Curriculum Vitae

Ilya Dodin

PPPL, PO Box 451, MS 27
Princeton, NJ 08543
C-Site, T165

609-933-4935
idodin@princeton.edu
www.princeton.edu/∼idodin

EDUCATION

PhD (2005), MA (2001) *in plasma physics*	**Princeton University** Department of Astrophysical Sciences
BS (1998), MS (2000) *in physics*	**Nizhniy Novgorod State University** Nizhniy Novgorod, Russia

RESEARCH APPOINTMENTS

since 01/2020	**Principal Research Physicist** Princeton Plasma Physics Laboratory
10/2015-12/2019	**Research Physicist** Princeton Plasma Physics Laboratory
11/2011-09/2015	**Staff Research Physicist** Princeton Plasma Physics Laboratory
11/2007-10/2011	**Associate Research Scholar** Princeton University
07/2005-11/2007	**Postdoctoral Research Associate** Princeton University

TEACHING APPOINTMENTS

since 02/2020	**Lecturer with the Rank of Professor** Department of Astrophysical Sciences, Princeton University
09/2009-02/2020	**Lecturer** Department of Astrophysical Sciences, Princeton University

VISITING APPOINTMENTS

06/2017-07/2017	**Visiting Associate Professor** National Institute for Fusion Science, Japan

RESEARCH INTERESTS

Basic plasma theory, wave theory and geometrical optics, radiofrequency waves, laser–plasma interactions, turbulence, ponderomotive effects, quantum–classical analogies, Hamiltonian mechanics.

AWARDS AND FELLOWSHIPS

- **Thomas H. Stix Award** for Outstanding Early Career Contributions to Plasma Physics Research, American Physical Society, 2014.
- **Young Scientist Prize** in Plasma Physics, International Union of Pure and Applied Physics, 2011.
- **Harold W. Dodds Fellowship**, Princeton University, academic year 2003-2004.
- **First Prize**, 7th Nizhniy Novgorod Session of Young Scientists, Nizhniy Novgorod, Russia, 2002.
- **First Year Merit Prize**, Princeton University, 1999.
- **Russian Government Fellowship**, Nizhniy Novgorod State University, academic year 1998-1999.
- **Soros Student Fellowship**, Open Society Institute Soros Fund, academic year 1994-1995.

SYNERGISTIC ACTIVITIES

- **Committee Member**, Selection Committee for the 2023 APS DPP John Dawson Award for Excellence in Plasma Physics Research.
- **Co-organizer**, Mini-conference on Plasma and Quantum Information Sciences, to be held at the 65th Annual Meeting of the APS Division of Plasma Physics (2023).
- **Co-organizer**, workshop *Working Across Scales in Complex Systems* (Atlanta, 2023, livingtheory.emory.edu/news-events/plasma_bio_workshop.html).
- **Editorial Board Member**, Physical Review E (2019-current).
- **Associate Editor**, Journal of Plasma Physics (2016-2017).
- **Chair of the Organizing Committee**, symposium *Solved and Unsolved Problems in Plasma Physics* (Princeton, 2016, fisch-fest2016.pppl.gov).
- **Session Chair**, APS DPP Annual Meetings (2019, 2016, 2008).
- **Committee Member**, Selection Committee for the 2015 APS Thomas H. Stix Award.
- **Lecturer**, National Undergraduate Fellowship Program (2011-2014).
- **Reviewer**, multiple journals and U.S. federal funding agencies.

PH.D. STUDENTS

- **Nicolas A. Lopez**, *Metaplectic geometrical optics*, Ph.D. thesis (Princeton University, 2022), arXiv:2210.03188.

- **Hongxuan Zhu**, *Phase-space theory of drift wave–zonal flow interactions and the Dimits shift*, Ph.D. thesis (Princeton University, 2020).
- **Daniel E. Ruiz**, *A geometric theory of waves and its applications to plasma physics*, Ph.D. thesis (Princeton University, 2017), arXiv:1708.05423.
- **Deepen Garg**, *Dispersive gravitational waves in gases and plasmas*, final public oral examination scheduled on 7/18/2023.
- **Suying Jin**, *Structure formation in magnetohydrodynamic turbulence* (ongoing).

INVITED TALKS, EXTERNAL SEMINARS, AND COLLOQUIA

1. *Quasilinear theory, collisions, and ponderomotive forces: a unification for general plasmas and beyond*, Plenary Talk, PL-27, 6th Asia Pacific Conference on Plasma Physics (AAPPS-DPP-2022), Oct 9-14, 2022.
2. *Waves in plasmas: is ray optics really limited to short wavelengths?*, Seminar (online), A*STAR, Singapore, Sep 20, 2022.
3. *Quasilinear theory: incorporating plasma inhomogeneity and collisions from first principles*, Invited Talk, 13th Plasma Kinetics Working Meeting, Vienna, Austria, Jul 25–Aug 5, 2022.
4. *Modern wave theory with applications to radiofrequency waves in plasma*, Review Talk (plenary), YR01.001, 63rd Annual Meeting of the APS Division of Plasma Physics, Pittsburgh, PA, Nov 8–12, 2021.
5. *Applications of modern geometrical optics to modeling radiofrequency waves and plasma turbulence*, Journal of Plasma Physics Frontiers of Plasma Physics Colloquium (online), Oct 28, 2021.
6. *Does quantum computing look promising for plasma simulations?*, Seminar (online), Instituto Superior Técnico, Lisbon, Portugal, Dec 18, 2020.
7. *Plasma physics of waves and turbulence*, Seminar (online), UC Berkeley, Oct 16, 2020.
8. *Theory of mode-converting quasioptical wave beams in inhomogeneous plasma*, Invited Talk, US–Japan Workshop on RF Heating Physics, Princeton, NJ, Sep 4–6, 2019.
9. *Cross-scale interactions and the Dimits shift in reduced models of drift-wave turbulence*, Invited Talk, 12th Plasma Kinetics Working Meeting, Vienna, Austria, Jul 29 – Aug 9, 2019.
10. *Modeling drift-wave turbulence as quantumlike plasma*, Invited Talk, 46th EPS Conference on Plasma Physics, Milan, Italy, Jul 8–12, 2019.
11. *Understanding the dynamics of zonal flows through quantumlike modeling of drift-wave turbulence*, Plasma Physics Seminar, University of Maryland, Jun 12, 2019.
12. *Structure from turbulence*, Theoretical Physics Colloquium, University of Oxford, Oxford, UK, May 3, 2019.
13. *Quantumlike modeling of drift-wave turbulence: recent updates*, Plasma Theory Group Seminar, University of Oxford, Oxford, UK, May 2, 2019.

14. *Mode-converting wave beams can be simulated without full-wave codes*, Invited Talk, Sherwood Fusion Theory Conference, Princeton, NJ, Apr 15–17, 2019.

15. *Structure from turbulence, or why you might want to care about plasma physics even if you are not a plasma physicist*, Invited Seminar, Max Planck Institute for Gravitational Physics (Albert Einstein Institute), Potsdam, Germany, Mar 28, 2019.

16. *Inhomogeneous drift-wave turbulence as an effective quantum plasma*, Invited Talk, 11th Plasma Kinetics Working Meeting, Vienna, Austria, Jul 23 – Aug 3, 2018.

17. *Inhomogeneous wave turbulence as an effective quantum plasma: a study of zonal flows*, Invited Talk, SIAM Conference on Nonlinear Waves and Coherent Structures, Orange, CA, Jun 11–14, 2018.

18. *Does a photon have a linear polarizability and why does it matter?*, Magneto-Fluid Dynamics Seminar, CIMS, NYU, Oct 10, 2017.

19. *Quantumlike physics in classical plasmas*, Physics Colloquium, University of Massachusetts Boston, Sep 24, 2015.

20. *Modernizing and advancing the understanding of plasma waves: field-theoretical paradigm*, Online Town Hall Meeting on Theory and Computation, Frontiers of Plasma Science Workshop series, Aug 5, 2015.

21. *The ponderomotive effect beyond the ponderomotive force*, Invited Talk, 56th Annual Meeting of the APS Division of Plasma Physics, New Orleans, LA, Oct 27–31, 2014.

22. *Nonlinear plasma waves with trapped particles: variational theory and simulations*, Invited Talk, 5th International Conference "Frontiers of Nonlinear Physics", Nizhny Novgorod, Russia, Jul 28 – Aug 2, 2013.

23. *Lagrangian and geometrical methods in the fundamental physics of waves and their application to plasma dynamics*, Invited Talk, 6th ITER International School on RF Heating and Current Drive in Plasmas, Ahmedabad, India, Dec 2–6, 2012.

24. *Quantum physics of classical waves in plasma*, Invited Talk, 54th Annual Meeting of the APS Division of Plasma Physics, Providence, RI, Oct 29 – Nov 2, 2012.

25. *Axiomatic approach to wave-particle interactions and its applications to waves with trapped particles*, Invited Talk, Sherwood Fusion Theory Conference (held in conjunction with the APS April Meeting), Atlanta, GA, Mar 30 – Apr 3, 2012.

26. *Ponderomotive forces and wave dispersion: two sides of the same coin*, Invited Talk, 30th International Conference on the Phenomena in Ionized Gases, Belfast, UK, Aug 28 – Sep 2, 2011.

27. *Nonlinear dispersion and conservation theorems for adiabatic waves in collisionless plasmas*, Invited Talk, 3rd International Conference on High Energy Density Physics, Lisbon, Portugal, May 17–20, 2011.

28. *Compressing linear waves trapped in plasma*, Invited Talk, 40th Winter Colloquium on the Physics of Quantum Electronics, Snowbird, UT, Jan 3–7, 2010.

29. *Non-Newtonian mechanics and manipulation of oscillation centers*, Invited Talk, International Workshop on the Frontiers of Modern Plasma Physics, ICTP, Trieste, Italy, Jul 14–25, 2008.

30. *Classical analogues of atom manipulation techniques using laser radiation*, Invited Talk, International Workshop on Quantum Reflection, ITAMP, Harvard University, Cambridge, MA, Oct 21–24, 2007.

31. *Particle manipulation with nonadiabatic ponderomotive forces*, Invited Talk, 15th International Conference on Atomic Processes in Plasmas, Gaithersburg, MD, Mar 19–22, 2007.

32. *Manipulating the particle phase space with nonadiabatic ponderomotive barriers*, Invited Talk, 47th Annual Meeting of the APS Division of Plasma Physics, Philadelphia, PA, Oct 30 – Nov 3, 2006.

33. *Precise manipulations of the particle phase space with nonadiabatic ponderomotive barriers*, Invited Talk, Attosecond Science Workshop, Santa Barbara, CA, Jul 31 – Sep 15, 2006.

34. *Nonadiabatic ponderomotive barriers*, Invited Talk, International Conference on Plasma Science ICOPS 2006, Traverse City, MI, Jun 4–8, 2006.

35. *Nonadiabatic ponderomotive barriers*, Invited Talk, Sherwood Fusion Theory Conference (held in conjunction with the APS April Meeting), Dallas, TX, Apr 22–25, 2006.

PUBLICATIONS

1. D. Garg and I. Y. Dodin, *Self-consistent interaction of linear gravitational and electromagnetic waves in non-magnetized plasma*, arXiv:2307.05844.

2. D. Garg and I. Y. Dodin, *Gauge-invariant gravitational waves in matter beyond linearized gravity*, arXiv:2106.05062.

3. Y. Fu, I. Y. Dodin, and H. Qin, *Spin Hall effect of radiofrequency waves in magnetized plasmas*, Phys. Rev. E **107**, 055210 (2023), https://doi.org/10.1103/PhysRevE.107.055210.

4. I. Novikau, I. Y. Dodin, and E. A. Startsev, *Simulation of linear non-Hermitian boundary-value problems with quantum singular-value transformation*, Phys. Rev. Appl. **19**, 054012 (2023), https://doi.org/10.1103/physrevapplied.19.054012.

5. D. Garg and I. Y. Dodin, *Gauge invariants of linearized gravity with a general background metric*, Class. Quantum Gravity **39**, 245003 (2022), https://doi.org/10.1088/1361-6382/aca067.

6. D. Garg and I. Y. Dodin, *Gravitational wave modes in matter*, J. Cosmol. Astropart. Phys. **2022**, 017 (2022), https://doi.org/10.1088/1475-7516/2022/08/017.

7. I. Y. Dodin, *Quasilinear theory for inhomogeneous plasma*, J. Plasma Phys. **88**, 905880407 (2022), https://doi.org/10.1017/S0022377822000502.

8. I. Novikau, E. A. Startsev, and I. Y. Dodin, *Quantum signal processing for simulating cold plasma waves*, Phys. Rev. A **105**, 062444 (2022), https://doi.org/10.1103/physreva.105.062444.

9. N. A. Lopez and I. Y. Dodin, *Metaplectic geometrical optics for ray-based modeling of caustics: theory and algorithms*, Phys. Plasmas **29**, 052111 (2022), https://doi.org/10.1063/5.0082241.

10. K. Yanagihara, I. Y. Dodin, and S. Kubo, *Quasioptical modeling of wave beams with and without mode conversion. IV. Numerical simulations of waves in dissipative media*, Phys. Plasmas **28**, 122102 (2021), https://doi.org/10.1063/5.0057345.

11. K. Yanagihara, S. Kubo, I. Y. Dodin, and the LHD Experiment Group, *Quasioptical propagation and absorption of electron cyclotron waves: simulations and experiment*, Nucl. Fusion **61**, 106012 (2021), https://doi.org/10.1088/1741-4326/ac1d86.

12. I. Y. Dodin and E. A. Startsev, *On applications of quantum computing to plasma simulations*, Phys. Plasmas **28**, 092101 (2021), https://doi.org/10.1063/5.0056974.

13. S. M. Donnelly, N. A. Lopez, and I. Y. Dodin, *Steepest-descent algorithm for simulating plasma-wave caustics via metaplectic geometrical optics*, Phys. Rev. E **104**, 025304 (2021), https://doi.org/10.1103/physreve.104.025304.

14. N. A. Lopez and I. Y. Dodin, *Exactly unitary discrete representations of the metaplectic transform for linear-time algorithms*, J. Opt. Soc. Am. A **38**, 634 (2021), https://doi.org/10.1364/josaa.417412.

15. H. Zhu and I. Y. Dodin, *Wave-kinetic approach to zonal-flow dynamics: recent advances*, Phys. Plasmas **28**, 032303 (2021), https://doi.org/10.1063/5.0043784.

16. N. A. Lopez and I. Y. Dodin, *Metaplectic geometrical optics for modeling caustics in uniform and nonuniform media*, J. Opt. **23**, 025601 (2021), https://doi.org/10.1088/2040-8986/abd1ce.

17. D. Garg and I. Y. Dodin, *Average nonlinear dynamics of particles in gravitational pulses: effective Hamiltonian, secular acceleration, and gravitational susceptibility*, Phys. Rev. D **102**, 064012 (2020), https://doi.org/10.1103/physrevd.102.064012.

18. N. A. Lopez and I. Y. Dodin, *Restoring geometrical optics near caustics using sequenced metaplectic transforms*, New J. Phys. **22**, 083078 (2020), https://doi.org/10.1088/1367-2630/aba91a.

19. H. Zhu, Y. Zhou, and I. Y. Dodin, *Theory of the tertiary instability and the Dimits shift within a scalar model*, J. Plasma Phys. **86**, 905860405 (2020), https://doi.org/10.1017/S0022377820000823.

20. M. A. Oancea, J. Joudioux, I. Y. Dodin, D. E. Ruiz, C. F. Paganini, and L. Andersson, *Gravitational spin Hall effect of light*, Phys. Rev. D **102**, 024075 (2020), https://doi.org/10.1103/PhysRevD.102.024075.

21. V. Tsiolis, Y. Zhou, and I. Y. Dodin, *Structure formation in turbulence as an instability of effective quantum plasma*, Phys. Lett. A **384**, 126377 (2020), https://doi.org/10.1016/j.physleta.2020.126377.

22. Y. Zhou, H. Zhu, and I. Y. Dodin, *Solitary zonal structures in subcritical drift waves: a minimum model*, Plasma Phys. Control. Fusion **62**, 045021 (2020), https://doi.org/10.1088/1361-6587/ab78f3.

23. H. Zhu, Y. Zhou, and I. Y. Dodin, *Theory of the tertiary instability and the Dimits shift from reduced drift-wave models*, Phys. Rev. Lett. **124**, 055002 (2020), https://doi.org/10.1103/PhysRevLett.124.055002.

24. N. A. Lopez and I. Y. Dodin, *Pseudo-differential representation of the metaplectic transform and its application to fast algorithms*, J. Opt. Soc. Am. A **36**, 1846 (2019), https://doi.org/10.1364/JOSAA.36.001846.

25. K. Yanagihara, I. Y. Dodin, and S. Kubo, *Quasioptical modeling of wave beams with and without mode conversion. III. Numerical simulations of mode-converting beams*, Phys. Plasmas **26**, 072112 (2019), https://doi.org/10.1063/1.5095174.

26. K. Yanagihara, I. Y. Dodin, and S. Kubo, *Quasioptical modeling of wave beams with and without mode conversion. II. Numerical simulations of single-mode beams*, Phys. Plasmas **26**, 072111 (2019), https://doi.org/10.1063/1.5095173.

27. I. Y. Dodin, D. E. Ruiz, K. Yanagihara, Y. Zhou, and S. Kubo, *Quasioptical modeling of wave beams with and without mode conversion. I. Basic theory*, Phys. Plasmas **26**, 072110 (2019), https://doi.org/10.1063/1.5095076.

28. K. Yanagihara, S. Kubo, T. I. Tsujimura, and I. Y. Dodin, *Mode purity of electron cyclotron waves after their passage through the peripheral plasma in the Large Helical Device*, Plasma and Fusion Research **14**, 3403103 (2019), https://doi.org/10.1585/pfr.14.3403103.

29. H. Zhu, Y. Zhou, and I. Y. Dodin, *Nonlinear saturation and oscillations of collisionless zonal flows*, New J. Phys. **21**, 063009 (2019), https://doi.org/10.1088/1367-2630/ab2251.

30. Y. Zhou, H. Zhu, and I. Y. Dodin, *Formation of solitary zonal structures via the modulational instability of drift waves*, Plasma Phys. Controlled Fusion **61**, 075003 (2019), https://doi.org/10.1088/1361-6587/ab16a8.

31. D. E. Ruiz, M. E. Glinsky, and I. Y. Dodin, *Wave kinetic equation for inhomogeneous drift-wave turbulence beyond the quasilinear approximation*, J. Plasma Phys. **85**, 905850101 (2019), https://doi.org/10.1017/S0022377818001307.

32. H. Zhu, Y. Zhou, and I. Y. Dodin, *On the Rayleigh–Kuo criterion for the tertiary instability of zonal flows*, Phys. Plasmas **25**, 082121 (2018), https://doi.org/10.1063/1.5038859.

33. H. Zhu, Y. Zhou, and I. Y. Dodin, *On the structure of the drifton phase space and its relation to the Rayleigh–Kuo criterion of the zonal-flow stability*, Phys. Plasmas **25**, 072121 (2018), https://doi.org/10.1063/1.5039652.

34. H. Zhu, Y. Zhou, D. E. Ruiz, and I. Y. Dodin, *Wave kinetics of drift-wave turbulence and zonal flows beyond the ray approximation*, Phys. Rev. E **97**, 053210 (2018), https://doi.org/10.1103/PhysRevE.97.053210.

35. I. Y. Dodin, D. E. Ruiz, and S. Kubo, *Mode conversion in cold low-density plasma with a sheared magnetic field*, Phys. Plasmas **24**, 122116 (2017), https://doi.org/10.1063/1.5003931.

36. A. V. Arefiev, I. Y. Dodin, A. Kohn, E. J. Du Toit, E. Holzhauer, V. F. Shevchenko, and R. G. L. Vann, *Kinetic simulations of X–B and O–X–B mode conversion and its deterioration at high input power*, Nucl. Fusion **57**, 116024 (2017), https://doi.org/10.1088/1741-4326/aa7e43.

37. K. Hara, I. Barth, E. Kaminski, I. Y. Dodin, and N. J. Fisch, *Kinetic simulations of ladder climbing by electron plasma waves*, Phys. Rev. E **95**, 053212 (2017), https://doi.org/10.1103/PhysRevE.95.053212.

38. I. Y. Dodin and A. V. Arefiev, *Parametric decay of plasma waves near the upper-hybrid resonance*, Phys. Plasmas **24**, 032119 (2017), https://doi.org/10.1063/1.4979168.

39. I. Y. Dodin, A. I. Zhmoginov, and D. E. Ruiz, *Variational principles for dissipative (sub)systems, with applications to the theory of linear dispersion and geometrical optics*, Phys. Lett. A **381**, 1411 (2017), https://doi.org/10.1016/j.physleta.2017.02.023.

40. D. E. Ruiz and I. Y. Dodin, *Extending geometrical optics: a Lagrangian theory for vector waves*, Phys. Plasmas **24**, 055704 (2017), https://doi.org/10.1063/1.4977537.

41. D. E. Ruiz and I. Y. Dodin, *Ponderomotive dynamics of waves in quasiperiodically modulated media*, Phys. Rev. A **95**, 032114 (2017), https://doi.org/10.1103/PhysRevA.95.032114.

42. I. Y. Dodin and D. E. Ruiz, *Photon polarizability and its effect on the dispersion of plasma waves*, J. Plasma Phys. **83**, 905830201 (2017), https://doi.org/10.1017/S0022377817000198.

43. D. E. Ruiz, J. B. Parker, E. L. Shi, and I. Y. Dodin, *Zonal-flow dynamics from a phase-space perspective*, Phys. Plasmas **23**, 122304 (2016), https://doi.org/10.1063/1.4971813.

44. A. A. Balakin, I. Y. Dodin, G. M. Fraiman, and N. J. Fisch, *Backward Raman amplification of broad-band pulses*, Phys. Plasmas **23**, 083115 (2016), https://doi.org/10.1063/1.4960835.

45. D. E. Ruiz, C. L. Ellison, and I. Y. Dodin, *Relativistic ponderomotive Hamiltonian of a Dirac particle in a vacuum laser field*, Phys. Rev. A **92**, 062124 (2015), https://doi.org/10.1103/PhysRevA.92.062124.

46. D. E. Ruiz and I. Y. Dodin, *First-principles variational formulation of polarization effects in geometrical optics*, Phys. Rev. A **92**, 043805 (2015), https://doi.org/10.1103/PhysRevA.92.043805.

47. D. E. Ruiz and I. Y. Dodin, *On the correspondence between quantum and classical variational principles*, Phys. Lett. A **379**, 2623 (2015), https://doi.org/10.1016/j.physleta.2015.06.014.

48. C. Liu and I. Y. Dodin, *Nonlinear frequency shift of electrostatic waves in general collisionless plasma: unifying theory of fluid and kinetic nonlinearities*, Phys. Plasmas **22**, 082117 (2015), https://doi.org/10.1063/1.4928585.

49. D. E. Ruiz and I. Y. Dodin, *Lagrangian geometrical optics of nonadiabatic vector waves and spin particles*, Phys. Lett. A **379**, 2337 (2015), https://doi.org/10.1016/j.physleta.2015.07.038.

50. I. Barth, I. Y. Dodin, and N. J. Fisch, *Ladder climbing and autoresonant acceleration of plasma waves*, Phys. Rev. Lett. **115**, 075001 (2015), https://doi.org/10.1103/PhysRevLett.115.075001.

51. A. A. Balakin, G. M. Fraiman, and I. Y. Dodin, *Two-stage Raman compression of laser pulses with controllable phase fronts*, Phys. Plasmas **22**, 053112 (2015), https://doi.org/10.1063/1.4921654.

52. I. Y. Dodin, *Comment on "Formation of phase space holes and clumps"*, Phys. Rev. Lett. **113**, 179501 (2014), https://doi.org/10.1103/PhysRevLett.113.179501.

53. I. Y. Dodin and N. J. Fisch, *Are perytons signatures of ball lightning?*, Ap. J. **794**, 98 (2014), https://doi.org/10.1088/0004-637X/794/2/98.

54. I. Y. Dodin and N. J. Fisch, *Ponderomotive forces on waves in modulated media*, Phys. Rev. Lett. **112**, 205002 (2014), https://doi.org/10.1103/PhysRevLett.112.205002.

55. I. Y. Dodin, *Geometric view on noneikonal waves*, Phys. Lett. A **378**, 1598 (2014), https://doi.org/10.1016/j.physleta.2014.04.004.

56. I. Y. Dodin and N. J. Fisch, *On the nature of kinetic electrostatic electron nonlinear (KEEN) waves*, Phys. Plasmas **21**, 034501 (2014), https://doi.org/10.1063/1.4868230.

57. I. Y. Dodin, *On variational methods in the physics of plasma waves*, Fusion Sci. Tech. **65**, 54 (2014), https://doi.org/10.13182/FST13-641.

58. X. Guan, I. Y. Dodin, H. Qin, J. Liu, and N. J. Fisch, *On plasma rotation induced by waves in tokamaks*, Phys. Plasmas **20**, 102105 (2013), https://doi.org/10.1063/1.4823713.

59. I. Y. Dodin, P. F. Schmit, J. Rocks, and N. J. Fisch, *Negative-mass instability in nonlinear plasma waves*, Phys. Rev. Lett. **110**, 215006 (2013), https://doi.org/10.1103/PhysRevLett.110.215006.

60. P. F. Schmit, I. Y. Dodin, J. Rocks, and N. J. Fisch, *Nonlinear amplification and decay of phase-mixed waves in compressing plasma*, Phys. Rev. Lett. **110**, 055001 (2013), https://doi.org/10.1103/PhysRevLett.110.055001.

61. I. Y. Dodin and N. J. Fisch, *Axiomatic geometrical optics, Abraham–Minkowski controversy, and photon properties derived classically*, Phys. Rev. A **86**, 053834 (2012), https://doi.org/10.1103/PhysRevA.86.053834.

62. I. Y. Dodin and N. J. Fisch, *Adiabatic nonlinear waves with trapped particles: III. Wave dynamics*, Phys. Plasmas **19**, 012104 (2012), https://doi.org/10.1063/1.3673065.

63. I. Y. Dodin and N. J. Fisch, *Adiabatic nonlinear waves with trapped particles: II. Wave dispersion*, Phys. Plasmas **19**, 012103 (2012), https://doi.org/10.1063/1.3662115.

64. I. Y. Dodin and N. J. Fisch, *Adiabatic nonlinear waves with trapped particles: I. General formalism*, Phys. Plasmas **19**, 012102 (2012), https://doi.org/10.1063/1.3654030.

65. I. Y. Dodin and N. J. Fisch, *Nonlinear dispersion of stationary waves in collisionless plasmas*, Phys. Rev. Lett. **107**, 035005 (2011), https://doi.org/10.1103/PhysRevLett.107.035005.

66. P. F. Schmit, I. Y. Dodin, and N. J. Fisch, *New wave effects in compressing plasma*, IEEE Trans. Plasma Sci. **39**, 2490 (2011), https://doi.org/10.1109/TPS.2011.2132151.

67. P. F. Schmit, I. Y. Dodin, and N. J. Fisch, *Evolution of nonlinear waves in compressing plasma*, Phys. Plasmas **18**, 042103 (2011), https://doi.org/10.1063/1.3574343.

68. P. F. Schmit, C. R. Mooney, I. Y. Dodin, and N. J. Fisch, *Evolution of the bump-on-tail instability in compressing plasma*, J. Plasma Phys. **77**, 629 (2011), https://doi.org/10.1017/S0022377810000747.

69. A. I. Zhmoginov, I. Y. Dodin, and N. J. Fisch, *A Hamiltonian model of dissipative wave-particle interactions and the negative-mass effect*, Phys. Lett. A **375**, 1236 (2011), https://doi.org/10.1016/j.physleta.2011.01.041.

70. I. Y. Dodin and N. J. Fisch, *Vlasov equation and collisionless hydrodynamics adapted to curved space-time*, Phys. Plasmas **17**, 112118 (2010), https://doi.org/10.1063/1.3497005.

71. I. Y. Dodin and N. J. Fisch, *Damping of linear waves via ionization and recombination in homogeneous plasmas*, Phys. Plasmas **17**, 112113 (2010), https://doi.org/10.1063/1.3514166.

72. P. F. Schmit, I. Y. Dodin, and N. J. Fisch, *Controlling hot electrons by wave amplification and decay in compressing plasma*, Phys. Rev. Lett. **105**, 175003 (2010), https://doi.org/10.1103/PhysRevLett.105.175003.

73. I. Y. Dodin and N. J. Fisch, *On the evolution of linear waves in cosmological plasmas*, Phys. Rev. D **82**, 044044 (2010), https://doi.org/10.1103/PhysRevD.82.044044.

74. I. Y. Dodin and N. J. Fisch, *On generalizing the K–χ theorem*, Phys. Lett. A **374**, 3472 (2010), https://doi.org/10.1016/j.physleta.2010.06.030.

75. A. I. Zhmoginov, I. Y. Dodin, and N. J. Fisch, *Negative effective mass of wave-driven classical particles in dielectric media*, Phys. Rev. E **81**, 036404 (2010), https://doi.org/10.1103/PhysRevE.81.036404.

76. V. I. Geyko, I. Y. Dodin, N. J. Fisch, and G. M. Fraiman, *Supra-bubble regime for laser acceleration of cold electron beams in tenuous plasma*, Phys. Plasmas **17**, 023105 (2010), https://doi.org/10.1063/1.3309488.

77. I. Y. Dodin, V. I. Geyko, and N. J. Fisch, *Langmuir wave linear evolution in inhomogeneous nonstationary anisotropic plasma*, Phys. Plasmas **16**, 112101 (2009), https://doi.org/10.1063/1.3250983.

78. V. I. Geyko, G. M. Fraiman, I. Y. Dodin, and N. J. Fisch, *Ponderomotive acceleration of hot electrons in tenuous plasmas*, Phys. Rev. E **80**, 036404 (2009), https://doi.org/10.1103/PhysRevE.80.036404.

79. I. Y. Dodin and N. J. Fisch, *Dressed-particle approach in the nonrelativistic classical limit*, Phys. Rev. E **79**, 026407 (2009), https://doi.org/10.1103/PhysRevE.79.026407.

80. I. Y. Dodin and N. J. Fisch, *Charged particle acceleration in dense plasma channels*, Phys. Plasmas **15**, 103105 (2008), https://doi.org/10.1063/1.2988772.

81. I. Y. Dodin and N. J. Fisch, *Diffusion paths in resonantly driven Hamiltonian systems*, Phys. Lett. A **372**, 6112 (2008), https://doi.org/10.1016/j.physleta.2008.08.012.

82. I. Y. Dodin, A. I. Zhmoginov, and N. J. Fisch, *Manley–Rowe relations for an arbitrary discrete system*, Phys. Lett. A **372**, 6094 (2008), https://doi.org/10.1016/j.physleta.2008.08.011.

83. I. Y. Dodin and N. J. Fisch, *Positive and negative effective mass of classical particles in oscillatory and static fields*, Phys. Rev. E **77**, 036402 (2008), https://doi.org/10.1103/PhysRevE.77.036402.

84. I. Y. Dodin and N. J. Fisch, *Stochastic extraction of periodic attosecond bunches from relativistic electron beams*, Phys. Rev. Lett. **98**, 234801 (2007), https://doi.org/10.1103/PhysRevLett.98.234801.

85. I. Y. Dodin and N. J. Fisch, *Particle manipulation with nonadiabatic ponderomotive forces*, Phys. Plasmas **14**, 055901 (2007), https://doi.org/10.1063/1.2436149.

86. I. Y. Dodin and N. J. Fisch, *Nonadiabatic tunneling in ponderomotive barriers*, Phys. Rev. E **74**, 056404 (2006), https://doi.org/10.1103/PhysRevE.74.056404.

87. I. Y. Dodin and N. J. Fisch, *Correction to the Alfvén–Lawson criterion for relativistic electron beams*, Phys. Plasmas **13**, 103104 (2006), https://doi.org/10.1063/1.2358970.

88. I. Y. Dodin and N. J. Fisch, *Nonadiabatic ponderomotive potentials*, Phys. Lett. A **349**, 356 (2006), https://doi.org/10.1016/j.physleta.2005.09.049.

89. I. Y. Dodin and N. J. Fisch, *Ponderomotive ratchet in a uniform magnetic field*, Phys. Rev. E **72**, 046602 (2005), https://doi.org/10.1103/PhysRevE.72.046602.

90. I. Y. Dodin and N. J. Fisch, *Quantumlike dynamics of classical particles in ponderomotive potentials*, Phys. Rev. Lett. **95**, 115001 (2005), https://doi.org/10.1103/PhysRevLett.95.115001.

91. I. Y. Dodin and N. J. Fisch, *Variational formulation of the Gardner's restacking algorithm*, Phys. Lett. A **341**, 187 (2005), https://doi.org/10.1016/j.physleta.2005.04.078.

92. I. Y. Dodin and N. J. Fisch, *Approximate integrals of radiofrequency-driven particle motion in magnetic field*, J. Plasma Phys. **71**, 289 (2005), https://doi.org/10.1017/S0022377804003174.

93. I. Y. Dodin, N. J. Fisch, and J. M. Rax, *Ponderomotive barrier as a Maxwell demon*, Phys. Plasmas **11**, 5046 (2004), https://doi.org/10.1063/1.1787771.

94. I. Y. Dodin and N. J. Fisch, *Relativistic electron acceleration in focused laser fields after above-threshold ionization*, Phys. Rev. E **68**, 056402 (2003), https://doi.org/10.1103/PhysRevE.68.056402.

95. N. J. Fisch, J. M. Rax, and I. Y. Dodin, *Current drive in a ponderomotive potential with sign reversal*, Phys. Rev. Lett. **91**, 205004 (2003), Erratum: Phys. Rev. Lett. **93**, 059902(E) (2004), https://doi.org/10.1103/PhysRevLett.91.205004.

96. I. Y. Dodin, N. J. Fisch, and G. M. Fraiman, *Drift Lagrangian for relativistic particle in intense laser field*, Pis'ma Zh. Eksp. Teor. Fiz. **78**, 238 (2003), English translation: JETP Lett. **78**, 202 (2003), https://doi.org/10.1134/1.1622032.

97. I. Y. Dodin and N. J. Fisch, *Dynamic volume holography and optical information processing by Raman scattering*, Opt. Comm. **214**, 83 (2002), https://doi.org/10.1016/S0030-4018(02)02144-2.

98. I. Y. Dodin, G. M. Fraiman, V. M. Malkin, and N. J. Fisch, *Amplification of short laser pulses by Raman backscattering in capillary plasmas*, Zh. Eksp. Teor. Fiz. **122**, 723 (2002), English translation: JETP **95**, 625 (2002), https://doi.org/10.1134/1.1520595.

99. I. Y. Dodin and N. J. Fisch, *Storing, retrieving, and processing optical information by Raman backscattering in plasmas*, Phys. Rev. Lett. **88**, 165001 (2002), https://doi.org/10.1103/PhysRevLett.88.165001.

100. I. Y. Dodin and N. J. Fisch, *Alfvén wave tomography for cold magnetohydrodynamic plasmas*, Phys. Plasmas **9**, 760 (2002), https://doi.org/10.1063/1.1448499.

101. I. Y. Dodin and N. J. Fisch, *Motion of charged particles near magnetic-field discontinuities*, Phys. Rev. E **64**, 016405 (2001), https://doi.org/10.1103/PhysRevE.64.016405.

102. V. L. Bratman, I. E. Dodin, and D. A. Lukovnikov, *To the problem of single-mode operation in Smith–Purcell FEM*, Intl. J. Infrared Millimeter Waves **20**, 991 (1999), https://doi.org/10.1023/A:1021751901641.

CONFERENCE PAPERS AND OTHER NON-REFEREED PUBLICATIONS

1. I. Y. Dodin, I. Novikau, and E. A. Startsev, *Quantum computing for modeling of classical systems*, position paper, ASCR Basic Research Needs in Quantum Computing and Networking (2023).

2. I. Y. Dodin and E. A. Startsev, *Quantum computation of nonlinear maps*, arXiv:2105.07317.

3. I. Y. Dodin, H. Zhu, Y. Zhou, and D. E. Ruiz, *Modeling drift-wave turbulence as quantumlike plasma*, in Proceedings of the 46th EPS Conference on Plasma Physics (Milan, Italy, 2019).

4. I. Y. Dodin, D. E. Ruiz, Y. Zhou, and H. Zhu, *Plasma is turbulence, and turbulence is plasma*, white paper for the Decadal Assessment of Plasma Science – Plasma 2020 (first edition); white paper for APS-DPP-CPP (second edition).

5. I. Y. Dodin, *Plasma science as a science*, white paper, in *Frontiers of Plasma Science Workshops* (2015).

6. I. Y. Dodin and N. J. Fisch, *Fundamental variational theory of plasma waves*, Town Hall Meeting, Frontiers of Plasma Science Workshops (2015).

7. I. Y. Dodin, *Nonlinear plasma waves with autoresonantly trapped particles: variational theory and simulations*, 5th International Conference "Frontiers of Nonlinear Physics", Nizhniy Novgorod, Russia, Jul 28 – Aug 2, 2013.

8. I. Y. Dodin and N. J. Fisch, *Surfatron acceleration along magnetic field by oblique electrostatic waves*, arXiv:1111.4638.

9. I. Y. Dodin, *Ponderomotive forces and wave dispersion: two sides of the same coin*, 30th International Conference on the Phenomena in Ionized Gases, Belfast, UK, Aug 28 – Sep 2, 2011, arXiv:1107.2852.

10. I. Y. Dodin and N. J. Fisch, *Non-Newtonian mechanics of oscillation centers*, AIP Proc. **1061**, 263 (2008), in *Frontiers in Modern Plasma Physics: International Workshop on the Frontiers of Modern Plasma Physics, ICTP, Trieste, Italy, Jul 14–25* (AIP, New York, 2008), https://doi.org/10.1063/1.3013777.

11. I. E. Dodin and G. M. Fraiman, *Short laser pulses amplification in oversized dielectric capillary plasmas*, Priklad. Fizika **5**, 28 (2002), in Russian.

12. N. J. Fisch and I. Y. Dodin, *Possibilities in processing optical information in plasma*, in Proceedings of the 29th EPS Conference on Plasma Phys. and Contr. Fusion (Montreux, Switzerland, 2002).