX, 2007.
94. X. Wang, **D. J. Hilton**, L. Ren, D. M. Mittleman, J. Kono, and J. L. Reno, "*Coherent THz Cyclotron Oscillations in a Two-dimensional Electron Gas*," Optical Society of America: Terahertz Science and Technology, Orlando, FL, March 18-21, 2007. [WA6]

## 2006

95. **D. J. Hilton**, "*Time-resolved Conductivity Dynamics in Vanadium Dioxide*," Aerospace Corporation, Los Angeles, CA, Sept 29, 2006.
96. **D. J. Hilton**, R. D. Averitt, C. A. Meserole, S. A. Trugman, G. L. Fisher, Q. X. Jia, D. J. Funk, and A. J. Taylor, "*Ultrafast Demagnetization in Iron*," Gordon Research Conference: Ultrafast Phenomena in Cooperative Systems, Buellton, CA, 2006.
97. **David J. Hilton**, Rohit P. Prasankumar, Sylvain Fourmaux, Andrea Cavalleri, Daniel Brassard, My Ali El Khakani, Jean-Claude Keiffer, Antoinette J. Taylor, and Richard D. Averitt, "*Enhanced Photosusceptibility in the Insulator-to-Metal Phase Transition in Vanadium Dioxide*," Ultrafast Phenomena, Pacific Grove, CA, July 31, 2006. [MG6]

## 2005

98. **D. J. Hilton**, R. P. Prasankumar, S. Fourmaux, A. Cavalleri, D. Brassard, M. A. El Khakani, J. -C. Keiffer, A. J. Taylor, and R. D. Averitt, "*Time-resolved Conductivity Dynamics in Vanadium Dioxide*," CLEO/QELS, Baltimore, MD, May 22-27, 2005. [QThF5]
99. **D. J. Hilton**, "*Terahertz Spectroscopy of Ultrafast Demagnetization in Ferromagnetic*

Iron," Rice University, Houston, TX, May 5, 2006.

100. **D. J. Hilton**, J. F. O'Hara, B. S. Kang, R. D. Averitt, Q. X. Jia, and A. J. Taylor, "The Terahertz Frequency Index of Refraction of  $Ba_xSr_{1-x}TiO_3$ ," Materials Research Society Spring Meeting, San Francisco, CA, April 2006
101. **D. J. Hilton**, R. P. Prasankumar, A. Cavalleri, S. Fourmaux, D. Brassard, M. A. El Khakani, J. C. Keiffer, A. J. Taylor, and R. D. Averitt, "Terahertz Spectroscopy of the metal-insulator Transition in Vanadium Dioxide," APS March Meeting, Baltimore, MD, March 13-17 2006. [R45.00003]

## 2005

102. **David J. Hilton**, Richard D. Averitt, Joe D. Thompson, Chad A. Meserole, Greg L. Fisher, David J. Funk, and Antoinette J. Taylor, "Terahertz Emission Spectroscopy of Ultrafast Demagnetization in Iron," Institute For Complex and Adaptive Matter, Santa Fe, NM October 2005.
103. Chad A. Meserole, Greg L. Fisher, **David J. Hilton**, Richard D. Averitt, Joe D. Thompson, David J. Funk, and Antoinette J. Taylor, "Growing Fe(001) Thin Films for Novel Applications," American Vacuum Society, October 2005.
104. **David J. Hilton**, Richard D. Averitt, Joe D. Thompson, Chad A. Meserole, Greg L. Fisher, Quanxi Jia, Stuart A. Trugman, David J. Funk, and Antoinette J. Taylor, "Ultrafast Demagnetization in Ferromagnetic Iron," IQEC CLEO-PR, July 11-15, 2005.
105. Greg L. Fisher, Chad A. Meserole, **David J. Hilton**, Richard D. Averitt, Joe D. Thompson, David J. Funk, and Antoinette J. Taylor, "Structural Characterization and THz emission of Fe(001) Thin Films," MRS Spring Meeting, March 28-April 1, 2005.
106. **David J. Hilton**, Richard D. Averitt, Joe D. Thompson, Chad A. Meserole, Greg L. Fisher, David J. Funk, and Antoinette J. Taylor, "Ultrafast Demagnetization in Ferromagnetic Iron," March Meeting March 21-25, 2005.
107. R. P. Prasankumar, J. F. O'Hara, A. Scopatz, **D. J. Hilton**, A. J. Taylor, R. D. Averitt, J. M. Zide, and A. C. Gossard, "Carrier Dynamics in Self-assembled ErAs Nanoislands Measured by Optical Pump Terahertz Probe Spectroscopy," APS March Meeting March 21-25, 2005.
108. **David J. Hilton**, Richard D. Averitt, Joe D. Thompson, Chad A. Meserole, Greg L. Fisher, David J. Funk, and Antoinette J. Taylor, "Terahertz Emission Spectroscopy of Ultrafast Demagnetization in Iron," Optical Society of America: Terahertz Science and Technology March 14-16, 2005. [MA2]
109. **David J. Hilton**, Richard D. Averitt, Chad A. Meserole, Greg L. Fisher, David J. Funk, and Antoinette J. Taylor, "Terahertz Spectroscopy of Ultrafast Demagnetization in Ferromagnetic Iron," CLEO/QELS, Baltimore, MD, May 22-27, 2005. [QTuI7]
110. Rohit P. Prasankumar, Anthony Scopatz, **David J. Hilton**, Antoinette J. Taylor, Richard D. Averitt, Joshua M. Zide, Arthur C. Gossard, "Carrier Dynamics in ErAs Nanoislands Measured by Optical-Pump THz-Probe Spectroscopy," CLEO/ QELS, Baltimore, MD, May 22-27, 2005. [QWC3]

## 2004

111. **D. J. Hilton**, R. D. Averitt, C. A. Meserole, G. L. Fisher, D. J. Funk, J. D. Thompson, and A. J. Taylor, "*Ultrafast Demagnetization of Ferromagnetic Iron Films Studied by Terahertz Time-domain Spectroscopy*," Thomas Jefferson National Laboratory, Newport News, VA, October 28-30, 2004.
112. **D. J. Hilton**, R. D. Averitt, C. A. Meserole, G. L. Fisher, D. J. Funk, J. D. Thompson, and A. J. Taylor, "*Terahertz emission via ultrashort pulse excitation of magnetic metal surfaces*," Optical Society of America: Frontiers in Optics, Rochester, NY, October 10-14, 2004.
113. **D. J. Hilton**, R. D. Averitt, C. A. Meserole, G. L. Fisher, D. J. Funk, J. D. Thompson, and A. J. Taylor, "*Terahertz emission via ultra-short pulse excitation of magnetic metal films*," Nonlinear Optics, Waikoloa, Hawaii, August 2-6, 2004.
114. **D. J. Hilton**, R. D. Averitt, C. A. Meserole, G. L. Fisher, D. J. Funk, J. D. Thompson, and A. J. Taylor, "*Terahertz emission via ultrafast demagnetization of ferromagnetic iron films*," Low Energy Electrodynamics in Solids, Kloster Banz, Germany, July 18-22, 2004.
115. **D. J. Hilton**, R. D. Averitt, C. A. Meserole, G. L. Fisher, D. J. Funk, J. D. Thompson, and A. J. Taylor, "*Terahertz emission via ultrashort pulse excitation of magnetic metal surfaces*," Conference on Lasers and Electrooptics/International Quantum Electronics Conference, San Francisco, CA, May 17-21, 2004.
116. **D. J. Hilton**, R. D. Averitt, C. A. Meserole, G. L. Fisher, D. J. Funk, J. D. Thompson, and A. J. Taylor, "*Terahertz emission via ultrashort pulse excitation of magnetic metal surfaces*," March Meeting of the American Physical Society, Montreal, Quebec, Canada, March 22-26, 2004.

## 2003

117. **D. J. Hilton**, R. D. Averitt, C. A. Meserole, G. L. Fisher, D. J. Funk, and A. J. Taylor, "*Terahertz emission via ultrashort pulse excitation of metal surfaces*," Sixth Annual Directed Energy Symposium, Albuquerque, NM, October 20-24, 2003.
118. **D. J. Hilton** and C. L. Tang, "*Optical orientation of spin polarized holes in bulk GaAs*," Conference on Lasers and Electrooptics, Baltimore, MD, June 2-6, 2003. [QThF2]

## 2002

119. **D. J. Hilton** and C. L. Tang, "*Optical orientation and femtosecond spectroscopy of spin polarized holes in gallium arsenide*," Fall Meeting, Materials Research Society, Boston, MA, December 2-6, 2002.
120. **D. J. Hilton** and C. L. Tang, "*Optical orientation and femtosecond relaxation of spin-polarized holes in GaAs*," Nonlinear Optics, Waikoloa, Hawaii, August 2-6, 2002.

## RESEARCH FACILITIES AND CAPABILITIES

1. *Lab space*: 1500 ft<sup>2</sup>, chemical hood, and climate controlled
2. *Coherent Legend Elite USP*: Amplified titanium:sapphire laser system (35 fs, 3.0 mJ per pulse, 1 kHz repetition rate)
3. *Coherent Micra*: Seed laser for Coherent Legend Elite USP
4. *Coherent Mira*: Titanium:sapphire laser system ( $\geq 120$  fs, 20 nJ per pulse, 1 MHz repetition rate)
5. *Cryostat*: A closed cycle cryostat with sufficient cooling power to operate in the temperature range  $10 \text{ K} \leq T \leq 300 \text{ K}$
6. *Cryostat*: A closed cycle cryostat with sufficient cooling power to operate in the temperature range  $4 \text{ K} \leq T \leq 300 \text{ K}$
7. **Custom-constructed broadband THz amplifier**: Broadband spectroscopy in 25 Tesla.
8. **Custom-constructed high-peak field terahertz spectrometer**: THz control of materials using ultrafast sources with a peak electrical field that is at or above the typical mean field value in materials.
9. **Custom-constructed terahertz reflection spectrometer**: This is a standard ZnTe-based terahertz spectrometer configured to operate in the reflection geometry to enable the study of high loss materials that cannot be studied after transmission through the sample.
10. **Custom-constructed terahertz transmission spectrometer**: This is a standard ZnTe-based terahertz spectrometer configured to operate in the transmission geometry to enable the study of materials.

## TEACHING

### POSTDOCTORAL STUDENTS

1. Dr. Biplob Barman, *“Terahertz time-domain spectroscopy of Two-dimensional systems in transition metal dichalcogenides,”* 2015-2107. Current: Assistant Professor, University of Michigan - Flint.
2. Dr. Takahisa Tokumoto, *“Terahertz time-domain spectroscopy of Two-dimensional systems in high magnetic field,”* 2012-2016, Current: AMPACC Law Group, PLLC.

### PH. D STUDENTS

3. Mr. Tracy Hastings, (2017-current), *“TBD,”* in progress.
4. Ms. Ashlyn Burch, (2015-current), *“TBD,”* in progress.
5. Dr. Jeremy Curtis, *“Terahertz Time-domain Spectroscopy of Two-dimensional Electron Gasses at High Magnetic Fields,”* 2016. Current: NHMFL, post-doc.
6. Dr. Nate Brady, *“Ultrafast Dynamics of Nucleation and Growth of Metallic Domains in Vanadium Dioxide,”* 2014, Current: The Walker School, instructor.
7. Dr. Bagvanth Sangala, *“Terahertz time-domain spectroscopy of astronomical ices,”* 2012, Current: Palamuru University, Mahabubnagar, India, instructor.

### M.S. STUDENTS

8. Mr. Andrew (Garrison) Linn, (2015-2017), Current: Physics Ph. D Program, University of Colorado at Boulder.
9. Mr. Chris Spradlin (2011-2013).
10. Mr. Nathan Ridling (2007-2010).

### UNDERGRADUATE STUDENTS

11. Mr. Ahmed Farrukh (2018-current), Physics, UAB.
12. Mr. Andrew Pope (2018-current), Mathematics, UAB.
13. Mr. Christian Owens (2018), Chemical Physics, Rice University.
14. Ms. Topenga Fucci (2018), Mechanical Engineering, UAB.
15. Mr. Micah Armstrong (2017), Materials Science and Engineering, UAB.
16. Mr. Mark Barnes (2016-current), Mechanical Engineering, UAB.
17. Ms. Joanna Schmidt, (2016-2017), Computational Physics, UAB.
18. Mr. Erasmo Canongo-Larios, (REU, 2017), Mechanical Engineering, San Diego State University
19. **Mr. Aidan O’Beirne**, (2013-2017), Physics, UAB, **Goldwater Scholar Honorable Mention**, 2016. Current: Graduate School, Physics, Stanford.
20. Ms. Ashlen Kurrē, (2014-2016), Physics, UAB, Graduate School in Physics.
21. **Mr. Luke McClintock**, (REU, 2012-2016), UAB Physics/Chemistry, **Goldwater Scholar**,

2015, Current: Graduate School, UC-Davis.

22. Mr. Matt Stiles, (REU, 2016), Physics, Utah Valley University.
23. Mr. Henry Crosby (2016), Physics, Birmingham Southern.
24. Mr. Reza Taghavi, (REU, 2015), Physics/Biomedical Engineering, Univ. Arkansas.
25. Mr. Cody Jett (2015-2016), Computer and Information Sciences, UAB.
  - Mr. Andrew Garrison Linn (2014-2015), Physics, Birmingham Southern, Current: Ph. D student, Univ. Colorado, Physics.
  - Mr. Jackson Carr (2013-2015), Physics, UAB, Current: Front-End Engineer at BBVA Compass.
26. Ms. Jessica Graves, (REU, 2014), Physics, Middle Tennessee State University, Current: unknown.
27. Mr. Sean Young (2011- 2013), UAB physics/chemistry, Current: unknown.
28. Mr. Jon-Michael Conrad (2011- 2013), Physics, UAB, Current: post-baccalaureate in Electrical Engineering, UAB.
29. Mr. H. Keith Roberts (REU, 2008-2009), Physics, UAB, Current: US Patent Clerk.
30. Mr. David Cooper - (2009-2011), Mechanical Engineering, UAB, Current: UAB Physics Ph. D Student
31. Mr. Jon Moore, (REU, 2009), Current: Ph. D student, Mississippi State, Electrical Engineering.

#### HIGH SCHOOL STUDENTS

32. Mr. Jacob Smith (2015-*current*), Good Hope High School, Cullman, AL. Current: Physics, University of Rochester.
33. Mr. Michael McGuinness (2014-2016), Jefferson County IB School. Current: Physics, Cornell University.
34. Ms. Ellen Price (Fall 2010-Spring 2011), Current: Astrophysics PhD Program, Harvard.

#### GRADUATE STUDENTS COMMITTEE MEMBER

35. Mr. Sumner Harris, UAB Ph. D Student, Advisor: Prof. Renato Camata.
36. Dr. Amit Singh, UA Ph. D Student, Materials Science Program, Advisor: Prof. Arun Gupta.
37. Mr. Will Willoughby, UAB Ph. D Student, Advisor: Prof. Mary Ellen Zvanut.
38. Dr. Zack Lindsey, UAB Ph. D Student, Advisor: Prof. Renato Camata.
39. Mr. Eric Remington, UAB Ph. D Student, Advisor: Prof. Renato Camata.
40. Dr. Ketan Goyal, UAB Ph. D Student, Advisor: Prof. Ryoichi Kawai.
41. Dr. Xing Zhong, UA Ph.D Student, Material Science, Advisor: Prof. Patrick LeClair.
42. Dr. David Wilbert, UA Ph. D Student, Electrical Engineering, Advisor: Prof. Seongsin Kim.
43. Dr. Sarah Thomas, UAB Ph. D Student, Advisor: Prof. Yogesh Vorha.
44. Dr. Walter Uhoya, UAB Ph. D Student, Advisor: Prof. Yogesh Vorha.

45. Dr. Christina Richey, UAB Ph. D Student, Advisor: Prof. Perry Gerakines.
46. Dr. Yuri Terekhov, UAB Ph. D Student, Advisor: Prof. Sergey Mirov.

## CLASSES TAUGHT

- Physics (PH) 221 [both non-honors and honors(H)]:** Freshman/Sophomore for Science/Engineering Undergraduates, General Physics I. *Physics for Scientists and Engineers, Volume 1*, Randall Knight.
- Physics (PH) 222 [both non-honors and honors(H)]:** Freshman/Sophomore for Science/Engineering Undergraduates, General Physics II. *Physics for Scientists and Engineers, Volume 2*, Randall Knight.
- Science and Technology Honors (STH) 201: Research Methods in Physics:** Freshman in the UAB Honors College. This class exposes beginning SciTech students to a broad variety of physics research methods and is primarily taken by physics, chemistry, and engineering majors in the second semester of their freshman year. This is an experiential learning class that has students read scientific papers, perform a series of short experiments, and write summary lab reports to learn how to conduct research in an undergraduate setting.
- Physics (PH) 750 and 751:** First Year Graduate, Advanced Electricity and Magnetism I and II. *Classical Electrodynamics*, J. D. Jackson.
- Physics (PH) 752:** Second Year Graduate, Light-Matter Interactions. This course is the second half of *both* graduate Advanced Electricity and Magnetism as well as of Graduate Quantum Mechanics. The emphasis is on both the semiclassical approximation as well as on second quantization and quantum field theory. The topical focus will be on light interactions with materials in gas, liquid, and solid state and will cover the basic interactions with quantized light. Topics include quantization of light, light coherence, theory of partial coherence, statistical mechanics of light, Jaynes-Cummings model, nonlinear interactions, correlation functions, and other related topics.

## IDEA SURVEY

These are rated using a 0 (lowest) to 5 (highest) scale. Classes must have an enrollment over 5 students to use IDEA at UAB, so scores are missing for those classes/semester where this enrollment number was not met.

<b>Term</b>	<b>Class</b>	<b>Progress</b> Raw/Adj.	<b>Teacher</b> Raw/Adj.	<b>Course</b> Raw/Adj.	<b>Average</b> Raw/Adj.	<b>Summary</b> Raw/Adj.
Spr 18	PH221H	3.5 /3.5	4.6/4.6	4.4/4.4	4.5/4.5	4.0/4.0
Spr 18	STH201	4.5 /4.2	4.0/5.0	4.5/4.8	4.9/4.7	4.6/4.4
Fall 17	PH222H	3.9 /3.9	4.8/4.9	4.2/4.4	4.7/4.5	4.3/4.2
Spr 16	PH221H	4.4 /4.3	4.5/4.4	4.2/4.0	4.4/4.2	4.4/4.3
Spr 16	PH222H	4.4 /4.2	4.6/4.4	4.0/3.5	4.3/4.0	4.4/4.1
Fall 15	PH221H	4.9 /4.5	5.0/4.6	4.6/3.8	4.8/4.2	4.9/4.4
Spr 15	PH222H	4.7 /4.4	4.8/4.5	4.4/3.9	4.6/4.2	4.7/4.3
Fall 14	PH221H	5.0 /5.0	5.0/4.9	5.0/5.0	5.0/5.0	5.0/5.0
Spr 14	PH222H	4.9 /4.6	5.0/4.7	5.0/4.4	5.0/4.6	5.0/4.6
Fall 13	PH221H	4.5 /4.3	4.8/4.6	4.3/3.8	4.6/4.2	4.6/4.3
Spr 12	PH751	4.7 /4.6	4.6/4.7	4.7/4.7	4.7/4.7	4.7/4.7
Fall 11	PH750	5.0 /4.7	4.9/4.6	4.7/4.1	4.8/4.4	4.9/4.6
Spr 11	PH222	4.7 /4.3	4.9/4.6	4.6/4.0	4.8/4.3	4.8/4.3
Fall 10	PH221	4.1 /3.8	3.9/3.8	3.7/3.2	3.8/3.5	3.9/3.7
Fall 09	PH750	4.5 /4.1	4.8/4.4	4.8/4.2	4.8/4.3	4.7/4.2
Spr 09	PH751	4.2 /3.8	4.7/4.3	4.0/3.2	4.4/3.8	4.3/3.8
Fall 08	PH750	4.5 /4.2	4.9/4.6	4.7/4.2	4.8/4.4	4.7/4.3
<b>Ave.</b>		4.5 /4.3	4.8/ 4.6/	4.5/4.1	4.5/4.3	4.3/4.3

## SERVICE

### PHYSICS BRIDGE

I have initiated a new outreach program in the Department of Physics to bring new opportunities in Physics to the broader Central Alabama community. Physics Bridge provides area rising 9th grade students with an exciting summer experience in optics, lasers, and light by conducting hands on experiments working with great UAB faculty, students, and staff to understand physics. This experience is designed to help prepare students for careers in physics and to prepare them for high school. During this one week program, students are engaged in activities in mechanics, astronomy, electricity and magnetism, optics, and materials science. In its first three years, this program has included approximately 50 students, with 80% who were members of traditionally underrepresented minorities (African American) from Birmingham City schools and other Jefferson/Shelby County schools.

This program began with seed funding from the Department of Physics and is now funded by my National Science Foundation CAREER award (DMR-1056827). In its second year, faculty and graduate students from the Center for Optical Spectroscopies and Sensors (EPS-1158862) also joined, which allowed us to grow the participation rate in the program

by  $\sim 25\%$ . In the near term, we will be looking to expand the program to have thirty students and multiple one-week sessions and to recruit from a broader number of Birmingham metropolitan area schools. We will also expand the scope of this program to different age groups. To do so, I have also been working with Dr. Aaron Catledge, Associate Professor of Physics, to assist him in developing a more advanced program that will expand on this to provide a similar experience in Nanotechnology for rising 11th graders in the future.

#### OTHER PROFESSIONAL SERVICE

- ▶ **American Physical Society, Division of Laser Science** Starting in Spring 2017, I was elected to serve a multi-year commitment as a Member-at-large for the APS Division of Laser Science(<https://www.aps.org/units/dls/>). This committee of the American Physical Society “promotes laser science interests within the APS and represents such interests with other societies.” They are also charged with sponsoring and promoting the Laser Science Conference that is co-sponsored by the Optical Society of America’s Conference on Lasers and Electrooptics(CLEO) conference in May/June of every year.
- ▶ Served as panel reviewer and panel chair for proposals from NASA, DOE, and National Science Foundation.
- ▶ External ad hoc reviewer for the Foundation for Polish Science
- ▶ I was one of the organizing committee members for the terahertz sessions at OSA Sensors 2012 in Monterey, CA.
- ▶ Reviewer for manuscripts in IEEE Transactions on Nanotechnology Review, [Optics Express](#), NanoLetters, Nature Photonics, Thin Films, [Physical Review B](#), [Applied Physics Letters](#), Journal of the Optical Society of America B, and [Physical Review Letters](#).
- ▶ Since 2008, I have served as an external reviewer for user proposals submitted to the Center for Integrated Nanotechnologies at Los Alamos National Lab in the Nanophotonics Thrust.
- ▶ I served a two year term on the National High Magnetic Field Laboratory Review panel for their internal grant review panel.

#### UNIVERSITY AND DEPARTMENTAL SERVICE

- ▶ **Faculty Advisor** I serve as primary faculty advisor to approximately fifteen UAB physics majors in our Advanced (Graduate-school) and Applied Physics Undergraduate Tracks. In this role, I advise students on their physics and mathematical class work to meet their long-term career goals, which include attending graduate programs in physics and engineering as well as to find jobs after graduation with defense contractors and NASA-contractors in the Huntsville area.
- ▶ **CAS Promotion and Tenure Committee** From Fall of 2016-Spring 2019, I serve as the Dean’s Appointed Member to the College of Arts and Sciences Promotion and Tenure Committee for Math and Natural Sciences.
- ▶ **Chair of the UAB Physics Faculty Search Committee:** Fall 2015-Spring 2016. Success-

fully ran a search committee to locate and hire two new faculty members at UAB.

- ▶ **Research Capacity Building Committee Chair:** I served as the chair of an ad hoc Committee of funded researchers within the College of Art and Sciences and the School of Engineering, appointed by our Vice President for Research from 2014-2016. The main goal of this faculty committee is to streamline the administrative process for grants and contracts at UAB and to coordinate activities across science departments for large-scale grant funding opportunities.
- ▶ **Undergraduate Recruiting:** I have represented the Department of Physics at five UAB Day or Scholar Symposium events to help to recruit new students into our undergraduate Physics major.
- ▶ **Graduate Curriculum Committee:** I was a member of the faculty team that developed a new Ph. D Applied Physics Track. This involved the development of new curriculum that emphasized more flexibility to pursue classwork tailored to specific career goals.
- ▶ **Undergraduate Curriculum Committee:** I am a member of the faculty team that is currently developing an honors undergraduate version of our introductory Mechanics (PH 221) and Electricity and Magnetism (PH 222) classes that would be suitable for Physics and advanced Engineering majors.
- ▶ **Electricity and Magnetism Comprehensive Committee Member:** I have been a member of the Comprehensive Examination Committee for Electricity and Magnetism since Fall 2007. I was chair from Fall 2009 through Spring 2011 and have been a member of the committee for every semester since I came to UAB.
- ▶ **Tau Beta Pi (TBPi):** In my role on the EE faculty and as a member of this honor society myself (University of Rochester, NY-kappa chapter), I am one of four faculty advisors for the UAB student chapter of Tau Beta Pi since the 2012-2013 academic year. I have worked with the chapter president to engage the TBPi membership in outreach activities to middle schools in the Birmingham area.
- ▶ **CAS Masters Department Reviewer:** Served as the 2013 external member of the CAS Masters Department fellowship application review panel.

## PROFESSIONAL REFERENCES

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