

Vikram V. Deshpande

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Education

California Institute of Technology

Ph.D., Applied Physics 2009

- Gordon and Betty Moore graduate fellow (2002-2006)

M.S., Applied Physics 2004

Indian Institute of Technology (IIT) Bombay

B.Tech. and M. Tech., Mech. Engg. 2002

- Raj Mashruwala fellow (2001-2002)

Employment

University of Utah

Assistant Professor, Department of Physics & Astronomy 2014 – Present

Columbia University

Nanoelectronics Research Initiative post-doctoral fellow,
Department of Physics 2009 – 2012

Research Experience

University of Utah

PI: Atomically-Thin Materials Lab

Lab performs synthesis, nanofabrication and cryogenic (< 4K) transport and hybrid (electro-mechanical, electro-optical) measurements of novel quantum materials:

- Novel quantum materials (including graphene, chalcogenides, topological insulators & others)
- Heterostructuring, nanostructuring and strain engineering to design/tune properties
- Device applications in collaborations with engineers

Columbia University

Supervisors: Prof. Philip Kim, Prof. James Hone

Electrical, mechanical and optical measurements of ultra-high quality carbon nanostructures and other nano-materials

- Developed 3 direct RF electrical readout techniques for graphene NEMS
- Developed nanomechanical thermodynamic measurement of graphene in the quantum Hall regime
- Raman spectroscopy; electrostatic tuning of excitonic transitions in nanotubes

California Institute of Technology

Ph. D. thesis advisor: Prof. Marc Bockrath

Thesis title: “One Dimensional Physics of Interacting Electrons and Phonons in Carbon Nanotubes”

- Carbon nanotube single-electron transistors for realizing Wigner crystal and Mott insulator states
- Measurements of ballistic phonon propagation and heat dissipation in Joule-heated nanotube transistors using electrical breakdown thermometry and spatially-resolved Raman spectroscopy
- Demonstration of novel multi-wall nanotube linear bearing nano-switch

Honors and Distinctions

- NSF Quantum Idea Incubator Grant (one of only 19 awards across science and engineering departments in the United States in 2019-2020)
- ACS PRF Young Investigator Award
- **14** publications in *Science* and *Nature* journals and *Physical Review Letters* (including review article in *Nature*)
- **15** publications featured in popular media or highlighted by *Science*, *Nature*, *Physics Magazine*, *Physics Today*, *Popular Science*, *Tech Review*, etc. or made journal cover
- Gordon and Betty Moore Graduate Fellowship, Caltech (2002-2006)
 - Highest award for incoming graduate students at Caltech
- Institute Academic Prize, IIT Bombay (1998-2002)
 - Awarded to student with highest GPA in the department

- Among top 0.5% of over 200,000 students in the IIT entrance exam (1997)
- National Talent Search Scholarship, Government of India (1995-2002) – awarded to top 750 students among over 100,000 applicants

Journal Publications

* signifies current or former student/post-doc author

† signifies corresponding author

1. “Nanomechanical Characterization of an Antiferromagnetic Topological Insulator”, S. Liu*, S. K. Chong*, D. W. Kim, A. Vashist*, R. Kumar*, S. H. Lee, K. L. Wang, Z. Mao, F. Liu, V. V. Deshpande†, **Nano Letters** (in revision)
2. “Emergent Helical Edge States in a Hybridized Three-Dimensional Topological Insulator”, S. K. Chong*, L. Liu, K. Watanabe, T. Taniguchi, T. D. Sparks, F. Liu, and V. V. Deshpande†, **Nature Communications** 13, 6386 (2022)
3. “Gate-Tunable Anomalous Hall Effect in a 3D Topological Insulator/2D Magnet van der Waals Heterostructure”, V. Gupta, R. Jain, Y. Ren, X. S. Zhang, H. F. Alnaser, A. Vashist*, V. V. Deshpande, D. A. Muller, D. Xiao, T. D. Sparks, and D. C. Ralph, **Nano Letters** 22, 7166 (2022)
4. “Pressure-Induced Metallization with Absence of Structural Transition in Layered Ferromagnetic Compound $\text{Cr}_2\text{Ge}_2\text{Te}_6$ ”, W. Cai, L. Yan, S. K. Chong*, J. Xu, D. Zhang, V. V. Deshpande, L. Zhou and S. Deemyad, **Phys Rev B** 106 (8), 085116 (2022)
5. “van der Waals Heterostructures based on Three-Dimensional Topological Insulators”, S. K. Chong* and V. V. Deshpande†, **Current Opinion in Solid State and Materials Science** 25, 100939 (2021) (Invited Review Article)
6. “Quantum Interferences in Ultraclean Carbon Nanotubes”, N. Lotfizadeh*, M. Senger, D. R. McCulley, E. D. Minot and V. V. Deshpande†, **Physical Review Letters** 126, 216802 (2021)

Media coverage:

Physics Today, March 2022, volume 75, number 3 [Long carbon nanotubes reveal subtleties of quantum mechanics](#)

7. “Circular Electromechanical Resonators Based on Hexagonal-Boron Nitride Graphene Heterostructures”, R. Kumar*, D. W. Session*, R. Tsuchikawa*, M. Homer*, H. Paas*, K. Watanabe, T. Taniguchi and V. V. Deshpande†, **Applied Physics Letters** 117, 183103 (2020)
8. “Unique Thermoelectric Properties Induced by Intrinsic Nanostructuring in a Polycrystalline Thin-Film Two-Dimensional Metal–Organic Framework, Copper Benzenhexathiol”, R. Tsuchikawa*, N. Lotfizadeh*, N. Lahiri, S. Liu*, M. Lach*, C. Slam*, J. Louie and V. V. Deshpande†, **Phys. Stat. Sol. A** 217 (23), 2000437 (2020)
Selected as cover article
9. “Spin Wave Excitation, Detection, and Utilization in the Organic-Based Magnet, $\text{V}(\text{TCNE})_x$ (TCNE = Tetracyanoethylene)”, H. Liu, H. Malissa, R. M. Stolley, J. Singh, M. Groesbeck, H. Popli, M. Kavand, S. K. Chong*, V. V. Deshpande, J. S. Miller, C. Boehme, Z. V. Vardeny, **Advanced Materials** 32, 2002663 (2020)
10. “Landau Levels of Topologically-Protected Surface States Probed by Dual-Gated Quantum Capacitance” S. K. Chong*, R. Tsuchikawa*, J. Harmer*, T. D. Sparks and V. V. Deshpande†, **ACS Nano** 14, 1, 1158-1165 (2020)
11. “Bandgap-Dependent Electronic Compressibility of Carbon Nanotubes in the Wigner Crystal Regime”, N. Lotfizadeh*, D. R. McCulley, M. Senger, H. Fu, E. D. Minot, B. Skinner and V. V. Deshpande†, **Physical Review Letters** 123, 197701 (2019)
Selected as ‘Editor’s Suggestion’ and featured as highlight story in APS’s Physics magazine: [Squeezing an Electron Crystal](#)
12. “Tunable Coupling between Surface States of a Three-Dimensional Topological Insulator in the Quantum Hall Regime”, S. K. Chong*, K. B. Han, T. D. Sparks and V. V. Deshpande†, **Physical Review Letters** 123, 036804 (2019)

Media coverage:

- MRS Bulletin Dec 16, 2019** [Thinness of 3D topological insulators detrimental to their metallic surfaces](#)
University of Utah media release ["Limitation exposed in promising quantum computing material"](#)
PhysOrg JULY 16, 2019 ["Limitation exposed in promising quantum computing material"](#)
13. "Manifestation of Kinetic Inductance in Terahertz Plasmon Resonances in Thin-Film Cd₃As₂", A. Chanana, N. Loftizadeh*, P. Gopalan, J. Winger, H. O. Condori Quispe, V. V. Deshpande, M. Scarpulla, and B. Sensale-Rodriguez, **ACS Nano** 13 (4), pp 4091–4100 (2019)
 14. "Spin-Optoelectronic Devices Based on Hybrid Organic-Inorganic Trihalide Perovskites", J. Wang, C. Zhang, H. Liu, R. McLaughlin, Y. Zhai, S. R Vardeny, X. Liu, S. McGill, D. Semenov, H. Guo, R. Tsuchikawa*, V. V. Deshpande, D. Sun, Z. V. Vardeny, **Nature Communications** 10 (1), 129 (2019)
 15. "Topological Insulator-Based van der Waals Heterostructures for Effective Control of Massless and Massive Dirac Fermions", S. K. Chong*, K. B. Han, A. Nagaoka, R. Tsuchikawa*, R. Liu, C. Lee, Z. V. Vardeny, T. D. Sparks and V. V. Deshpande†, **Nano Letters** 18 (12), 8047–8053 (2018)
 16. "Enhancement in surface mobility and quantum transport of Bi(2-x)Sb(x)Te(3-y)Se(y) topological insulator by controlling the crystal growth conditions", K. B. Han, S. K. Chong*, A. Nagaoka, S. Petryk, M. Scarpulla, V. V. Deshpande, and T. D. Sparks, **Scientific Reports** 8:17290 (2018)
 17. "Universal interaction-driven gap in metallic carbon nanotubes", M. J. Senger, D. R. McCulley, N. Lotfizadeh*, V. V. Deshpande, E. D. Minot, **Physical Review B** 97, 035445 (2018)
Selected as 'Editor's Suggestion'
 18. "Hexaaminobenzene as a building block for a Family of 2D Coordination Polymers", N. Lahiri, N. Lotfizadeh*, R. Tsuchikawa*, V. V. Deshpande†, J. Louie, **J. Am. Chem. Soc.**, 139, 19–22 (2017)
 19. "Modulation of Mechanical Resonance by Chemical Potential Oscillation in Graphene", C. Chen*, V. V. Deshpande*, M. Koshino, S. Lee, A. Gondarenko, A.H. MacDonald, P. Kim, J. Hone, **Nature Physics** 12, 240–244 (2016)
 (* signifies equal contribution)
 20. "Tunable Electronic Correlation Effects in Nanotube-Light Interactions", Y. Miyauchi, Z. Zhang, M. Takekoshi, Y. Tomio, H. Suzuura, V. Perebeinos, V. V. Deshpande, C. Lu, S. Berciaud, P. Kim, J. Hone, and T. F. Heinz, **Phys. Rev. B** 92, 205407 (2015)
 21. "Graphene Mechanical Oscillators with Tunable Frequency", C. Chen, S. Lee, V. V. Deshpande, G.-H. Lee, M. Lekas, K. Shepard, J. Hone, **Nature Nanotechnology** 8, 923 (2013)
News and Views in:
Nature Nanotechnology "Tuning in to a graphene oscillator", 8, 897–898 (2013)
Media coverage:
Engadget "World's smallest FM transmitter built with graphene"
Gizmodo "What Is This? A Radio for Ants?"
Also Wired, ExtremeTech, SlashDot
 22. "Electrically Integrated SU-8 Clamped Graphene Drum Resonators for Strain Engineering", S. Lee, C. Chen, V. V. Deshpande, G. Lee, I. Lee, M. Lekas, A. Gondarenko, Y. Yu, K. Shepard, P. Kim, J. Hone, **Applied Physics Letters** 102, 153101 (2013)
Selected as Cover Article
 23. "All-Optical Structure Assignment of Individual Single-Walled Carbon Nanotubes from Rayleigh and Raman Scattering Measurements", S. Berciaud, V. V. Deshpande, R. Caldwell, Y. Miyauchi, C. Voisin, P. Kim, J. Hone, and T. F. Heinz, **Phys. Stat. Sol.(b)** 249, 2436 (2012)
Selected as Cover Article

24. "Memristive Behavior Observed in a Defected Single-Walled Carbon Nanotube", A. W. Bushmaker, C.-C. Chang, V. V. Deshpande, M. R. Amer, M. Bockrath, and S. B. Cronin, **IEEE Transactions on Nanotechnology** 10 (3), 582 (2011)
25. "Radio Frequency Electrical Transduction of Graphene Mechanical Resonators", Y. Xu*, C. Chen*, V. V. Deshpande*, F. A. DiRenno, A. Gondarenko, D. B. Heinz, S. Liu, P. Kim, J. Hone, **Applied Physics Letters** 97, 243111 (2010)
(* signifies equal contribution)
Media coverage:
Popular Science "In The Tiniest Receiver Ever, Graphene Can Directly Detect Radio Signals"
Technology Review "Engineers Build Radio Receiver Out Of Graphene"
26. "Electron Liquids and Solids in One Dimension", V. V. Deshpande, M. Bockrath, L. I. Glazman, A. Yacoby, **Nature** 464, 209 (2010)
Review Article in Nature Insight "Exotic Matter"
27. "Coupling Strongly, Discretely", J. Hone and V. V. Deshpande, **Science** 325, 1084 (2009)
28. "Large Modulations in the Intensity of Raman-Scattered Light from Pristine Carbon Nanotubes", A. W. Bushmaker, V. V. Deshpande, S. Hsieh, M. Bockrath, S. B. Cronin, **Physical Review Letters** 103, 067401 (2009)
29. "Gate Voltage Controllable Non-Equilibrium and Non-Ohmic Behavior in Suspended Carbon Nanotubes", A. W. Bushmaker, V. V. Deshpande, S. Hsieh, M. Bockrath, S. B. Cronin, **Nano Letters** 9, 2862 (2009)
30. "Spatially Resolved Temperature Measurements of Electrically Heated Carbon Nanotubes", V. V. Deshpande, S. Hsieh, A. W. Bushmaker, M. Bockrath, S. B. Cronin, **Physical Review Letters** 102, 105501 (2009)
Selected as 'Editor's Suggestion'
31. "Direct Observation of Born-Oppenheimer Approximation Breakdown in Metallic Carbon Nanotubes", A. W. Bushmaker, V. V. Deshpande, S. Hsieh, M. Bockrath, S. B. Cronin, **Nano Letters** 9, 607 (2009)
32. "Mott Insulating State in Ultra-Clean Carbon Nanotubes", V. V. Deshpande, B. Chandra, R. Caldwell, D. S. Novikov, J. Hone and M. Bockrath, **Science** 323, 106 (2009)
News and Views in:
Nature Nanotechnology "Gap opens in metallic nanotubes", 4, 147 (2009)
33. "The One-Dimensional Wigner Crystal in Carbon Nanotubes", V. V. Deshpande and M. Bockrath, **Nature Physics** 4, 314 (2008)
News and Views in:
Nature Physics "Old nanotubes, new tricks", 4, 266 (2008)
Nature Nanotechnology "A most unusual crystal", 3, 186 (2008)
34. "Direct Observation of Mode Selective Electron-Phonon Coupling in Suspended Carbon Nanotubes", A. W. Bushmaker, V. V. Deshpande, M. Bockrath, S. B. Cronin, **Nano Letters** 7, 3618 (2007)
35. "Carbon Nanotube Linear Bearing Nanoswitches", V. V. Deshpande*, H.-Y. Chiu*, H. W. Ch. Postma, C. Miko, L. Forro, M. Bockrath, **Nano Letters** 6, 1092 (2006)
(* signifies equal contribution)
Media coverage:
Science "Tubular switches", 312, 1107 (2006)
Nature "Bridging the gap", 442, 4 (2006)
36. "Ballistic Phonon Thermal Transport in Multi-Walled Carbon Nanotubes", H.-Y. Chiu*, V. V. Deshpande*, H. W. Ch. Postma, C. N. Lau, C. Miko, L. Forro, M. Bockrath, **Physical Review Letters** 95, 226101 (2005)
(* signifies equal contribution)
Media coverage: AIP Physics News Update "Digital heat flow", 752 #2, 2005

Manuscripts in submission or in preparation

1. “Strain-Induced Magnetism in Magic Angle Twisted Bilayer Graphene”, C. Liu*, D. Yadav*, J. Bradford*, K. Watanabe, T. Taniguchi, and V. V. Deshpande† (manuscript in preparation)
2. “Tuning the Band Structure of Twisted Bilayer Graphene Using Isotropic Strain”, C. Liu*, R. Tsuchikawa*, J. Berg*, L. Doherty, T. Fang, K. Watanabe, T. Taniguchi, Z. Wang, F. Liu, and V. V. Deshpande†, (to be submitted)
3. “Vernier Spectrum and Valley Polarization Control in Carbon Nanotube Quantum Dots”, N. Lotfizadeh*, J. Berg*, W. De Gottardi, M. J. Senger, E. D. Minot, V. V. Deshpande†, (to be submitted)
4. “Moiré Superlattice Effects in the Landau Level Crossings of ABA Trilayer Graphene Heterostructures”, C. Liu*, R. Tsuchikawa*, J. Berg*, K. Watanabe, T. Taniguchi, and V. V. Deshpande†, (submitted)

Invited Talks and Seminars

1. Penn State 2D Crystal Consortium Seminar, State College PA (October 2022)
2. Condensed Matter Seminar, Washington University at St. Louis, St. Louis, MO (September 2022)
3. Penn State 2D Crystal Consortium Annual Meeting (virtual mini-talk) (August 2022)
4. Physics Colloquium, Aalto University, Finland (May 2022)
5. Physics Colloquium, George Mason University (March 2021)
6. Physics Colloquium, Idaho State University (February 2021)
7. Vaibhav Summit, Global Summit of Overseas and Resident Indian Scientists and Academicians, Government of India (October 2020)
8. Quantum Leap Grantees Meeting Fall 2020, University of Oregon (September 2020)
9. International School and Workshop on Electronic Crystals ECRYS-2020, Corsica, France (August 2020) – declined due to pandemic
10. Condensed Matter Seminars at Ohio State University (September 2019) and Duke University (October 2019) by Deshpande group graduate student Su Kong Chong
11. Physics Colloquium, Oregon State University, Corvallis OR (April 2019)
12. Invited Session Chair, APS March Meeting 2019, Boston MA (March 2019)
13. Physics Colloquium, Utah State University, Logan UT (January 2019)
14. Physics Colloquium, Weber State University, Ogden UT (October 2017)
15. Condensed Matter Seminar, Georgia Tech, Atlanta GA (October 2017)
16. EP2DS 2017, State College PA (July 2017)
17. Physics Colloquium, Emory University (April 2017)
18. Invited session chair, APS March Meeting 2017, New Orleans, LA (March 2017)
19. Electronic Materials and Applications (EMA) 2017, Orlando FL (January 2017)
20. Materials Science & Technology 2016, Salt Lake City, UT (October 2016)
21. Invited session chair, APS March Meeting 2016, Baltimore, MD (March 2016)
22. Physics Colloquium, Idaho State University (September 2015)
23. Materials Science Graduate Seminar, University of Utah (Feb 2015)
24. International Workshop ‘Building blocks for carbon-based electronics’, University of Regensburg, Germany (April 2013)
25. Materials Science Seminar, Caltech, Department of Applied Physics and Materials Science (May 2012)
26. Applied Physics Seminar, Harvard University, School of Engineering and Applied Sciences (March 2012)
27. Physics Colloquium, Boston College, Department of Physics (Feb 2012)
28. Physics Colloquium, University of Utah, Department of Physics and Astronomy (February 2012)
29. Physics Colloquium, Dartmouth College, Department of Physics and Astronomy (February 2012)

30. Materials Science Seminar, University of California Santa Barbara, Materials Department (February 2012)
31. NT11 Symposium on Graphene Technology, Cambridge, England (July 2011)
32. International Winterschool on Electronic Properties of Novel Materials, Kirchberg, Austria (March 2011)
33. International Workshop on Quantum Physics of Low-Dimensional Systems and Materials, Stellenbosch, South Africa (January 2011)
34. 25th Intl Conference on Low Temperature Physics, Amsterdam, (August 2008)
35. Indian Institute of Science, Bangalore, India (June 2008)
36. Tata Institute of Fundamental Research, Mumbai, India (June 2008)
37. Delft University of Technology, Kavli Institute of Nanoscience (June 2008)
38. University of Colorado, Department of Physics (May 2008)
39. Yale University, Department of Applied Physics (April 2008)
40. Columbia University, Department of Physics (April 2008)
41. Princeton University, Department of Physics (April 2008)
42. American Physical Society March Meeting 2008, New Orleans, LA (March 2008)
43. Caltech Condensed Matter Seminar (November 2007)

Contributed Talks and Posters

1. Two contributed talks by group members Jamie Berg and Dinesh Yadav at the 2023 American Physical Society March Meeting, Las Vegas, NV (March 2023)
2. Contributed talk and poster presentation by group member Amit Vashist at the 2022 MRS Fall Meeting, Boston (November 2022)
3. 2022 Correlated Electron Systems Gordon Research Conference, South Hadley, MA (June 2022)
4. NT22: 22nd International Conference on the Science and Application of Nanotubes and Low-Dimensional Materials, Sungkyunkwan University, Suwon, Korea (June 2022)
5. Three contributed talks by group members Chuankun Liu, Shuwan Liu and Jamie Berg in-person at the 2022 American Physical Society March Meeting, Chicago IL (March 2022)
6. American Physical Society March Meeting 2021 (virtual): contributed talks by group members Rohit Kumar and Chuankun Liu
7. American Physical Society March Meeting, Denver, CO (2020): Contributed talks by group members/alumni Neda Lotfizadeh, Su Kong Chong, Rohit Kumar, Chuankun Liu, Shuwan Liu (Canceled due to the pandemic)
8. American Physical Society March Meeting, Boston, MA (2019): Contributed talks by group members Neda Lotfizadeh, Su Kong Chong, Ryuichi Tsuchikawa
9. 55th Fullerenes-Nanotube-Graphene General Symposium in Sendai, Japan (October 2018), delivered by Dr. Ryuichi Tsuchikawa.
10. American Physical Society March Meeting, Los Angeles, CA (2018): Contributed talks by group members Neda Lotfizadeh, Su Kong Chong, Ryuichi Tsuchikawa
11. American Physical Society March Meeting, New Orleans, LA (2017): Contributed talks by group members Neda Lotfizadeh, Su Kong Chong, Rachael Morris, Ryuichi Tsuchikawa
12. American Physical Society March Meeting, Pittsburgh, PA (2009)
13. Gordon Research Conf. on Quantum Information Science, Tuscany, Italy (2007)
14. American Physical Society March Meeting, Denver, CO (2007)
15. American Vacuum Society Symposium, Boston, MA (2005)
16. Niels Bohr Institute "Transport in mesoscopic and single-molecule systems" Symposium, Copenhagen, Denmark (2005)
17. American Physical Society March Meeting 2005, Los Angeles, CA (2005)

Patents, Technology Transfer and Industry Collaborations

- Ultra-Compact Inductor made of 3D Dirac Semimetal, US Patent App. 16/817,077

- Collaboration with graphene-based startup ‘Solan’, University of Utah
- “Nanomechanical switching device”, United States Patent 7382648
- Post-doctoral research funded by Semiconductor Research Corporation (SRC)

Classes Taught

University of Utah:

- Fall 2014, 2015, 2016, 2022 – PHYS 4410 Classical Physics I
- Spring 2015 – PHYS 5020 Theoretical E&M and Stat Mech
- Spring 2016, 2017, 2022 – PHYS 4420 Classical Physics II
- Spring 2018, 2019, 2020, 2021, Fall 2021 – PHYS 3760 Thermodynamics & Statistical Mechanics
- Fall 2018, 2019 – PHYS 5510 Solid State Physics I
- Spring 2023 – PHYS 3010 (Physics IV) Intermediate Mechanical with Special Relativity

Prior to 2014:

- Lecturer at Columbia University’s Science Honors Program (2010-2012)
 - Deliver two 3-hour lectures per semester on nanotechnology to high-school AP students
- Occasional lecturer for graduate courses at Columbia University
- Teaching assistant for:
 - Solid State Physics (graduate course, Caltech), 2004 and 2006
 - Micro/Nanofabrication Lab (graduate lab, Caltech), 2006
 - Continuum Mechanics (undergraduate course, IIT Bombay), 2001
 - Thermodynamics (undergraduate course, IIT Bombay), 2001

Students/Postdocs Supervised

Thesis advisor for graduate students (PhD granted):

Su Kong Chong (PhD 2020, present position: UCLA postdoc)

Neda Lotfizadeh (PhD 2021, present position: NYU postdoc)

Rohit Kumar (PhD 2021, present position: Intel (Hillsboro, OR))

Shuwan Liu (PhD 2022, present position: Applied Materials (Santa Clara, CA))

Chuankun Liu (PhD 2022, present position: Texas Instruments (Lehi, UT))

Thesis advisor for graduate students (current):

Jamie Berg, Dinesh Yadav

Postdocs:

Amit Vashist (2021-2023) (present position: DST INSPIRE Junior Faculty Fellow, Institute of Nano Science and Technology, Mohali, India)

Ryuichi Tsuchikawa (2016-2019) (present position: Valencia College faculty)

Undergraduate students:

Current: Jasper Bradford, Mario Homer, Tinasy Wang

Past: Jamie Berg (UofU PhD), Deric Session (now at University of Maryland grad school), Cedric Wilson (now at MIT graduate school), Greg Spencer (Varex imaging), Ben Riseman (UROP Summer/Fall 2015), Justina Bonaventura (REU Summer 2015), Glen Hamblin (UROP Spring, REU Summer 2015), Garrett Stevens (UROP Fall/Spring 2014-15), Alex Bingham (UROP Summer 2014), Kenzie Lach (REU 2017), Abigail Ambrose (REU 2018), Celine Slam (SPUR 2018), Conrad Morris (awarded ‘Outstanding Undergrad for Condensed matter, biophysics, or Physics Education Research, 2022’ for research in group)

Prior to 2014: Mentored 2 graduate students (Changyao Chen and Mitsuhide Takekoshi) and 3 undergrads (Scott Hsieh, Saba Hamidi and David Heinz)

Past, Current and Pending Support

Present support:

1. PI: “QII - TAQS: Quantum Devices with Majorana Fermions in High-Quality 3D Topological Insulator Heterostructures”, NSF OMA, \$1,635,591. From 09/01/2019 to 08/31/2023. (Grantee approved no-cost extension due to COVID impacts applied).

2. PI: “One-Dimensional Correlated and Topological Electronic States in Ultra-Clean Carbon Nanotubes”, NSR DMR, \$296,128 (with an additional ~\$200,000 awarded to co-PI at Oregon State University). From 07/01/2020 to 06/30/2024. (Grantee approved no-cost extension due to COVID impacts applied).
3. PI: “Acquisition of High-Field Superconducting Magnet for Millikelvin Dilution Fridge”, University of Utah Research Instrumentation Fund, \$131,190.80. From 06/01/2021 to 05/31/2023.
4. PI: “Quantum Transport in Magnetic Topological Insulator and Semimetal”, National High Magnetic Field Laboratory Proposal for usage of 45T magnet (Granted for the period 2021-2024).

Past support:

1. PI: “Characterization of Organic Topological Insulators”, ACS PRF Young Investigator Award, \$110,000. From 07/01/2017 to 06/30/2019.
2. PI: “2D Metal-Organic Frameworks as High-Efficiency Organic Thermoelectrics”, Utah Science Technology and Research Initiative (USTAR) STIG, \$75,000. From 07/01/2018 to 06/30/2019
3. Co-PI: University of Utah Seed Grant toward LIGO Scientific Collaboration Application, \$24,000. From 09/01/2019 to 08/31/2020
4. PI: “Search for Interaction Effects in Dual-Gated Topological Insulators in the Quantum Hall Regime”, National High Magnetic Field Laboratory Proposal for usage of 45T magnet (Granted for the period 2017-2020).
5. PI: “Layered Topological Materials in the 2D Limit”, NSF MRSEC SEED Grant, University of Utah. \$39,400. From 1/1/2015 to 02/29/2016.
6. PI: Albaugh equipment grant, College of Science, University of Utah. \$10,500.
7. Senior personnel: Seed grant for writing the proposal “Dirac Materials for Terahertz Optoelectronics”, NSF MRSEC, University of Utah. \$8,000. From 4/1/2016 to 12/31/2016.

Pending support:

1. PI: “QuSeC-TAQS Preliminary Proposal: Casimir Quantum Force Sensing using Topological Materials”, NSF OMA, \$2,000,000. From 09/01/2023 to 08/31/2027.
2. Co-PI: “Equipment: MRI Track 1: Acquisition of an integrated physical property measurement system for the electrical, optical, and magnetic characterization of materials”, NSF DMR, \$900,000.
3. PI: “DMREF: Tuning Flat Band Materials Using Biaxial Strain”, NSF DMR, \$2,000,000. From 10/01/2023 to 09/31/2027.

Service to Department/University, University of Utah

- Member, College Council, College of Science 2021-23
- Chair, Admissions Committee 2015-16, 2016-17, 2017-18
- Chair, Condensed Matter Seminar Committee 2014-15, 2016-17, 2018-19
- Chair, Colloquium Committee 2019-20
- Member, Admissions Committee 2014-15, 2018-19, 2019-20, 2021-22, 2022-23
- Member CME Faculty Search Committee 2018-19, 2020-21
- Member CMT-HET Faculty Search Committee 2018-19, 2021-22
- Member, Condensed Matter Seminar Committee 2017-18
- Member, Safety Committee 2020-21, 2021-22.
- Member, REU committee 2014-15, 2015-16, 2016-17, 2017-18, 2018-19
- Member, Futures Committee 2015-16, 2016-17, 2022-23
- Member, UG Program Development/Reform Committee 2015-16, 2021-22
- Member, Nanofab Executive Committee, 2016-17, 2018-19
- Serving on thesis committee of:
 - Physics & Astronomy students
 - Paul Bailey, Sam Feldman, Anukriti Ghimire, Dinesh Yadav.
 - Other departments

Cedric Shaskey (MechE), Wei Jia (ECE), Ruiyang Chen (ECE), Lacie Townsend (Chemistry), Jichao Fan (ECE)

- Previously served on the thesis committee of:

Physics & Astronomy students

Xin Pan, Ren-Bo Wang, Megha Agarwal, Hassan Allami, Devon Fischer, Ricardo Gonzales, Tomal Hossain, Timothy Hutchinson, Wen Jin, Run Li, Janvida Rou, Nabraj Sapkota, Ting Zhang, Hui Zhou

Other departments

Xueling Cheng (ECE), Prashanth Gopalan (ECE), Samali Weliwatte (Chemistry), Arkka Bhattacharya (ECE), Hugo Condori (ECE), Mehdi Hasan (ECE), Xinbo Wang (ECE), Nabajit Lahiri (Chemistry), Athena Shahrabi-Farahani (MSE), Sourangshu Banerji (ECE), Ashish Chanana (ECE), Janina Letz (Math)

Professional Service

- Reverse site visit reviewer for NSF PIRE (MRSEC equivalent) center at the University of Pittsburgh.
- Panel and ad-hoc reviewer for several NSF programs.
- Proposal reviewer for Department of Energy Office Basic Energy Sciences.
- Session chair of various graphene and topological materials sessions at APS March Meetings 2016-2019, Nanotube meetings: NT20, NT21
- Frequent reviewer for Nature Materials, Nature Communications, Nano Letters, ACS Nano, Physical Review, Appl Phys Lett, J Phy Cond Mat
- Reviewer for European Research Council (ERC) consolidator grant proposals.
- Kavli Nanoscience Colloquium host and committee member, Caltech