Curriculum Vitae

Eugene Mishchenko

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Professional History:

• *Aug 2010/present*: Professor, Department of Physics and Astronomy, University of Utah, Salt Lake City, Utah.
• *July 2007/Aug 2010*: Associate Professor, Department of Physics, University of Utah, Salt Lake City, Utah.
• *Aug 2004/July 2007*: Assistant Professor, Department of Physics, University of Utah, Salt Lake City, Utah.
• *Sep 2002/Aug 2004*: Research Associate, Department of Physics, Harvard University, Cambridge, Massachusetts.
• *Oct 2000/Aug 2002*: Postdoctoral Researcher, Bell Laboratories, Lucent Technologies, Murray Hill, New Jersey and Department of Physics, University of Colorado at Boulder, Colorado.
• *Oct 1998/ Sep 2000*: Postdoctoral Researcher, Lorentz Institute, Leiden University, Leiden, The Netherlands.

Education:

• J.D.: S.J. Quinney College of Law, University of Utah, 2018, Certificate in Intellectual Property law.
• Ph.D.: L.D. Landau Institute for Theoretical Physics, Moscow, Russia, 1996, thesis: "Raman scattering in a system of interacting electrons and phonons", supervisor Leonid Falkovsky.
• Diploma of Physicist: Physics Department of Chernivtsy National University, Chernivtsy, Ukraine, 1993

Research interests:

Transport in low-dimensional systems, spin-polarized phenomena in metals and semiconductors, many-body effects in transport and optics of solid bodies, nanoscience, graphene, carbon nanotubes, plasmonics, interaction of electromagnetic field with matter

Grants awarded:

1. Many-Body Effects in Spin-Polarized Transport, DOE 2006, Sep 2006 – Aug 2009, $210.000.

2. Many-body effects in graphene, Apr 2008 - March 2009, Seed Grant from VP for Research (Utah), $30.000.

3. Many-Body Effects in Chiral Electron Systems, DOE 2009 – 2013, $330,000.

4. Scialog Award from the Research Corporation for Scientific Development, with J. Lupton, 2010-2012, $250,000.

5. Optical, transport phenomena, and interaction effects in novel low-dimensional electron systems, DOE 2013 – 2017, $330,000.

6. Disorder, interactions, and their interplay in novel narrow-gap Dirac materials and Weyl semimetals, DOE 2017 – 2021, $332,000.

Award:

Early Career Teaching Award, University of Utah, 2008.

Departmental Committees:

1. Retention, Promotion and Tenure Committee, Chair, 2013 – 2015.

2. Associate Chair, Department of Physics and Astronomy, 2008 – 2010.

3. 2004–2015 Committees: Colloquium, Solid State Seminar, Research Council, Student Awards, Faculty Awards, Futures, Common Exam Preparation Committee, Common Exam, Policy Board, Space, Curriculum, Faculty Searches.

Since Fall 2015:

1. Space Committee, 2018 – 2021

2. Faculty Awards Committee, 2015 – 2020

3. Student Awards Committee, 2017 – 2021

4. Junior Faculty Mentorship Committee, 2018 – 2019

5. Condensed Matter Faculty Search Committee, 2018 – 2019

6. RPT Policy Revision Committee, 2017 – 2020

7. Graduate Comprehensive Exam Committee, 2019 – 2021

8. Graduate Review Committee, 2020 – 2022

9. Condensed Matter Seminar Committee, 2021 – 2022

College and University Committees, since Fall 2014:

1. College of Science Retention, Promotions and Tenure Committee, Chair, 2014 – 2015
2. College Council, 2014 – 2015.
3. Academic Senate, 2021 – current.

Students supervised:

Abdel Khalek-Farid, 2004 – 2008 (Ph.D., Aug 2008)

Vladimir Zyuzin, 2005 – 2008

Nora Hassan, 2011 – 2012 (M.Sc., Aug 2012)

Lei Shan, 2012 – 2018 (Ph.D., Aug 2018)

Megha Agarwal, 2015 – 2020 (Ph.D., June 2020)

Jonah Barber, 2019 – 2020 (B.Sc., 2020)

Postdocs supervised:

Suhas Gangadharaiah, 2007 – 2008

Andrey Shytov, 2008 – 2009

Vagharsh Mkhitaryan, 2010 – 2012

Courses taught:

Solid State I (PHYS 5510), Fall 2004, Fall 2005, Fall 2006, Fall 2021

Thermodynamics and Statistical Physics (PHYS 3760), Spring 2006, Spring 2022

Advanced Solid State I (PHYS 7510), Spring 2007

Advanced Solid State II (PHYS 7520), Fall 2007

Classical Physics II (PHYS 4420), Spring 2008, Spring 2009

Physics for Scientists and Engineers II (PHYS 2220), Fall 2009, Fall 2016, Spring 2019

Classical and Quantum Mechanics (PHYS 5010), Fall 2010, Fall 2011, Fall 2012

Electrodynamics I (PHYS 7110), Fall 2013, Fall 2015, Fall 2019, Fall 2020

Electrodynamics II (PHYS 7120), Spring 2014, Spring 2016, Spring 2021

General Physics II (PHYS 2020), Spring 2015

Intellectual Property Law for Scientists and Engineers (PHYS 3735), Spring 2020

List of refereed journal publications:

74. M. Agarwal and E. G. Mishchenko, *Dynamic response functions of two-dimensional Dirac fermions with screened Coulomb and short-range interactions*, Phys. Rev. B **102**, 125421 (2020).

73. L. Shan, M. Agarwal, and E. G. Mishchenko, *Binding energy and lifetime of excitons in metallic nanotubes*, Phys. Rev. B **99**, 035434 (2019).

72. M. Agarwal and E. G. Mishchenko, *Potential and spin-exchange interaction between Anderson impurities in graphene*, Phys. Rev B **99**, 085439 (2019).

71. L. Shan and E. G. Mishchenko, *Breakdown of classical electrostatics in the depolarization of quantum wires and nanotubes*, Phys. Rev. B **96**, 195441 (2017).

70. R. K. Malla, E. G. Mishchenko, and M. E. Raikh, *Suppression of the Landau-Zener transition probability by a weak classical noise*, Phys. Rev. B **96**, 075419 (2017).

69. M. Agarwal and E. G. Mishchenko, *Long-range exchange interaction between magnetic impurities in graphene*, Phys. Rev. B **95**, 075411 (2017).

68. E. G. Mishchenko and P. F. Pshenichka, *Reversible temperature exchange upon thermal contact*, Am. J. Phys. **85**, 23 (2017).

67. L. Shan, E. G. Mishchenko, M. E. Raikh, *Plasmon spectrum and plasmon-mediated energy transfer in a multi-connected geometry*, Phys. Rev. B **93**, 085435 (2016).

66. J. Talbot, S. LeBohec, E. G. Mishchenko, *Suppression of diffusion of hydrogen adatoms on graphene by effective adatom interaction*, Phys. Rev. B **93**, 115402 (2016).

65. D. A. Pesin, E. G. Mishchenko, A. Levchenko, *Density of states and magnetotransport in Weyl semimetals with long-range disorder*, Phys. Rev. B **92**, 174202 (2015).

64. R. C. Roundy, M. C. Prestgard, A. Tiwari, E. G. Mishchenko, and M. E. Raikh, *Manifestation of two-channel nonlocal spin transport in the shapes of the Hanle curves*, Phys. Rev. B 90, 115206 (2014).

63. E. G. Mishchenko and O. A. Starykh, *Equilibrium currents in chiral systems with nonzero Chern number*, Phys. Rev. B **90**, 035114 (2014).

62. S. LeBohec, J. Talbot, and E. G. Mishchenko, *Attraction-repulsion transition in the interaction of adatoms and vacancies in graphene*, Phys. Rev. B **89**, 045433 (2014).

61. E.G. Mishchenko, *Dipole-induced localized plasmon modes and resonant surface plasmon scattering*, Phys. Rev. B **88**, 115436 (2013).

60. V.V. Mkhitaryan and E.G. Mishchenko, *Localized States due to Expulsion of Resonant Impurity Levels from the Continuum in Bilayer Graphene*, Phys. Rev. Lett. **110**, 086805 (2013).

59. V.V. Mkhitaryan, E.G. Mishchenko, *Resonant finite-size impurities in graphene, unitary limit and Friedel oscillations*, Phys. Rev. B **86**, 115442 (2012).

58. P.G. Silvestrov, P.W. Brouwer, E.G. Mishchenko, *Spin and Charge Structure of the Surface States in Topological Insulators*, Phys. Rev. B **86**, 075302 (2012).

57. N.M. Hassan, V.V. Mkhitaryan, E.G. Mishchenko, *One-dimensional plasmons confined in bilayer graphene p-n junctions*, Phys. Rev. B **85**, 125411 (2012).

56. E.G. Mishchenko, O.A. Starykh, *Intersubband Edge Singularity in Metallic Nanotubes*, Phys. Rev. Lett. **107**, 116804 (2011).

55. Wei Chen, A.V. Andreev, E.G. Mishchenko, L.I. Glazman, *Decay of a plasmon into neutral modes in a carbon nanotube*, Phys. Rev. B, **82**, 115444 (2010).

54. E.G. Mishchenko, A.V. Shytov, and P.G. Silvestrov, *Guided Plasmons in Graphene p-n Junctions*, Phys. Rev. Lett. **104**, 156806 (2010).

53. P.G. Silvestrov, and E.G. Mishchenko, *Spin-Hall Effect in Chiral Electron Systems: from Semiconductor Heterostructures to Topological Insulators*, in "Perspectives of Mesoscopic Physics", also at arXiv:0912.4658.

52. E.G. Mishchenko, *Dynamic conductivity in graphene beyond linear response*, Phys. Rev. Lett. **104**, 246802 (2009).

51. V.V. Mkhitaryan, E.G. Mishchenko, M.E. Raikh, and L. I. Glazman, *Photon absorption edge in superconductors and gapped one-dimensional systems*, Phys. Rev. B **80**, 205416 (2009).

50. P.G. Silvestrov, V.A. Zyuzin, and E.G. Mishchenko, *Mesoscopic Spin-Hall Effect in 2D electron systems with smooth boundaries*, Phys. Rev. Lett. **102**, 196802 (2009).

49. V. V. Mkhitaryan, Y. Fang, J. Gerton, E. G. Mishchenko, M. E. Raikh, *Scattering of plasmons at the intersection of two metallic nanotubes: Implications for tunnelling*, Phys. Rev. Lett. **101**, 256401 (2008).

48. A. Farid and E.G. Mishchenko, *Coupling of plasmons to the spins of Tamm-Shockley states at noble metal surfaces*, Phys. Rev. B **78**, 205434 (2008).

47. S. Gangadharaiah, A. Farid, and E.G. Mishchenko, *Charge response function and a novel plasmon mode in graphene*, Phys. Rev. Lett. **100**, 166802 (2008).

46. E.G. Mishchenko, *Minimal conductivity in graphene: interaction corrections and ultraviolet anomaly*, to Europhys. Lett. **83**, 17005 (2008).

45. V.A. Zyuzin, P.G. Silvestrov, and E.G. Mishchenko, *Spin-Hall edge spin polarization in a ballistic 2D electron system*, Phys. Rev. Lett. **99**, 106601 (2007).

44. T.A. Sedrakyan, E.G. Mishchenko, M.E. Raikh, *Zero-bias tunneling anomaly in a clean 2D electron gas caused by the smooth density variations*, Phys. Rev. Lett. **99**, 206405 (2007).

43. E.G. Mishchenko, *Effect of electron-electron interactions on the conductivity of clean graphene*, Phys. Rev. Lett. **98**, 216801 (2007).

42. T.A. Sedrakyan, E.G. Mishchenko, M.E. Raikh, *Smearing of the 2D Kohn anomaly in a nonquantizing magnetic field: Implications for the interaction effects*, Phys. Rev. Lett. **99**, 036401 (2007).

41. N. Zheng, C. C. Williams, E. G. Mishchenko, and E. Bussmann, *A three-dimensional model of single-electron tunneling between a conductive probe and a localized electronic state in a dielectric*, J. Appl. Phys. 101, 093702 (2007).

40. T.A. Sedrakyan, E.G. Mishchenko, M.E. Raikh, *Planar array of semiconducting nanotubes in external electric field: Collective screening and polarizability*, Phys. Rev. B **74**, 235423 (2006).

39. M. Pustilnik, E.G. Mishchenko, and O.A. Starykh, *Generation of spin current by Coulomb drag*, Phys. Rev. Lett. **97**, 246803 (2006) .

38. V. A. Zyuzin, E. G. Mishchenko, M. E. Raikh, *Tunneling between 2D electron layers with correlated disorder: anomalous sensitivity to spin-orbit coupling*, Phys. Rev. B **74**, 205322 (2006).

37. E. Gubankova, E.G. Mishchenko, and F. Wilczek, *Gapless Surfaces in Anisotropic Superfluids*, Phys. Rev. B **74**, 184516 (2006).

36. T.A. Sedrakyan, E.G. Mishchenko, and M.E. Raikh, *Penetration of external field into regular and random arrays of nanotubes: Implications for field emission*, Phys. Rev. B **73**, 245325 (2006).

35. Abdel-Khalek Farid and E. G. Mishchenko, *Optical Conductivity of a Two-Dimensional Electron Liquid with Spin-Orbit Interaction*, Phys. Rev. Lett. **97**, 096604 (2006).

34. A.V. Shytov, E.G. Mishchenko, H-A. Engel, and B.I. Halperin, *Small-angle impurity scattering and the spin Hall conductivity in 2D systems*, Phys. Rev. B **73**, 075316 (2006).

33. E.G. Mishchenko and M.E. Raikh, *Electrostatics of Straight and Bent Nanotubes*, Phys. Rev. B **74**, 155410 (2006).

32. L.A. Falkovsky and E.G. Mishchenko, *Infrared absorption and Raman scattering on coupled plasmon-phonon modes in superlattices*, JETP **102**, 661 - 670 (2006).

31. L.A. Falkovsky and E.G. Mishchenko, *Phonon-plasmon coupled modes in hetero-superlattices*, JETP Letters **82**, 103 (2005).

30. P.G. Silvestrov and E.G. Mishchenko, *Polarized Electric Current in Semiclassical Transport with Spin-Orbit Interaction*, Phys. Rev. B **74**, 165301 (2006).

29. D.-W. Wang, E.G. Mishchenko, and E. Demler, *Pseudospin ferromagnetism in double–quantum-wire systems*, Phys. Rev. Lett. **95**, 086802 (2005).

28. E. Gubankova, E.G. Mishchenko, and F. Wilczek, *Breached Superfluidity via p-Wave*, Phys. Rev. Lett. **94**, 110402 (2005).

Prior to coming to Utah in 2004

27. E.G. Mishchenko, A.V. Shytov, and B.I. Halperin, *Spin current and polarization in impure 2D electron systems with spin-orbit coupling*, Phys. Rev. Lett. **93**, 226602 (2004).

26. E.G. Mishchenko, M.Yu. Reizer, and L.I. Glazman, *Plasmon attenuation and optical conductivity of a two-dimensional electron gas*, Phys. Rev. B **69**, 195302 (2004).

25. E.G. Mishchenko, A. Brataas, and Ya. Tserkovnyak, *Spin Detection in Quantum Dots by Electric Currents*, Phys. Rev. B **69**, 073305 (2004).

24. E.G. Mishchenko, *Fluctuations of Radiation from a Chaotic Laser Below Threshold*, Phys. Rev. A **69**, 033802 (2004).

23. E.G. Mishchenko, *Shot Noise in a F-N-F Spin Valve*, Phys. Rev. B **68**, 100409(R) (2003).

22. E.G. Mishchenko and B.I. Halperin, *Transport Equations for a Two-Dimensional Electron Gas with Spin-Orbit Interaction*, Phys. Rev. B **68** 045317 (2003).

21. A.O. Lyakhov and E.G. Mishchenko, *Thermal Conductivity of a Two-dimensional Electron Gas with Coulomb Interaction*, Phys. Rev. B **67**, 041304(R) (2003).

20. M. Pustilnik, E.G. Mishchenko, L.I. Glazman and A.V. Andreev, *Coulomb Drag by Small Momentum Transfer between Quantum Wires*, Phys. Rev. Lett. **91**, 126805 (2003).

19. E.G. Mishchenko and A.V. Andreev, *Zero-Bias Anomaly in Two-Dimensional Electron Layers and Multiwall Nanotubes*, Phys. Rev. B **65**, 235310 (2002).

18. E.G. Mishchenko, A.V. Andreev, and L.I. Glazman, *Zero-Bias Anomaly in Disordered Wires*, Phys. Rev. Lett. **87**, 246801 (2001).

17. A.V. Andreev and E.G. Mishchenko, *Full Counting Statistics of a Charge Pump in the Coulomb Blockade Regime*, Phys. Rev. B **64**, 233316 (2001).

16. E.G. Mishchenko, M. Patra, and C.W.J. Beenakker, *Frequency-Dependence of the Photonic Noise Spectrum in an Absorbing or Amplifying Diffusive Medium*, European Physical Journal D **13**, 289 (2001).

15. E.G. Mishchenko, *Nonlinear Voltage Dependence of the Shot Noise in Mesoscopic Degenerate Conductors with Strong Electron-Electron Scattering*, Phys. Rev. Lett. **85**, 4144 (2000).

14. E.G. Mishchenko and C.W.J. Beenakker, *Radiative Transfer Theory for Vacuum Fluctuations*. Phys. Rev. Lett. **83**, 5475 (1999).

13. H. Schomerus, E.G. Mishchenko, and C.W.J. Beenakker, *Shot-Noise in Non-Degenerate Semiconductors with Energy-Dependent Elastic Scattering*, in *Statistical and Dynamical Aspects of Mesoscopic Systems*, edited by D. Reguera, G. Platero, L.L. Bonilla, and M. Rubi (Lecture Notes in Physics, Springer, 2000), p. 96.

12. H. Schomerus, E.G. Mishchenko and C.W.J. Beenakker, *Kinetic Theory of Shot noise in Non-Degenerate Diffusive Conductors*, Phys. Rev. B **60**, 5839 (1999).

11. L.A. Kosyachenko, M.P. Mazur and E.G. Mishchenko, *Hot-Carrier Energy Losses in a Silicon p-n-p Bipolar Transistor*, Phys. Stat. Solidi (a) **172**, 407 (1999).

10. E.G. Mishchenko, *Raman Scattering in a Two-Dimensional Electron Gas: Boltzmann Equation Approach*, Phys. Rev. B **59**, 14892 (1999).

9. L.A. Falkovsky and E.G. Mishchenko, *Electron-Lattice Kinetics of Metals Heated by Ultrashort Laser Pulses*, JETP **88**, 84 (1999).

8. S. Klama and E.G. Mishchenko, *Two Electrons in a Quantum Dot: a Semiclassical Approach*, J. Phys.: Cond. Matter **10**, 3411 (1998).

7. L.A. Falkovsky and E.G. Mishchenko, *Lattice Deformation from Interaction with Electrons Heated by an Ultrashort Laser Pulse*, JETP Lett. **66**, 209 (1997).

6. E.G. Mishchenko, *Electronic Raman Scattering in a Magnetic Field*, Phys. Rev. B **53**, 2083 (1996).

5. E.G. Mishchenko, *Effect of a Magnetic Field on the Raman Spectrum in a Metal*, JETP Lett. **62**, 752 (1995).

4. L.A. Falkovsky and E.G. Mishchenko, *Inelastic Light Scattering at Metal-Insulator Transition: Ripple and Elasto-Optic Mechanisms*, JETP Lett. **61**, 699 (1995).

3. E.G. Mishchenko and L.A. Falkovsky, *Long-Wavelength Optical Phonons: Damping, Surface Oscillations, and Raman Scattering*, JETP **80**, 531 (1995).

2. L.A. Falkovsky and E.G. Mishchenko, *Surface Excitations in Metals: Brillouin and Raman Light Scattering*, Phys. Rev. B **51**, 7239 (1995).

1. L.A. Falkovsky and E.G. Mishchenko, *Theory of Electronic Brillouin Scattering in Metals*, JETP Lett. **59**, 726 (1994).