

# Enrico Rossi

## Curriculum Vitae

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### EDUCATION

**Ph.D. in Physics**, 2005,  
University of Texas at Austin  
Advisor: Professor Allan H. MacDonald.

**Joint B.S. & M.S. in Engineering Physics**, 1998.  
Turin Polytechnic, Turin, Italy  
Italian Laurea: 110/110 *Summa Cum Laude*

### PROFESSIONAL APPOINTMENTS

**Professor.** August 2022-Present  
Physics Department  
William & Mary

**Associate Professor.** August 2016-July 2022  
Physics Department  
William & Mary

**Visiting Scientist.** August 2016-July 2017  
Microsoft Station Q, Santa Barbara, CA

**Assistant Professor.** August 2010-August 2016  
Physics Department  
William & Mary

**Postdoctoral Research Associate.** September 2007-August 2010.  
Condensed Matter Theory Center, Physics Department  
University of Maryland

**Postdoctoral Research Associate.** 2005-2007.  
Physics Department  
University of Illinois at Chicago

### ADDITIONAL PROFESSIONAL EXPERIENCE

- Invited Participant, Program on “Quantum Matter with and without Quasiparticles”, Kavli Institute for Theoretical Physics (KITP), UCSB (10/2023).
- Invited Participant, Program on “Exotic Phases, Gauge Field Theories and Dynamics in Systems with Constraints”, Aspen Center for Physics (June-July 2023).
- Invited Participant, Program on “A Quantum Universe in a Crystal: Symmetry and Topology across the Correlation Spectrum”, Kavli Institute for Theoretical Physics (KITP), UCSB (04/2023-05/2023).
- Invited Participant, Program on “Programmable Quantum Matter: Many- Body Physics in the Era of Quantum Advantage”, Aspen Center for Physics (July 2022)

- Invited Participant, Program on “Spin and heat transport in quantum and topological materials”, Kavli Institute for Theoretical Physics (KITP), UCSB (December 2019).
- Invited Participant, Program on “Topological Quantum Matter”, Nordic Institute for Theoretical Physics (NORDITA), Stockholm, Sweden (August 2019).
- Invited Participant, Program on “Moiré Materials: Strong Correlations in Synthetic Superlattices”, Aspen Center for Physics (June-July 2019).
- Invited Participant, Program on “From Physics to Applications of Quantum Computers”, Aspen Center for Physics (July 2018)
- Invited Participant, Program on “Physics of Interfaces and Layered Structures”, Nordic Institute for Theoretical Physics (NORDITA) program, Stockholm, Sweden (August 2015).
- Invited Participant, Program on “Graphene Program”, Kavli Institute for Theoretical Physics (KITP) UCSB, Spring 2012.

## AWARDS AND HONORS

- Joseph Plumeri Award for Faculty Excellence (\$10,000), (2017).
- NSF-CAREER Award (\$475,000), (2015).
- ACS-PRF Doctoral New Investigator Award. (\$100,000), (2013).
- Scholarship Award, First International School and Conference on Nanoscale Molecular Mechanics, Maui, HI (2002).

## FELLOWSHIPS AND GRANTS

- **Novel Topological Josephson Junctions Architectures for Fault-Tolerant Qubits and Advanced Sensing.**  
DOE Quantum Information Sciences (BES). (September 2021-September 2024). PI (WM lead institution). Co-PIs: Javad Shabani (NYU) and Wei Pan (Sandia). \$1,740,000 (WM part: \$630,000).
- **Search for Novel Collective Modes in Topological Quantum Material Josephson Junctions**  
DOE-Sandia National Laboratories, January 2021-September 2022. Single PI. \$40,000.
- **Josephson Effect in Topological Quantum Materials.**  
DOE-Sandia National Laboratories, December 2020-September 2021. Single PI. \$25,000.
- **Quantum Metric Effects in Correlated States of 2D Heterostructures.**  
XSEDE Startup Allocation, June 2021-June 2022. Single PI. 1,600 Node Hours.
- Virginia Space Grant Consortium (Graduate Fellowship: Joseph Cuzzo). 2020-2021. \$12,000.
- **Superconductor-Quantum Hall systems.**  
Army Research Office (ARO), July 2018-December 2022. Single PI. \$384,000.
- **Graphene-topological insulators hybrid devices.**  
United States-Israel Binational Science Foundation (BSF), July 2017-July 2022. Enrico Rossi PI for US part, Hadar Steinberg (Hebrew University of Jerusalem, Israel) PI for Israel part. \$220,000 (WM part: \$110,000)
- **Practical implementations of parafermions and braiding of non-Abelian anyons.**  
Office of Naval Research (ONR), September 2016-September 2019. Single PI. \$370,869.
- **Topological Heterostructures**  
Army Research Office (ARO), July 2016-July 2017. Single PI. \$77,761.

- **Two-dimensional Van Der Waals systems with tunable spin-orbit coupling.**  
National Science Foundation (NSF) CAREER Award, July 2015-July 2021. Single PI. \$475,000.
- **Electronic properties of graphene on substrates with strong spin-orbit coupling.**  
Office of Naval Research (ONR), January 2013-December 2015. Single PI. \$365,748,
- **Designer graphene nanostructures for heterogeneous catalysis.**  
American Chemical Society (ACS), Petroleum Research Fund (PRF), Doctoral New Investigator (DNI) Award, September 2013-August 2016. Single PI. \$100,000.
- **Computational tools for controlling thin films properties for optoelectronics and nanotechnology applications.**  
Jeffress Trust Award in Interdisciplinary Research, June 2013-June 2015. PI. Irina Novikova co-PI. \$100,000.
- **Effects of disorder in graphene and bilayer graphene.**  
Jeffress Memorial Trust, July 2011-July 2014. Single PI. \$35,000
- Virginia Space Grant Consortium (Graduate Fellowship: Christopher Triola), 2012-2013. \$10,000.
- **Topological-insulators heterostructures.**  
William & Mary Summer Research Grant, June 2013-August 2013. Single PI. \$4,000
- **Electronic collective behavior in graphene based systems.**  
William & Mary Summer Research Grant, June 2012-August 2012. Single PI. \$4,000

## PUBLICATIONS

### Citations indices

Number of citations (Google Scholar)	~ 7000
h-index (Google Scholar)	34
Number of publications	67+6 Preprints

### Refereed Publications

1. Sayed Ali Akbar Ghorashi, Jennifer Cano, Enrico Rossi, Taylor L. Hughes  
*Higher-Order Nodal Hinge States in Doped Superconducting Topological Insulator*  
[Physical Review B \*\*108\*\*, 094504 \(2023\)](#)
2. Bassel Heiba Elfeky, Joseph J. Cuzzo, Neda Lotfizadeh, William F. Schiela, William M. Strickland, Dylan Langone, Enrico Rossi, Javad Shabani  
*Reemergence of missing Shapiro steps in the presence of in-plane magnetic field*  
[ACS Nano \*\*17\*\*, 4650 \(2023\)](#)
3. T. R. Devidas, Tom Dvir, Enrico Rossi, Hadar Steinberg  
*Kondo Effect in Defect-bound Quantum Dots Coupled to NbSe<sub>2</sub>*  
[Physical Review B \*\*106\*\*, 094502 \(2023\)](#)
4. Xiang Hu, Timo Hyart, Dmitry I. Pikulin, Enrico Rossi  
*Quantum-metric-enabled exciton condensate in double twisted bilayer graphene*  
[Physical Review B \(Letter\) \*\*105\*\*, L140506 \(2022\)](#)
5. Alexander Lau, Sebastiano Peotta, Dmitry I. Pikulin, Enrico Rossi, Timo Hyart  
*Universal suppression of superfluid weight by non-magnetic disorder in s-wave superconductors independent of quantum geometry and band dispersion*  
[SciPost Physics, \*\*13\*\*, 086 \(2022\)](#)
6. Mehdi Hatefipour, Joseph J. Cuzzo, Jesse Kanter, William Strickland, Tzu-Ming Lu, Enrico Rossi, Javad Shabani  
*Induced superconducting pairing in integer quantum Hall edge states*  
[Nano Letters, \*\*22\*\*, 6173, \(2022\)](#)

7. Enrico Rossi  
*Quantum Metric and Correlated States in Two-dimensional Systems*  
[Current Opinion in Solid State & Materials Science](#) **25**, 100952 (2021)
8. Matthieu C. Dartiailh, Joseph J. Cuzzo, William Mayer, Joseph Yuan, Kaushini S. Wickramasinghe, Enrico Rossi, Javad Shabani  
*Missing Shapiro steps in topologically trivial Josephson Junction on InAs quantum well*  
[Nature Communications](#) **12**, 78 (2021)
9. William Mayer, Matthieu C. Dartiailh, Joseph Yuan, Kaushini S. Wickramasinghe, Enrico Rossi, Javad Shabani  
*Gate Controlled Anomalous Phase Shift in Al/InAs Josephson Junctions*  
[Nature Communications](#) **11**, 212 (2020)
10. Sayed Ali Akbar Ghorashi, Taylor L. Hughes, Enrico Rossi  
*Vortex and Surface Phase Transitions in Superconducting Higher-order Topological Insulators*  
[Phys. Rev. Lett](#), **125**, 037001 (2020)
11. Xiang Hu, Timo Hyart, Dmitry I. Pikulin, Enrico Rossi  
*Geometric and conventional contribution to superfluid weight in twisted bilayer graphene*  
[Phys. Rev. Lett](#), **123**, 237002 (2019)  
[Featured in Physics, the online magazine from the American Physical Society](#)
12. Yohanes S. Gani, Eric. J. Walter, Enrico Rossi  
*Proximity induced spin-orbit splitting in graphene nanoribbons on transition metal dichalcogenides*  
[Phys. Rev. B](#), **101**, 195416 (2020)
13. Enrico Rossi, Christopher Triola  
*Van der Waals heterostructures with spin-orbit coupling*  
[Annalen der Physik](#) 1900344 (2019)
14. M. Rodriguez-Vega, G. Schwiete, Enrico Rossi  
*Spin-charge coupled transport in van der Waals systems with random tunneling*  
[Phys. Rev. Research](#), **1**, 033085 (2019)
15. Sayed Ali Akbar Ghorashi, Xiang Hu, Taylor L. Hughes, Enrico Rossi  
*Second-order Dirac superconductors and magnetic field induced Majorana hinge modes*  
[Phys. Rev. B](#), **100**, 020509(R) [Rapid Comm.](#) (2019). [Editor's suggestion](#)
16. Yohanes S. Gani, Hadar Steinberg, Enrico Rossi  
*Superconductivity in twisted Graphene NbSe<sub>2</sub> heterostructures*  
[Phys. Rev. B](#), **99**, 235404 (2019)
17. Yohanes S. Gani, D.S.L. Abergel, Enrico Rossi  
*Electronic structure of graphene-nanoribbons on hexagonal boron nitride*  
[Phys. Rev. B](#), **98**, 205415 (2018)
18. Andrey E. Antipov, Arno Bargerbos, Georg W. Winkler, Bela Bauer, Enrico Rossi, Roman M. Lutchyn  
*Effects of gate-induced electric fields on semiconductor Majorana nanowires*  
[Phys. Rev. X](#), **8**, 031041 (2018)
19. Dong E. Liu, Enrico Rossi, Roman M. Lutchyn,  
*Impurity-induced states in superconducting heterostructures*  
[Phys. Rev. B., Rapid Communication](#) **97**, 161408(R)(2018)
20. M. Rodriguez-Vega, G. Schwiete, J. Sinova, E. Rossi,  
*Giant Edelstein effect in topological-insulator-graphene heterostructures*  
[Phys. Rev. B.](#), **96**, 235419(2017).

21. Chih-Pin Lu, Martin Rodriguez-Vega, Guohong Li, Adina Luican-Mayer, K. Watanabe, T. Taniguchi, E. Rossi, Eva Y. Andrei,  
*Local, global, and nonlinear screening in twisted double-layer graphene*  
[PNAS \*\*113\*\*, 6623 \(2016\)](#).
22. C. Triola, D. M. Badiane, A. V. Balatsky, E. Rossi,  
*General conditions for proximity-induced odd-frequency superconductivity in two-dimensional electronic systems*  
[Phys. Rev. Lett. \*\*116\*\*, 257001 \(2016\)](#).
23. Junhua Zhang, Younghyun Kim, E. Rossi, Roman M. Lutchyn,  
*Topological superconductivity in a multichannel Yu-Shiba-Rusinov chain*  
[Phys. Rev. B \*\*93\*\*, 024507 \(2016\)](#).
24. M. Rodriguez-Vega, M. T. Simons, E. Radue, S. Kittiwatanakul, J. Lu, S. A. Wolf, R. A. Lukaszew, I. Novikova, E. Rossi,  
*Effect of inhomogeneties and substrate on the dynamics of the metal-insulator transition in VO<sub>2</sub> thin films*  
[Phys. Rev. B. \*\*92\*\*, 115420 \(2015\)](#).
25. A. Principi, G. Vignale, E. Rossi,  
*Kondo effect and non-Fermi liquid behavior in Dirac and Weyl semimetals*  
[Phys. Rev. B Rapid Communication \*\*92\*\*, 041107\(R\) \(2015\)](#).
26. Y. Kim, J. Zhang, E. Rossi, R. M. Lutchyn,  
*Impurity-induced bound states in superconductors with spin-orbit coupling*  
[Phys. Rev. Lett. \*\*114\*\*, 236804 \(2015\)](#).
27. J. Zhang, R. Nandkishore, E. Rossi,  
*Disorder-tuned selection of order in bilayer graphene*  
[Phys. Rev. B. \*\*91\*\*, 205425 \(2015\)](#).
28. E. Radue, L. Wang, S.Kittiwatanakul, J. Lu, S.A. Wolf, E. Rossi, R.A. Lukaszew, I. Novikova,  
*Substrate-induced microstructure effects on the dynamics of the photo-induced Metal-insulator transition in VO<sub>2</sub> thin films*  
[Journal of Optics \*\*17\*\*, 025503 \(2015\)](#).
29. Junhua Zhang, C. Triola, E. Rossi,  
*Proximity effect in graphene-topological insulator heterostructures*  
[Phys. Rev. Lett. \*\*112\*\*, 096802 \(2014\)](#).
30. C. Triola, E. Rossi, A. V. Balatsky,  
*Effect of a spin-active interface on proximity-induced superconductivity in topological insulators*  
[Phys. Rev. B. \*\*89\*\*, 165309 \(2014\)](#).
31. Martin Rodriguez-Vega, Jonathan Fischer, S. Das Sarma, E. Rossi,  
*Ground state of graphene heterostructures in the presence of random charged impurities*  
[Phys. Rev. B \*\*90\*\*, 035406 \(2014\)](#).
32. J. Zhang, E. Rossi,  
*Chiral states in hybrid graphene heterostructures*  
[Phys. Rev. Lett. \*\*111\*\*, 086804 \(2013\)](#).
33. D. S. L. Abergel, M. Rodriguez-Vega, E. Rossi, S. Das Sarma,  
*Inter-layer excitonic superfluidity in graphene*  
[Phys. Rev. B. \*\*88\*\*, 235402 \(2013\)](#).
34. Qiuzi Li, E. Rossi, S. Das Sarma,  
*Two-dimensional electronic transport on the surface of 3D topological insulators*  
[Phys. Rev. B. \*\*86\*\*, 235443 \(2012\)](#).

35. C. Triola, E. Rossi,  
*Screening and collective modes in gapped bilayer graphene*  
[Phys. Rev. B. \*\*86\*\*, 161408\(R\) Rapid Comm. \(2012\).](#)
36. D. S. L. Abergel, E. Rossi, S. Das Sarma,  
*Inhomogeneity and nonlinear screening in gapped bilayer graphene*  
[Phys. Rev. B. \*\*86\*\*, 155447 \(2012\).](#)
37. Qiuzi Li, E. H. Hwang, E. Rossi,  
*Effect of charged impurity correlation on transport in monolayer and bilayer graphene,*  
[Solid State Communications \*\*152\*\*, 1390 \(2012\).](#)
38. E. Rossi, J. H. Bardarson, M. S. Fuhrer, S. Das Sarma,  
*Universal conductance fluctuations in Dirac materials in the presence of long-range disorder,*  
[Phys. Rev. Lett. \*\*109\*\*, 096801 \(2012\).](#)
39. Qiuzi Li, E. H. Hwang, E. Rossi, S. Das Sarma,  
*Theory of 2D transport in graphene for correlated disorder,*  
[Phys. Rev. Lett. \*\*107\*\*, 156601 \(2011\).](#)
40. E. Rossi, S. Das Sarma,  
*Inhomogenous electronic structure, transport gap, and percolation threshold in disordered bilayer graphene,*  
[Phys. Rev. Lett. \*\*107\*\*, 155502 \(2011\).](#)
41. E. Rossi, J.H. Bardarson, P.W. Brouwer,  
*Klein Tunneling in Graphene p-n-p Junctions*  
[ECS Trans. \*\*35\*\*, 271 \(2011\).](#)
42. S. Das Sarma, S. Adam, E. H. Hwang and E. Rossi,  
*Electronic transport in two dimensional graphene,*  
[Reviews of Modern Physics \*\*83\*\*, 407 \(2011\).](#)
43. R. M. Lutchyn, E. Rossi, S. Das Sarma,  
*Spontaneous interlayer superfluidity in bilayer systems of cold polar molecules*  
[Phys. Rev. A \*\*82\*\*, 061604 Rapid Communication \(2010\).](#)
44. J.-P. Ismer, Ilya Eremin, E. Rossi, Dirk K. Morr, G. Blumberg,  
*Theory of Multiband Superconductivity in Spin-Density-Wave Metals,*  
[Phys. Rev. Lett. \*\*105\*\*, 037003 \(2010\).](#)
45. S. Das Sarma, E. H. Hwang, E. Rossi,  
*Theory of carrier transport in bilayer graphene*  
[Phys. Rev. B \*\*81\*\*, 161407 Rapid Communication \(2010\).](#)  
Selected as Editor's suggestion.
46. E. Rossi, J.H. Bardarson, P.W. Brouwer, S. Das Sarma,  
*Signatures of Klein tunneling in disordered graphene p-n-p junctions,*  
[Phys. Rev. B \*\*81\*\*, 121408 Rapid Communication \(2010\).](#)  
Selected as Editor's suggestion.
47. E. Rossi, D. K. Morr,  
*Vertex corrections of impurity scattering at a ferromagnetic quantum critical point,*  
[Phys. Rev. B \*\*81\*\*, 054443 \(2010\).](#)
48. E. H. Hwang, E. Rossi, S. Das Sarma,  
*Theory of thermopower in 2D graphene ,*  
[Phys. Rev. B. \*\*80\*\*, 235415 \(2009\).](#)

49. S. Adam, E. H. Hwang, E. Rossi, S. Das Sarma,  
*Theory of charged impurity scattering in two dimensional graphene*,  
Invited review for the graphene special issue of Solid State Communications,  
[Solid State Communications](#) **149** 1072 (2009).
50. E. Rossi, S. Adam, S. Das Sarma,  
*Effective medium theory of disordered two-dimensional graphene*,  
[Phys. Rev. B](#) **79**, 245423 (2009).
51. E. Rossi, S. Das Sarma,  
*Ground-state of graphene in the presence of random charged impurities*,  
[Phys. Rev. Lett.](#) **101** 166803 (2008).  
Featured in the 'Virtual Journal of Nanoscale Science & Technology', **18**, Issue 17, October 27, 2008.
52. R. H. Nyberg, E. Rossi, D. K. Morr,  
*Identifying Collective Modes in  $d_{x^2-y^2}$ -wave superconductors via Impurities*,  
[Phys. Rev. B](#) **78**, 054504 (2008).
53. J.-P. Ismer, I. Eremin, E. Rossi, Dirk K. Morr,  
*Dynamical spin susceptibility and the resonance peak in the electron-doped cuprate superconductors*,  
[Phys. Rev. Lett.](#) **99**, 047005 (2007).
54. U. Chatterjee, D. K. Morr, M. R. Norman, M. Randeria, A. Kanigel, M. Shi, E. Rossi, A. Kaminski, H. M. Fretwell, S. Rosenkranz, K. Kadowaki, J. C. Campuzano,  
*Dynamic Response Functions from Angle Resolved Photoemission Spectra*,  
[Phys. Rev. B](#) **75**, 172504 (2007).
55. E. Rossi, D. K. Morr,  
*Spatially dependent Kondo-effect in quantum corrals*,  
[Phys. Rev. Lett.](#) **97**, 236602 (2006).  
Featured in the 'Virtual Journal of Nanoscale Science & Technology', **14**, Issue 25, December 8, 2006.
56. E. Rossi, A. S. Nunez, A. H. MacDonald,  
*Interlayer Transport in Bilayer Quantum Hall Systems*,  
[Phys. Rev. Lett.](#) **95**, 266804 (2005).
57. E. Rossi, O. G. Heinonen, A. H. MacDonald,  
*Dynamics of magnetization coupled to a thermal bath of elastic modes*,  
[Phys. Rev. B](#), **72**, 174412 (2005).
58. Q. Q. Wang, A. Muller, P. Bianucci, E. Rossi, Q. K. Xue, T. Takagahara, C. Piermarocchi, A. H. MacDonald, C. K. Shih,  
*Decoherence processes during active manipulation of excitonic qubits in semiconductor quantum dots*,  
[Phys. Rev. B](#), **72**, 035306 (2005).  
Featured in the 'Virtual Journal of Nanoscale Science & Technology'. **12**, Issue 3, July 18, 2005.
59. A. A. Burkov, Y. N. Joglekar, E. Rossi, A. H. MacDonald,  
*Collective transport in bilayer quantum Hall systems*,  
[Physica E](#) **22**, 19 (2004).
60. A. H. MacDonald, A. A. Burkov, Y. N. Joglekar, E. Rossi,  
*Collective transport properties of bilayer-quantum-Hall excitonic condensates*,  
[Physics of Semiconductors](#) **171**, 29, (2003).

61. R. Fitzpatrick, E. Rossi, and E.P. Yu,  
*Improved evolution equations for magnetic island chains in toroidal pinch plasmas subject to externally applied resonant magnetic perturbations,*  
[Physics of Plasmas](#) **8** 4489 (2001).
62. R. Fitzpatrick and E. Rossi,  
*Control of tearing modes in toroidal fusion experiments using “designer” error-fields,*  
[Physics of Plasmas](#) **8**, 2760 (2001).
63. I. Furno, C. Angioni, F. Porcelli, H. Weisen, R. Behn, T.P. Goodman, M.A. Henderson, Z.A. Pietrzyk, A. Pochelon, H. Reimerdes, E. Rossi,  
*Understanding sawtooth activity during intense electron cyclotron heating experiments on TCV,*  
[Nuclear Fusion](#) **41** (4), 403, (2001).
64. F. Porcelli, A. Airoidi, C. Angioni, A. Bruschi, P. Buratti, F. Califano, S. Cirant, I. Furno, D. Grasso, E. Lazzaro, A.A. Martynov, M. Ottaviani, F. Pegoraro, G. Ramponi, E. Rossi, O. Sauter, C. Tebaldi, O. Tudisco,  
*Modeling of macroscopic magnetic islands in tokamaks,*  
[Nuclear Fusion](#) **41** (9), 1207, (2001).
65. F. Porcelli, C. Angioni, R. Behn, I. Furno, T. Goodman, M.A. Henderson, Z.A. Pietrzyk, A. Pochelon, H. Reimerdes, E. Rossi, O. Sauter,  
*Model for humpback relaxation oscillations,*  
[Nuclear Fusion](#) **40** (10), 1691, (2000).
66. A. Pochelon *et al.*,  
*Energy confinement and MHD activity in shaped TCV plasmas with localized electron cyclotron heating,*  
[Nuclear Fusion](#) **39** (11Y), 1807, (1999).
67. F. Porcelli, E. Rossi, G. Cima, and A. Wootton,  
*Macroscopic magnetic islands and plasma energy transport,*  
[Phys. Rev. Lett.](#) **82**, 1458, (1999).

### Publications Under Review

68. Mehdi Hatefipour, Joseph J. Cuzzo, Enrico Rossi, Javad Shabani  
*Andreev reflection of quantum Hall states through a quantum point contact*  
[\\*Preprint arXiv: 2309.01856](#)
69. Joseph J. Cuzzo, Enrico Rossi  
*SU(4) Symmetry Breaking and Induced Superconductivity in Graphene Quantum Hall Edges*  
[\\*Preprint arXiv: 2306.12483](#)
70. Joseph J. Cuzzo, Wei Pan, Javad Shabani, Enrico Rossi  
*Microwave-Tunable Diode Effect in Asymmetric SQUIDs with Topological Josephson Junctions*  
[\\*Preprint arXiv: 2303.16931\]](#)
71. Xiang Hu, Enrico Rossi, Yafis Barlas  
*Effect of Inversion Asymmetry on Bilayer Graphene’s Superconducting and Exciton Condensates*  
[\\*Preprint arXiv: 2304.04825](#)
72. Qu, Dong-Xia; Cuzzo, Joseph J.; Teslich, Nick E.; Ray, Keith G.; Dai, Zurong; Li, Tian T.; Chapline, George F.; DuBois, Jonathan L.; Rossi, Enrico  
*Phase-Slip Lines and Anomalous Josephson Effects in a Tungsten Clusters-Topological Insulator Microbridge*  
[\\*Preprint arXiv: 2301.00086](#)



73. Joseph J. Cuzzo, Wenlong Yu, Paul Davids, Tina M. Nenoff, Daniel B. Soh, Wei Pan, Enrico Rossi  
*Leggett Modes in Dirac Semimetals*  
[\\*Preprint arXiv: 2205.15995](#)

## INVITED TALKS

1. *Interplay of Quantum Metric and Disorder in 2D Superconductors*  
Kavli Institute for Theoretical Physics (KITP), Santa Barbara, CA (October 2023).
2. *Quantum Metric in 2D Superconductors and Exciton Condensates*  
Condensed Matter Seminar, University of California Irvine, Irvine, CA (October 2023).
3. *Quantum Metric and Superconductivity*  
**Physics Colloquium**, University of Indiana, Bloomington, IN, (September 2023).
4. *Anomalous Response of Novel Josephson Junctions Under Microwave Radiation*  
Condensed Matter Seminar, University of Indiana, Bloomington, IN, (September 2023).
5. *Quantum Metric in 2D Superconductors and Exciton Condensates* Microsoft Station Q, Santa Barbara, CA (August 2023).
6. *Quantum Metric and examples of its effect on physical observables*  
Aspen Center for Physics, Aspen, CO (July 2023).
7. *Quantum Metric and Correlated States in Two-dimensional Systems*  
Kavli Institute for Theoretical Physics (KITP), Santa Barbara, CA (May 2023).
8. *Leggett Modes in Dirac Semimetals*  
Center for Quantum Information Physics, New York University (January 2023)
9. *Quantum Metric and Superfluid States in Twisted Bilayer Graphene Systems*  
Condensed Matter Seminar, Stony Brook University (January 2023)
10. *Quantum Metric and Correlated States in Two-dimensional Systems*  
**Physics Colloquium**, University of Alabama (October 2022)
11. *Quantum Metric and Superfluid States in Twisted Bilayer Graphene Systems*  
Pioneering Symposium, Korean Physical Society (April 2022)
12. *Superconductivity and quantum metric in magic-angle twisted bilayer graphene*  
Condensed Matter Seminar, Georgia Tech (March 2021)
13. *Effect of spin-orbit coupling and magnetic field on Josephson effect in Majorana nanowires*  
Microsoft Theory Summit (September 2020)
14. *Superconductor-based heterostructures*  
ARO Program Division Review, Raleigh, NC, February 2020.
15. *Geometric and conventional contribution to superfluid weight in twisted bilayer graphene*  
KITP program "Spin and heat transport in quantum and topological materials, Santa Barbara CA (December 2019).
16. *Superconductivity in higher order topological insulators and twisted bilayer graphene*  
**Colloquium**, Physics Department, University of Nevada (November 2019).
17. *Impurity-Induced States in Majorana Superconductors Nanowires*  
Microsoft Theory Summit (September 2019)
18. *Second order Dirac superconductors and superfluid weight in twisted bilayer graphene*  
NORDITA workshop "Topological Quantum Matter", Stockholm, Sweden (August 2019).
19. *Superconducting van der Waals heterostructures*  
Condensed Matter Seminar, Weizmann Institute, Rehovot, Israel (June 2019).

20. *Van der Waals heterostructures with spin-orbit coupling*  
Condensed Matter Seminar, Technion, Haifa, Israel (June 2019).
21. *Van der Waals heterostructures with spin-orbit coupling*  
Condensed Matter Seminar, Hebrew University of Jerusalem, Jerusalem, Israel (June 2019).
22. *Effects of electric fields and disorder on superconductor-semiconductor Majorana nanowires*  
Condensed Matter Seminar, Scuola Normale di Pisa, Pisa, Italy (July 2018).
23. *Effects of electric fields and disorder on superconductor-semiconductor Majorana nanowires*  
Condensed Matter Seminar, Polytechnic University of Turin, Turin, Italy (July 2018).
24. *Giant spin-orbit torque in graphene-topological insulator heterostructures*  
The Electronic and Optical Properties for 2D and Dirac Materials, Conference, Jacksonville, Florida (December 2016).
25. *Spin-orbit coupling effects in 2D heterostructures and superconductors*  
Condensed Matter Theory Seminar, Radboud University, Nijmegen, Netherlands (October 2016).
26. *Spin-orbit coupling effects in 2D heterostructures and superconductors*  
**Colloquium**, Physics Department, University of Texas at Dallas, TX (September 2016).
27. *Spin Orbit effects in 2D*  
Quantum Matter Symposium Virginia Tech, VA, (August 2016).
28. *2D transport theory*  
First Annual 2D Materials Summer School, University of Minnesota, Minneapolis (MN) (June 2016).
29. *Two-dimensional heterostructures with spin-orbit coupling*  
International Winter School on Electronic Properties of Novel Materials (IWEPNM2016), Kirchberg, Austria (February 2016).
30. *On the interplay of Interactions and disorder*  
Condensed Matter Seminar, Indiana University (October 2015).
31. *From transistors to Majorana fermions: a brief history of the physics of interfaces*  
Nordita, Stockholm, Sweden (August 2015).
32. *Two-dimensional heterostructures with spin-orbit coupling*  
Physics of Interfaces and Layered Structures, Nordita, Stockholm, Sweden (August 2015).
33. *Dirac materials*  
Physics Seminar, James Madison University, Harrisonburg, VA (October 2015).
34. *Kondo Effect in Dirac Materials and Yu-Shiba-Rusinov states in 2D superconductors with spin-orbit coupling*  
Physical Sciences Symposia-2015, Boston MA (September 2015).
35. *Interplay of impurities and correlations in bilayer graphene and 2D superconductors with spin-orbit coupling*  
Interaction effects in graphene and related materials workshop, San Sebastian, Spain (July 2015)
36. *Kondo effect in Weyl semimetals and impurity states in superconductors with spin orbit coupling*  
Quantum Matter Seminar, Physics Department, University of Waterloo, Canada (May 2015).
37. *Kondo Effect and Non Fermi Liquid Behavior in Dirac Materials*  
Quantum and Dirac Materials for Energy Applications Conference, Santa Fe NM (March 2015).
38. *Two-dimensional heterostructures with spin-orbit coupling*  
Condensed Matter Seminar, Center for Complex Quantum Systems, Physics Department, University of Texas at Austin (March 2015).

39. *Effects of interactions and disorder in graphene heterostructures*  
Physical Sciences Symposia-2013, Boston MA (September 2013).
40. *Chiral superfluid states in graphene heterostructures*  
**Colloquium** at the School of Physics, Astronomy, and Computational Sciences at George Mason University (November 2012).
41. *Surprises in the electronic transport of graphene and bilayer graphene*  
Condensed Matter & Nanophysics Seminar at the Physics Department at the University of Delaware, DE (September 2012).
42. *Graphene: how electrons move and interact in the ultimate flatland*  
**Colloquium** at the Department of Physics at the University of Virginia, Charlottesville, VA (August 2012).
43. *Inhomogenous electronic structure and transport gap in disordered bilayer graphene*  
4th International Conference on Smart Materials Structures and Systems (CIMTEC conference), Montecatini, Italy (June 2012).
44. *Electronic transport in graphene*  
15th International Workshop on Computational Electronics (IWCE 2012), Madison WI (May 2012).
45. APS Invited Talk  
*Superfluidity in Bilayer Systems of Cold Polar Molecules*  
2011 APS Southeastern Section in Roanoke, VA (November 2011).
46. *Graphene: the ultimate flatland*  
Applied Science Department, William and Mary, Williamsburg, VA (November 2011)
47. *Quantum motion of electrons and holes in the random puddle landscape of graphene*  
Centre for the Physics of Materials Seminar, Physics Department, McGill University, Canada (May 2011).
48. APS Invited talk  
*Quantum motion of electrons and holes in the random puddle landscape of graphene*  
2011 APS March Meeting in Dallas, TX.
49. ECS Invited talk  
*Klein Tunneling in Graphene p-n-p junctions*  
219th Meeting of Electrochemical Society, Montreal CA (May 2011).
50. *Quantum transport in disordered graphene*  
Colloquium at the Computational Materials Science Center at George Mason University, Fairfax, VA (April 2010).
51. *Spontaneous interlayer superfluidity in bilayer systems*  
Condensed Matter Seminar at the Department of Physics&Astronomy at the University of Iowa, Iowa city, PA (March 2010).
52. *Transport of massless Dirac Fermions in disordered graphene*  
Colloquium at the Department of Physics&Astronomy at the University of Iowa, Iowa city, PA (March 2010).
53. *Quantum transport in graphene: finding the missing “ $\pi$ ”*  
Colloquium at the Department of Physics, College of William & Mary, Williamsburg, VA (February 2010).
54. *Quantum transport in graphene: finding the missing “ $\pi$ ”*  
Colloquium at the Department of Physics&Astronomy at the University of Pittsburgh, Pittsburgh, PA (January 2010).

55. *Klein tunneling in p-n-p graphene junctions*  
Nanoelectronics Research Initiative annual review, Gaithersburg, MD (October 2009).
56. *Signatures of Klein tunneling in disordered graphene p-n-p junctions*  
CMTC symposium, University of Maryland, College Park, MD (September 2009).
57. *Disorder and quantum transport in graphene*  
Condensed Matter Seminar, Texas A&M University (September 2009)
58. *Klein tunneling in disordered graphene p-n-p junctions*  
Condensed Matter Seminar, University of Texas at Austin (September 2009)
59. *Disorder and quantum transport in graphene*  
SouthWest Academy of Nanoelectronics Annual review (September 2009).
60. *Theory of thermopower in 2D graphene*  
Invited talk at the Scuola Normale Superiore, Pisa, Italy (June 2009).
61. APS Invited talk  
*Ground-state of Two-dimensional Graphene in the Presence of Random Charged Impurities*,  
2009 March Meeting in Pittsburgh, PA.
62. *Graphene: massless electrons in the ultimate flatland*  
Colloquium at the Department of Physics at Virginia Tech, Blacksburg, VA (February 2009).
63. *Electronic structure and transport of disordered graphene*  
Center for Nanoscale Science and Technology, National Institute of Standards and Technology,  
Gaithersburg, MD (November 2008).
64. *Graphene: massless electrons in flatland*  
Colloquium at the University of Chile, Santiago, Chile (October 2008).
65. *Effective medium theory of disordered two-dimensional graphene*  
CMTC symposium, University of Maryland, College Park, MD (October 2008).
66. *Pseudospintronics*  
NRI-SRC Annual review, Santa Clara, CA (November 2007).
67. *Impurity-Induced States in 2DEG and d-wave superconductors*  
CMTC symposium, University of Maryland, College Park, MD (September 2007).
68. *Neutron resonance in electron-doped cuprates*  
Aspen Center for Physics, CO, Novel Aspects of Superconductivity program, (August 2007).
69. *Kondo Effect in Nanostructures*  
Argonne National Laboratory, IL (May 2007)
70. *Spatially dependent Kondo-effect in quantum corrals*  
University of Illinois at Chicago, Chicago, IL (February 2006).
71. *Effect of Disorder and Thermal Fluctuations on the Transport properties of Quantum Hall  
Bilayers*  
University of Illinois at Chicago, Chicago, IL (February 2005).

## CONTRIBUTED TALKS, PUBLISHED ABSTRACTS

- Over 80 contributed talks and published abstracts at various conferences and meetings such as the March Meeting of the American Physical Society.
- Over 50 poster presentations at professional meetings.

## COURSES TAUGHT

PHYS 630 Statistical Physics and Thermodynamics, S2022, S2023  
PHYS 603, Mathematical Physics, F2020, F2021, F2022  
PHYS 690, Quantum Materials, F2021  
PHYS 102P, General Physics II (Problem Session), S2021  
PHYS 101P, General Physics I (Problem Session), F2018  
PHYS 611, Classical Electricity and Magnetism II, F2017, F2018, F2018  
PHYS 622, Quantum Mechanics II, S2018, S2019, S2020, S2021  
PHYS 301, Introduction to Mathematical Physics, S2014, S2015, S2016  
PHYS 155, Freshman Research, S2016  
PHYS 255, Sophomore Research, F2018, S2019  
PHYS 355, Junior Research, F2017, S2018, F2019, S2020  
PHYS 496, Honors, F2018, S2019  
PHYS 455, Senior Research, F2012, S2013, F2015, S2016, F2018, F2021  
PHYS 742, Solid State Physics II, S2011, S2012, S2013  
PHYS 621, Quantum Mechanics I, F2011  
PHYS 741, Solid State Physics I, F2012, F2013, F2014, F2015  
PHYS 108P, Physics for Life-Sciences (Problem Session), S2013  
PHYS 800, Dissertation, F2019, S2020, F2021

On Research Leave: Fall 2010, Fall 2016, Spring 2017.

## GRADUATE STUDENTS SUPERVISION

- Brandon Korb, 2022-Present
- Jaeyeong Lee, 2022-Present
- Michael Sizemore, 2022-Present
- Mariami Bagishvili, 2022-Present
- Joseph J. Cuzzo, Ph.D. 2022  
Dissertation's Title: *Electronic Transport in Topological Superconducting Heterostructures*  
Truman Fellow, Sandia National Laboratory.
- Yohanes S. Gani, Ph.D. 2019  
Dissertation's Title: *Electronic properties of two-dimensional van der Waals systems*  
Data Analyst at PT Bank
- Christopher Hipp (2017-2019).
- Jiani Lu (2016-2017)
- Martin Rodriguez-Vega, Ph.D. 2016.  
Dissertation's Title: *Disorder effects in Dirac heterostructures*  
Director's Fellow at Los Alamos National Laboratory.
- William Dickinson (2011-2012)
- Christopher Triola, Ph.D. 2015.  
Dissertation's Title: *Electronic properties of chiral two-dimensional materials*  
Los Alamos National Laboratory Permanent Staff Member

## POSTDOCTORAL RESEARCH ASSOCIATES SUPERVISION

- Jonathan Schirmer, 2023-Present

- Han Fu, 2022-Present
- Sayed Ali Akbar Ghorashi, 2018-2021
- Xiang Hu, 2016-2020
- Driss Badiane, 2014-2015.
- Junhua Zhang, 2011-2015.

## UNDERGRADUATE STUDENTS SUPERVISION

- Jacopo Gliozzi (2016-2019): *Chiral Transport in Anisotropic Materials*, Honors Senior Thesis, 2019. Recipient of: 2018 E. Gary Clark Memorial Scholarship; 2019 Don Edward Harrison Jr. Award for Excellence in Physics; 2019 [Thomas Jefferson Prize in Natural Philosophy](#).
- Stuart Thomas (2017-2021) Recipient of: 2019 E. Gary Clark Memorial Scholarship; 2020 Don Edward Harrison Jr. Award for Excellence in Physics;
- Daniel Kang (2014-2016): *Quantum transport in two dimensions*, Senior Thesis, 2016.
- Sean Youn (2013-2014)
- Jonathan Fischer: *Ground state of disordered draphene heterostructures*, Honors Senior Thesis, 2013.

## PROFESSIONAL SERVICE

### University Service

- Nominations and Elections University Committee (Fall2019-F2022)
- Plumeri Award Selection Committee (2019)
- Physics representative on the Steering Committee for the William & Mary NSF Robert Noyce Teacher Scholarship Program, (2011-2016), 2019-Present.
- Physics representative on the Steering Committee for the William & Mary Department of Education Teachers for a Competitive Tomorrow (TCT) program (F2011-S2013).
- Major Advisor (2 students: Daniel Kang S2014-S2016, Jacopo Gliozzi S2016-S2019).
- Freshman Advisor (every year)
- 1 Mathematics Honors Thesis Committee (2019)
- Major Advisor (2 students: Jonathan Fischer S2012-S2013, Sean Young S2013-S2014).
- Graduate Research Symposium session chair, 2012, 2013, 2014.
- 1 Applied Science Ph.D. committee, 2012

### Physics Department Service

- Graduate Admission Committee, F2011-F2014, F2019-Present.
- External Relations Committee, F2022-Present.
- Graduate Studies Committee, F2020-F2021.
- Diversity Advisory Committee, F2019-F2020.
- Undergraduate Studies Committee, F2014-S2016; F2017-F2019.
- Chair of search committee for Tenure Track position in experimental condensed matter physics in support of EPAD program (F2018-S2019)
- Colloquium Coordinator, F2013-S2018.
- Colloquium Committee, F2010-F2011, F2018-S2019, F2021-F2022.

- 18 Ph.D. Committees: Jie Xu (2013), Dylan Albrecht (2013), Lei Wang (2015), Yudistira Virgus (2015), Chris Triola (2015), Zhen Wang (2016), Elizabeth Radue (2016), Martin Rodriguez-Vega (2016), Charles Fancher (2016), Matthew Burton (2017), Zhen Xing (2018), Peter Rosenberg (2018), Yohanes Satrio Gani (2019), Scott Madaras (2020), Adam Chiciak (2020), Patrick McArdle (2022), Hao Xu (2022), Joseph Cuzzo (2022).
- 2 Graduate Students Annual Review Committees, 2022.
- 3 Graduate Students Annual Review Committees, 2021.
- 4 Graduate Students Annual Review Committees, 2020.
- 8 Graduate Students Annual Review Committees, 2019.
- 4 Graduate Students Annual Review Committees, 2018.
- 2 Graduate Students Annual Review Committees, 2017.
- 6 Graduate Students Annual Review Committees, 2016.
- 7 Graduate Students Annual Review Committees, 2015.
- 8 Graduate Students Annual Review Committees, 2014.
- 7 Graduate Students Annual Review Committees, 2013.
- 7 Graduate Students Annual Review Committees, 2012.
- 2 Graduate Students Annual Review Committees, 2011.

### **Other Professional Service**

- Design and documentation of series of portable Physics demonstrations (Physics briefcase). (2016-Present).
- Demonstrations for K12 Students using the *Physics Briefcase* (2017-Present).
- Design and supervision of students' Wiki on Physics topics (CM-WM-Wiki) (2016-Present).
- Served on NSF review panel, 2022.
- Served on internal review panel for MRSEC center, 2022.
- Served as external reviewer for Physics Ph.D. dissertation, Aalto University (Finland) (2022).
- Moderator for the Virginia Junior Academy of Science (VJAS) Research Symposium (2021).
- Served on ERC review panel, 2021
- "Open Lab" for Conferences for Undergraduate Women in Physics (CUWiP) organized by William & Mary, (2019).
- External reviewer for 1 Physics Ph.D. at Jyväskylä University (Finland) (2020).
- External committee member for 1 Physics Ph.D. at the National University of Singapore (NUS) (2019)
- Lecturer for "First Annual 2D Materials Summer School", University of Minneapolis, Minneapolis, MN (2016)
- Public lecture on "Alice in Topological Wonderland", PhysicsFest William & Mary, 2016.
- Judge for Poster and Photo competitions for PhysicsFest at William & Mary.
- Served on NSF review panel, 2016
- Guest lecture on "Art and Science" at Christopher Newport University (CNU), 2013.
- External reviewer for 1 PhD at the Scuola Normale Superiore (Pisa, Italy), 2013.
- Public lecture on "Art and Science" for the Saturday morning physics program at William and Mary, 2012.
- Chair of Focus Session: "Graphene Structure, Stacking, Interactions: Magnetism and Interactions", APS March Meeting, Boston MA (March 2012).

- Co-organizer of the PhysicsFest, 2011, 2012.
- Organizer of the 2011 physics module of the GEAR-UP (Gaining Early Advantage and Awareness for Undergraduate Programs) Summer Academy for inner city and economically disadvantaged high school students, hosted by the W&M.
- Public lecture on “Art and Science” at the PhysicFest William and Mary, 2011.
- Referee for: Nature Physics, Physical Review Letters, Physical Review X, Nature Nanotechnology, Nature Materials, Nature Communications, Nature Physics Communications, Cambridge University Press, Nano Letters, Applied Physics Letters, 2D Materials, Nature Scientific Reports, Physical Review B, Physical Review Research, Journal of Physics: Condensed Matter, European Physics Letters, European Physics Journal B, Physics Letters A, Journal of Physics A, Physica E, Advances in Condensed Matter Physics, Journal of Superconductivity and Novel Magnetism.
- Proposal Reviewer for: Department of Energy (DOE), National Science Foundation (NSF), European Research Council (ERC), Army Research Office (ARO), American Chemical Society Petroleum Research Fund (ACS-PRF), German-Israeli Foundation for Scientific Research and Development (GIF), Netherlands Foundation for Fundamental Research on Matter (FOM), Fund for Scientific Research-FNRS (Belgium), National Commission for Scientific Research of Chile (CONICYT), Research Foundation Flanders (Fonds Wetenschappelijk Onderzoek - Vlaanderen, FWO).