

CYRILL B. MURATOV

Professor

Dipartimento di Matematica, Università di Pisa

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EDUCATION

- **Ph. D. in Physics**

Dissertation: “Theory of domain patterns in systems with long-range interactions of Coulombic type,” Boston University, Boston, MA, January 1998

- **M. S. in Applied Mathematics and Physics, with Honors**

Moscow Institute of Physics and Technology, Department of General and Applied Physics, Moscow, Russia, June 1993

EMPLOYMENT

- **Professor**, Dipartimento di Matematica, Università di Pisa, Fall 2022 – present
- **Professor**, Department of Mathematical Sciences, New Jersey Institute of Technology, Summer 2014 – Spring 2024
- **Associate Professor**, Department of Mathematical Sciences, New Jersey Institute of Technology, Summer 2006 – Spring 2014
- **Assistant Professor**, Department of Mathematical Sciences, New Jersey Institute of Technology, Summer 2001 – Spring 2006
- **Visiting Assistant Professor**, Department of Mathematical Sciences, New Jersey Institute of Technology, Fall 1999 – Spring 2001
- **Visiting Member**, Courant Institute of Mathematical Sciences, Summer 1997 – Fall 1999

VISITING POSITIONS

- Brookline Advanced Algorithms Institute, Boston, MA: Fall 2021 – present
- CNRS, Laboratoire de Physique et Chimie des Nano-objets, INSA, Toulouse: Summer 2019
- Isaac Newton Institute, University of Cambridge: Spring 2019
- Courant Institute of Mathematical Sciences: Spring 2008, Spring 2010, Spring 2012, Fall 2014, Spring 2015
- Max Planck Institute for Mathematics in the Sciences: Summer 2014
- NASA Ames Research Center: Summer 2008, Winter 2009, Winter 2015
- University of Pisa: Fall 2007
- *Short-term visits*: Basque Center for Applied Mathematics; University of Bonn; Bristol University; Polytechnic University of Catalonia; UCSB; UCLA; University of Chicago; University of Connecticut; Technical University of Eindhoven; Fields Institute, Toronto; Lorentz Center, Leiden; University of Marseille; Max Planck Institute, Leipzig; Mauro Picone Center for Analysis and Applications, Rome; Mittag-Leffler Institute, Stockholm; National Autonomous University of Mexico; University of Minnesota; University of Paris XI; University of Pisa; Institute Henri Poincaré, Paris; Princeton University; University of Rome III; Stanford University; Swansea University; University of Padua; UT Austin; University of Tokyo; University of Verona

RESEARCH INTERESTS

- Calculus of variations, analysis of nonlinear PDEs, mathematical physics
- Pattern formation and front propagation phenomena
- Reaction-diffusion equations and their applications to embryonic development
- Stochastic analysis of rare events
- Multiphysics modeling

GRANTS AND AWARDS

- *Magnetic skyrmions, skyrmionic bubbles and domain walls for spintronic applications*, P2022WJW9H, PRIN 2022 PNRR, January 2024 – December 2025, €225,000.
- *Coherent structures in nanomagnetism*, DMS-1908709, NSF, July 2019 – June 2023, \$354,300.
- *Magnetization dynamics at nanoscale*, DMS-1614948, NSF, July 2016 – June 2020, \$360,000.
- *A spectral mass gauging concept for large-scale cryogenic propellant tanks*, NASA Grant NNX15AT36A, September, 2015 – May, 2016, \$50,000.
- *Modeling and numerical study of explosive boiling in well wetting fluids under microgravity*, Universities Space Research Association, subcontract under NASA Grant NNX12AK33A, April 2014 – September 2014, \$50,000.
- *Deterministic and stochastic magnetization dynamics in thin ferromagnetic films and devices*, DMS-1313687, NSF, July 2013 – June 2016, \$375,577.
- *Strongly non-equilibrium phenomena at H₂ and O₂ phase boundaries*, NASA Grant NNX12AF82G, February 2012 – September 2013, \$199,000.
- *Collaborative Research: Dynamics of Morphogen Gradients*, DMS-1119724, NSF, October 2011 – 2014, \$249,999.
- *Upper stage engine uncontrollable failure analysis*, NASA Grant NNX10AC65G, January – December, 2010, \$155,000.
- *Winding domain walls in thin ferromagnetic films*, DMS-0908279, NSF, July 2009 – 2014, \$370,957.
- *Collaborative Research: Analysis of spatiotemporal signal processing in developmental patterning*, DMS-0718027, NSF, July 2007 – 2010, \$155,000.
- *Collaborative Research: Multiscale analysis of epithelial patterning: modeling and experiments*, NIH R01 GM076690, July 2005 – 2008, \$204,379.
- *Collaborative research: modeling and computational analysis of cell communication in Drosophila oogenesis*, DMS-0211864, NSF, August 2002 – 2005, \$104,378.
- Plenary lecture, SIAM Conference on Mathematical Aspects of Materials Science, May 2021.
- Visiting Fellowship, LABEX NEXT “Nano, Mesures EXtrêmes et Théorie”, INSA, Toulouse, France, Summer 2019.
- *Distinguished Research Award*, College of Science and Liberal Arts, NJIT, April 2018.
- Visiting Fellowship, Max Planck Institute for Mathematics in the Sciences, Germany, Summer 2014.
- Kavli Frontiers of Science symposium speaker, National Academy of Sciences, US, April 2011.

- Visiting Fellowships, Istituto Nazionale di Alta Matematica Francesco Severi, Italy, Summers 2005, 2006, 2011, 2017.
- Visiting Fellowship, Gruppo Nazionale per l'Analisi Matematica, la Probabilità e le loro Applicazioni, Italy, July 2007.

PUBLICATIONS

1. V. V. Osipov and C. B. Muratov, “*Properties of wide-peak autosolitons in electron-hole and gas plasma*”, Phys. Rev. E **50**, 3251–3254 (1994).
2. V. V. Osipov and C. B. Muratov, “*Ultrafast traveling spike autosolitons in reaction-diffusion systems*”, Phys Rev. Lett. **75**, 338–341 (1995).
3. C. B. Muratov and V. V. Osipov, “*General theory of instabilities for patterns with sharp interfaces in reaction-diffusion systems*”, Phys. Rev. E **53**, 3101–3116 (1996).
4. C. B. Muratov, “*Self-replication and splitting of domain patterns in reaction-diffusion systems with the fast inhibitor*”, Phys. Rev. E **54**, 3369–3376 (1996).
5. C. B. Muratov and V. V. Osipov, “*Scenarios of domain pattern formation in a reaction-diffusion system*”, Phys. Rev. E **54**, 4860–4879 (1996).
6. C. B. Muratov, “*Synchronization, chaos, and the breakdown of the collective domain oscillations in reaction-diffusion systems*”, Phys. Rev. E **55**, 1463–1477 (1997).
7. C. B. Muratov, “*Instabilities and disorder of the domain patterns in systems with competing interactions*”, Phys. Rev. Lett. **78**, 3149–3152 (1997).
8. C. B. Muratov, “*Unusual coarsening during phase separation in polymer systems*”, Phys. Rev. Lett. **81**, 3699–3702 (1998).
9. C. B. Muratov, “*Traveling wave solutions in the Burridge-Knopoff model*”, Phys. Rev. E **59**, 3847–3857 (1999).
10. C. B. Muratov and V. V. Osipov, “*Theory of spike spiral waves in a reaction-diffusion system*”, Phys Rev. E **60**, 242–246 (1999).
11. C. B. Muratov and V. V. Osipov, “*Spike autosolitons in the Gray-Scott model*”, CAMS Rep. 9900-10, New Jersey Institute of Technology, Newark, NJ, January 2000.
12. C. B. Muratov, “*A quantitative approximation scheme for the traveling wave solutions in the Hodgkin-Huxley model*”, Biophys. J. **79** 2893–2901 (2000).
13. C. B. Muratov and V. V. Osipov, “*Static spike autosolitons in the Gray-Scott model*”, J. Phys. A: Math. Gen **33**, 8893–8916 (2000).
14. C. B. Muratov and V. V. Osipov, “*Traveling spike autosolitons in the Gray-Scott model*”, Physica D **155**, 112–131 (2001).
15. C. B. Muratov, “*On the well-posedness of the equations for the smoothed phase space distribution function and irreversibility in classical statistical mechanics*”, J. Phys. A: Math. Gen. **34**, 4641–4651 (2001).
16. C. B. Muratov and V. V. Osipov, “*Spike autosolitons and pattern formation scenarios in the two-dimensional Gray-Scott model*”, Eur. Phys. J. B **22**, 213–221 (2001).
17. C. B. Muratov and W. E, “*Theory of phase separation kinetics in polymer-liquid crystal systems*”, J. Chem. Phys. **116**, 4723–4734 (2002).

18. S. Y. Shvartsman, C. B. Muratov and D. A. Lauffenburger, “*Modeling and computational analysis of EGF Receptor-mediated cell communication in Drosophila oogenesis*”, *Development* **129**, 2577–2589 (2002).
19. C. B. Muratov and V. V. Osipov, “*Stability of the static spike autosolitons in the Gray-Scott model*”, *SIAM J. Appl. Math.* **62**, 1463–1487 (2002).
20. C. B. Muratov, “*Theory of domain patterns in systems with long-range interaction of Coulomb type*”, *Phys. Rev. E* **66**, 066108 (2002).
21. M. Pribyl, C. B. Muratov and S. Y. Shvartsman, “*Transitions in the model of epithelial patterning*”, *Devel. Dynamics* **226**, 155–159 (2003).
22. M. Pribyl, C. B. Muratov and S. Y. Shvartsman, “*Long-range signal transmission in autocrine relays*”, *Biophys. J.* **84**, 883–896 (2003).
23. M. Pribyl, C.B. Muratov and S.Y. Shvartsman, “*Discrete models of autocrine cell communication in epithelial layers,*” *Biophys. J.* **84**, 3624–3635 (2003).
24. C. B. Muratov, “*Free boundary problem and its applications to reaction-diffusion systems of activator-inhibitor type*”, *Proceedings of the Conference on Dynamics of Patterns in Reaction-Diffusion Systems and the Related Topics, RIMS, Kyoto University*, 63-78 (2003).
25. C. B. Muratov and S. Y. Shvartsman, “*An asymptotic study of the inductive pattern formation mechanism in Drosophila egg development*”, *Physica D* **186**, 93–108 (2003).
26. C. B. Muratov and E. Vanden-Eijnden, “*Breakup of universality in the generalized spinodal nucleation theory,*” *J. Stat. Phys.* **114**, 605–623 (2004).
27. C. B. Muratov, “*A global variational structure and propagation of disturbances in reaction-diffusion systems of gradient type,*” *Discrete Cont. Dyn. S., Ser. B* **4**, 867–892 (2004).
28. M. Lucia, C.B. Muratov, and M. Novaga, “*Linear vs. nonlinear selection for the propagation speed of the solutions of scalar reaction-diffusion equations invading an unstable equilibrium,*” *Commun. Pure Appl. Math.* **57**, 616–636 (2004).
29. C. B. Muratov and S. Y. Shvartsman “*Signal propagation and failure in discrete autocrine relays*”, *Phys. Rev. Lett.* **93**, 118101 (2004).
30. C. B. Muratov and E. Vanden-Eijnden, and Weinan E, “*Self-induced stochastic resonance in excitable systems*”, *Physica D* **210**, 227–240 (2005).
31. R. E. L. DeVille, E. Vanden-Eijnden, and C. B. Muratov, “*Two distinct mechanisms of coherence in randomly perturbed dynamical systems*”, *Phys. Rev. E* **72**, 031105 (2005).
32. A. M. Berezhkovskii, M. I. Monine, C. B. Muratov, and S. Y. Shvartsman, “*Homogenization of boundary conditions for surfaces with regular arrays of traps*”, *J. Chem. Phys.* **124**, 036103 (2006).
33. M. Bertsch, C. B. Muratov, and I. Primi, “*Traveling wave solutions of harmonic heat flow*”, *Calc. Var. PDE* **26**, 489–509 (2006).
34. C. B. Muratov and V. V. Osipov, “*Optimal grid-based methods for thin film micromagnetics simulations*”, *J. Comput. Phys.* **216**, 637–653 (2006).
35. R. E. L. DeVille, C. B. Muratov, and E. Vanden-Eijnden, “*Non-meanfield deterministic limits in chemical reaction kinetics far from equilibrium*”, *J. Chem. Phys.* **124**, 231102 (2006).
36. G. T. Reeves, C. B. Muratov, T. Schupbach, and S. Y. Shvartsman, “*Quantitative Models of Developmental Pattern Formation*”, *Devel. Cell* **11**, 289–300 (2006).

37. C. B. Muratov, E. Vanden-Eijnden, and Weinan E, “*Noise can play an organizing role for the coherent dynamics in excitable media*”, Proc. Natl. Acad. Sci. USA **104**, 702–707 (2007).
38. C. B. Muratov and M. Novaga, “*Front propagation in infinite cylinders. II. The sharp reaction zone limit.*” Calc. Var. PDE **31**, 521–547 (2007).
39. C. B. Muratov and E. Vanden-Eijnden, “*Noise-induced mixed-mode oscillations in a relaxation oscillator near the onset of a limit cycle*”, Chaos **18**, 015111 (2008).
40. M. Lucia, C. B. Muratov, and M. Novaga, “*Existence of traveling waves of invasion for Ginzburg-Landau-type problems in infinite cylinders*”, Arch. Rat. Mech. Anal. **188**, 475–508 (2008).
41. C. B. Muratov and S. Y. Shvartsman, “*Boundary homogenization for periodic arrays of absorbers*”, Multiscale Model. Simul. **7**, 44–61 (2008).
42. F. Posta, S. Y. Shvartsman and C. B. Muratov, “*Compensated optimal grids for elliptic boundary-value problems*”, J. Comput. Phys. **227**, 8622–8635 (2008).
43. C. B. Muratov and V. V. Osipov, “*Theory of 360° domain walls in thin ferromagnetic films*”, J. Appl. Phys. **104**, 053908 (2008).
44. C. B. Muratov and M. Novaga, “*Front propagation in infinite cylinders. I. A variational approach.*” Commun. Math. Sci. **6**, 799-826 (2008).
45. V. V. Osipov and C. B. Muratov, “*Dynamic condensation blocking in cryogenic refueling*”, Appl. Phys. Lett. **93**, 224105 (2008).
46. C. B. Muratov, F. Posta and S. Y. Shvartsman, “*Autocrine signal transmission with extracellular ligand degradation*”, Phys. Biol. **6**, 016006 (2009).
47. C. B. Muratov, M. Novaga, G. Orlandi, and C. J. García-Cervera, “*Geometric strong segregation theory for compositionally asymmetric diblock copolymer melts*”, in “Singularities in nonlinear evolution phenomena and applications”, CRM Series, Birkhauser, 2009.
48. C. B. Muratov and V. V. Osipov, “*Bit storage by 360-degree domain walls in ferromagnetic nanorings*”, IEEE Trans. Magn. **45**, 3207–3209 (2009).
49. C. B. Muratov and S. Y. Shvartsman, “*Waves of autocrine signaling in patterned epithelia*”, Math. Model. Nat. Phenom. **5**, 46-63 (2010).
50. C. B. Muratov, “*Droplet phases in non-local Ginzburg-Landau models with Coulomb repulsion in two dimensions*”, Commun. Math. Phys. **299**, 45-87 (2010).
51. V. V. Osipov, C. B. Muratov, E. Ponzovsaky-Devine, M. Foygel and V. N. Smelyanskiy, “*Cavitation-induced ignition of cryogenic hydrogen-oxygen fluids*,” Appl. Phys. Lett. **98**, 134102 (2011).
52. P. V. Gordon, C. Sample, A. Berezhkovskii, C. B. Muratov and S. Y. Shvartsman, “*Local kinetics of morphogen gradients*”, Proc. Natl. Acad. Sci. USA **108**, 6157–6162 (2011).
53. C. B. Muratov, P. V. Gordon and S. Y. Shvartsman, “*Self-similar dynamics of morphogen gradients*”, Phys. Rev. E **84**, 041916 (2011).
54. H. Knüpfer and C. B. Muratov, “*Domain structure of bulk ferromagnetic crystals in applied fields near saturation*”, J. Nonlin. Sci. **21**, 921-962 (2011).
55. V. V. Osipov, M. J. Daigle, C. B. Muratov, M. Foygel, V. N. Smelyanskiy and M. D. Watson, “*A dynamical model of rocket propellant loading with liquid hydrogen*,” J. Spacecraft Rockets **48**, 987-998 (2011).

56. C. B. Muratov, V. V. Osipov, V. N. Smelyanskiy and R. W. Tyson, “Nucleate boiling in long-term cryogenic propellant storage in microgravity”, IAC-11.A2.6.4.x12034, Proceedings of the 62nd International Astronautical Congress, Cape Town, South Africa, September 2011.
57. C. B. Muratov, V. V. Osipov, V. N. Smelyanskiy, “Issues of Long-Term Cryogenic Propellant Storage in Microgravity”, NASA Tech. Report, TM-2011-215988, October 2011.
58. C. B. Muratov and M. Novaga, “Global exponential convergence to variational traveling waves in cylinders,” SIAM J. Math. Anal. **44**, 293–315 (2012).
59. P. V. Gordon and C. B. Muratov, “Self-similarity and long-time behavior of solutions of the diffusion equation with nonlinear absorption and a boundary source”, Netw. Heterog. Media. **7**, 767–780 (2012).
60. C. B. Muratov and X. Zhong, “Threshold phenomena for symmetric decreasing solutions of reaction-diffusion equations,” Nonlin. Diff. Equations Appl. **20**, 1519–1552 (2013).
61. P. V. Gordon, C. B. Muratov and S. Y. Shvartsman, “Local accumulation times for source, diffusion and degradation models in two and three dimensions,” J. Chem. Phys. **138**, 104121 pp. 1-6 (2013).
62. H. Knüpfer and C. B. Muratov, “On an isoperimetric problem with a competing non-local term. I. The planar case.” Commun. Pure Appl. Math. **66**, 1129–1162 (2013).
63. P. V. Gordon, C. B. Muratov and M. Novaga, “Multiplicity of supercritical fronts for reaction-diffusion equations in cylinders,” Calc. Var. PDE **47**, 683–709 (2013).
64. V. V. Osipov, C. B. Muratov, H. Hafiychuk, E. Ponizovskaya-Devine and V. N. Smelyanskiy, “Explosion Hazard from a Propellant Tank Breach in Liquid Hydrogen-Oxygen Rockets” J. Spacecraft Rockets **50**, 860-871 (2013).
65. G. Chaves-O’Flynn and C. B. Muratov, “Micromagnetic Studies of the Effects of Crystalline Anisotropy on the Remanent Magnetization of Ferromagnetic Nanorings”, IEEE Trans. Magn. **49**, 3125–3128 (2013).
66. D. Goldman, C. B. Muratov and S. Serfaty, “The Γ -limit of the two-dimensional Ohta-Kawasaki energy. I. Droplet density.” Arch. Rat. Mech. Anal. **210**, 581–613 (2013).
67. M. Chermisi and C. B. Muratov, “One-dimensional Néel walls under applied magnetic fields”, Nonlinearity **26**, 2935–2950 (2013).
68. D. Goldman, C. B. Muratov and S. Serfaty, “The Γ -limit of the two-dimensional Ohta-Kawasaki energy. Droplet arrangement via the renormalized energy.” Arch. Rat. Mech. Anal. **212**, 445–501 (2014).
69. H. Knüpfer and C. B. Muratov, “On an isoperimetric problem with a competing non-local term. II. The general case.” Commun. Pure Appl. Math. **67**, 1974-1994 (2014).
70. V. Moroz and C. B. Muratov, “Asymptotic properties of ground states of scalar field equations with a vanishing parameter” J. Eur. Math. Soc. **16**, 1081-1109 (2014).
71. A. Cesaroni, C. B. Muratov and M. Novaga, “Asymptotic behavior of attractors for inhomogeneous Allen-Cahn equations”, RIMS Kokyuroku **1924**, 97-114 (2014).
72. C. B. Muratov and A. Zaleski, “On an isoperimetric problem with a competing non-local term: Quantitative results.” Ann. Global Anal. Geom. **47**, 63–80 (2015).
73. A. Cesaroni, C. B. Muratov and M. Novaga, “Front propagation in geometric and phase field models of stratified media” Arch. Rat. Mech. Anal. **216**, 153–191 (2015).

74. C. B. Muratov, V. V. Osipov and E. Vanden-Eijnden, “Energy barriers for bit-encoding states based on 360-degree domain walls in ultrathin ferromagnetic nanorings” *J. Appl. Phys.* **117**, 17D118 pp. 1–4 (2015).
75. V. V. Osipov, M. Khasin, H. Hafiychuk, C. B. Muratov, M. Watson and V. Smelyanskiy, “Mitigation of Solid Booster Ignition-Over-Pressure Wave by Water Aerosol Sprays”, *J. Spacecraft Rockets* **52**, 928–943 (2015).
76. J. Lu, V. Moroz and C. B. Muratov, “Orbital-free density functional theory of out-of-plane charge screening in graphene”, *J. Nonlin. Sci.* **25**, 1391–1430 (2015).
77. P. V. Gordon and C. B. Muratov, “Eventual self-similarity of solutions for the diffusion equation with nonlinear absorption and a point source”, *SIAM J. Math. Anal.* **47**, 2903–2916 (2015).
78. C. B. Muratov and X. Yan, “Uniqueness of one-dimensional Néel wall profiles”, *Proc. R. Soc. A* **472**, 20150762 (2016).
79. C. B. Muratov and M. Novaga, “On well-posedness of variational models of charged drops,” *Proc. R Soc. A* **472**, 20150808 (2016).
80. R. G. Lund and C. B. Muratov, “One-dimensional domain walls in thin ferromagnetic films with fourfold anisotropy,” *Nonlinearity* **29**, 1716-1734 (2016).
81. H. Knüpfer, C. B. Muratov and M. Novaga, “Low density phases in a uniformly charged liquid,” *Commun. Math. Phys.* **345**, 141-183 (2016).
82. R. G. Lund, G. D. Chaves-O’Flynn, A. D. Kent and C. B. Muratov, “A reduced model for precessional switching of thin-film nanomagnets under the influence of spin-torque,” *Phys. Rev. B* **94**, 144425 (2016).
83. C. B. Muratov and V. V. Slastikov, “Domain structure of ultrathin ferromagnetic elements in the presence of Dzyaloshinskii-Moriya interaction,” *Proc. R. Soc. A* **473**, 20160666 (2017).
84. C. B. Muratov and X. Zhong, “Threshold phenomena for symmetric-decreasing radial solutions of reaction-diffusion equations,” *Discr. Cont. Dyn. Syst. A* **37**, 915-944 (2017).
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86. R. Choksi, C. B. Muratov and I. Topaloglu, “An Old Problem Resurfaces Nonlocally: Gamow’s Liquid Drops Inspire Today’s Research and Applications”, *Notices Amer. Math. Soc.* **64**, 1275–1283 (2017).
87. K.-S. Chen, C. B. Muratov and X. Yan, “Layer solutions for a one-dimensional nonlocal model of Ginzburg-Landau type”, *Math. Model. Nat. Phenom.* **12**, 68–90 (2017).
88. J. Feller, A. Kashani, M. Khasin, C. B. Muratov, V. V. Osipov and S. Sharma, “Spectral mass gauging of unsettled liquid with acoustic waves”, *IOP Conf. Ser.: Mater. Sci. Eng.* **278**, 012003 (2017).
89. J. Feller, A. Kashani, M. Khasin, C. B. Muratov, V. V. Osipov and S. Sharma, “Spectral mass gauging of unsettled liquid with acoustic waves”, *NASA Tech. Report*, TM-2018-219876, January 2018.
90. R. G. Lund, C. B. Muratov and V. V. Slastikov, “One-dimensional in-plane edge domain walls in ultrathin ferromagnetic films” *Nonlinearity* **31**, 728-754 (2018).
91. C. B. Muratov, M. Novaga and B. Ruffini, “On equilibrium shapes of charged flat drops”, *Commun. Pure Appl. Math.* **71**, 1049–1073 (2018).

92. M. Henry, D. Hilhorst, and C. B. Muratov, “*A multiple scale pattern formation cascade in reaction-diffusion systems of activator-inhibitor type*”, *Interfaces Free Bound.* **20**, 297–336 (2018).
93. R. Diegmiller, H. Montanelli, C. B. Muratov and S. Y. Shvartsman, “*Spherical Caps in Cell Polarization*”, *Biophys. J.* **115**, 26–30 (2018).
94. C. B. Muratov, “*A universal thin film model for Ginzburg-Landau energy with dipolar interaction*” *Calc. Var. PDE* **58**, 52 (2019).
95. H. Knüpfer, C. B. Muratov, and F. Nolte, “*Magnetic domains in thin ferromagnetic films with strong perpendicular anisotropy*”, *Arch. Rat. Mech.* **232**, 727-761 (2019).
96. V. V. Slastikov, C. B. Muratov, J. M. Robbins and O. A. Tretiakov, “*Walker solution for Dzyaloshinskii domain wall in ultrathin ferromagnetic films*”, *Phys. Rev. B* **99**, 100403R (2019).
97. Y. Yu, C. B. Muratov, and R. O. Moore, “*Importance sampling for thermally induced switching and non-switching probabilities in spin-torque magnetic nanodevices*”, *IEEE Trans. Magn.* **55**, 7205011 (2019).
98. C. B. Muratov and T. M. Simon, “*A nonlocal isoperimetric problem with dipolar repulsion*”, *Commun. Math. Phys.* **372**, 1059-1115 (2019).
99. H. Knuepfer, C. B. Muratov, and M. Novaga, “*Emergence of non-trivial minimizers for the three-dimensional Ohta-Kawasaki energy*”, *Pure Appl. Analysis* **2**, 1-21 (2020).
100. A. Bernand-Mantel, C. B. Muratov and T. M. Simon, “*Unraveling the role of dipolar vs. Dzyaloshinskii-Moriya interaction in stabilizing compact magnetic skyrmions*”, *Phys. Rev. B.* **101**, 045416 (2020).
101. R. G. Lund, C. B. Muratov and V. V. Slastikov, “*Edge domain walls in ultrathin exchange-biased films*”, *J. Nonlin. Sci.* **30**, 1165–1205 (2020).
102. M. M. Alyobi, C. J. Barnett, C. B. Muratov, V. Moroz, and R. J. Cobley, “*The voltage-dependent manipulation of few-layer graphene with a scanning tunneling microscopy tip*”, *Carbon* **163**, 379–384 (2020).
103. G. Di Fratta, C. B. Muratov, F. N. Rybakov and V. V. Slastikov, “*Variational principles of micromagnetics revisited*”, *SIAM J. Math. Anal.* **52**, 3580–3599 (2020).
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111. M. Morini, C. B. Muratov, M. Novaga, V. V. Slastikov, “*Transverse domain walls in thin ferromagnetic strips*”, Arch. Ration. Mech. Anal. **247**, 59 (2023).
112. P. W. Miller, D. Fortunato, C. B. Muratov, M. Novaga, S. Y. Shvartsman, “*Generation and motion of interfaces in a mass-conserving reaction-diffusion system*”, SIAM J. Appl. Dyn. Syst. **22**, 2408–2431 (2023).
113. K.-S. Chen, C. B. Muratov and X. Yan, “*Layered solutions for a nonlocal Ginzburg-Landau model with periodic modulation*”, Math. Eng. **5**, 1–52 (2023).
114. A. Bernand-Mantel, A. Fondet, S. Barnova, T. M. Simon and C. B. Muratov, “*Theory of magnetic field-stabilized compact skyrmions in thin film ferromagnets*”, Phys. Rev. B **108**, L161405 (2023).
115. A. Monteil, C. B. Muratov, T. M. Simon and V. V. Slastikov, “*Magnetic skyrmions under confinement*”, Commun. Math. Phys. **404**, 1571–1605 (2023).
116. V. Moroz and C. B. Muratov, “*Thomas-Fermi theory of out-of-plane charge screening in graphene*”, Proc. R. Soc. A (2024, to appear).
117. C. B. Muratov, M. Novaga and P. Zaleski, “*A variational model of charged drops in dielectrically matched binary fluids: the effect of charge discreteness*”, Arch. Ration. Mech. Anal. (2024, to appear).
118. G. Di Fratta, C. B. Muratov and V. V. Slastikov, “*Reduced energies for thin ferromagnetic films with perpendicular anisotropy*”, Math. Models Methods Appl. Sci. (2024, to appear).
119. D. Mazzoleni, C. B. Muratov and B. Ruffini, “*An optimal design problem for a charge qubit*” (submitted).

SELECTED RECENT PRESENTATIONS

- Invited talk, Workshop on “Topics in the Calculus of Variations: Recent Advances and New Trends”, BIRS, Canada, May 2018.
- Invited talk, PDE Seminar, University of Pisa, September 2018.
- Invited talk, Analysis, Logic and Physics Seminar, Virginia Commonwealth University, November 2018.
- Invited talk, Workshop on “Optimal design of complex materials”, Isaac Newton Institute, Cambridge, January 2019.
- Invited talk, Workshop on “Mathematical Models for Pattern Formation”, Carnegie Mellon University, March 2019.
- Invited talk, AMS Sectional Meeting, Special Session on Modeling and Qualitative Study of PDEs from Materials Science and Geometry, Hartford, CT, April 2019.
- Invited talk, 12th International Symposium on Hysteresis Modeling and Micromagnetics, Heraklion, Greece, May 2019.
- Invited talk, LPCNO seminar, INSA, Toulouse, France, July 2019.
- Minisymposium talks, The 9th International Congress on Industrial and Applied Mathematics, Valencia, Spain, July 2019.
- Invited talk, Workshop on “PDEs and Applications to Life Sciences”, Penn State, October 2019.
- Invited talk, Workshop on “Modeling of Crystalline Interfaces and Thin Film Structures”, The Erwin Schrödinger International Institute for Mathematics and Physics, November 2019.

- Invited talk, Mathematical Physics Seminar, Rutgers University, February 2020.
- Invited talk, Applied Mathematics Seminar, University of Pisa, May 2020.
- Invited talk, Workshop on “Calculus of Variations”, Mathematisches Forschungsinstitut Oberwolfach, August 2020.
- Invited talk, Center for Nonlinear Analysis Seminar, Carnegie Mellon University, October 2020.
- Invited talk, Conference on “Mathematical and Computational Materials Science”, IMSI, University of Chicago, February 2021.
- Invited talk, Caltech and UCLA Joint Analysis Seminar, March 2021.
- Invited talk, Online North-East PDE and Analysis Seminar (ONEPAS), May 2021.
- Invited talk, IEEE-AIM 2020-21 virtual meeting, June 2021.
- Invited talk, “The Chemical Basis of Morphogenesis’ at 70”, Flatiron Institute, October 2022.
- Invited talk, Workshop on “Current challenges in complex materials: modelling and analysis”, Hausdorff Institute for Mathematics, Bonn, January 2023.
- Invited talk, SFB Seminar, Hausdorff Center for Mathematics, Bonn, January 2023.
- Invited talk, Workshop on “Universality in Condensed Matter and Statistical Mechanics”, Università di Roma Tre, February 2023.
- Invited talk, XXXII Convegno Nazionale di Calcolo delle Variazioni, Levico Terme, Italy, May 2023.
- Minisymposium talks, The 10th International Congress on Industrial and Applied Mathematics, Tokyo, Japan, August 2023.
- Invited talk, Workshop on “Modeling and analysis in nanomagnetism and beyond”, Università di Parma, May 2024