

# Vadim Munirov

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## Education

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### Princeton University

*Ph.D. in Astrophysical Sciences (Plasma Physics)*

Thesis title: [Radiative Processes in Astrophysical and Laboratory Plasmas](#)

Princeton, NJ

Aug 2014 – Jul 2020

### University of California, San Diego

*Ph.D. student in Physics*

La Jolla, CA

Sep 2013 – Jun 2014

### Moscow Institute of Physics and Technology

*M.Sc. in Applied Mathematics and Physics (with honors)*

Thesis title: [Investigation of Interaction of Nonuniformly Charged Macroparticles](#)

*B.Sc. in Applied Mathematics and Physics (with honors)*

Moscow, Russia

Sep 2011 – Jun 2013

Sep 2007 – Jun 2011

## Research and Work Experience

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### Princeton University

*Visitor, Nathaniel Fisch's research group*

Princeton, NJ

Oct 2022 – present

○ Developed Python code to optimize radiation losses from the proposed p-B11 fusion device

○ Studied confinement of relativistic electrons in magnetic mirror using analytical theory and Fokker–Planck simulations

### University of California, Berkeley

*Postdoctoral Scholar, Professor Jonathan Wurtele's research group*

Berkeley, CA

Aug 2020 – Sep 2022

○ Analytically and numerically demonstrated how to create space-time quasicrystals in plasma by autoresonantly exciting multiphase ion-acoustic and plasma waves

○ Developed and implemented ionization model for molecules, worked on parts of the code for modeling plasma grating experiments

○ Supervised research projects for undergraduate students

### Princeton Plasma Physics Laboratory

*Research Assistant, Advisor: Nathaniel Fisch*

Princeton, NJ

Aug 2014 – Jul 2020

○ Quantified influence of kinetic effects on magnetic field generation in astrophysical plasmas due to radiative interaction

○ Investigated the current drive and recoil effects in Bremsstrahlung absorption

○ Quantified influence of plasma on cosmic microwave background (CMB)

○ Developed  $\text{Ly}\alpha$  Monte Carlo radiative transfer Python code with finite correlation length turbulence

### Princeton University

*Teaching Assistant*

Princeton, NJ

Sep 2016/18 – Jan 2017/19

○ Teaching assistant for a graduate course on "Plasma Waves and Instabilities"

### University of California, San Diego

*Teaching Assistant*

La Jolla, CA

Sep 2013 – Jun 2014

○ Coordinated 20-30 undergraduate students in a physics lab; tutored semi-individually

### Troitsk Institute for Innovation and Fusion Research

*Research Assistant, Advisor: Anatoly Filippov*

Moscow, Russia

Sep 2010 – Jun 2013

○ Analytically and numerically studied interaction of dielectric macroparticles in plasma as part of Master's and Bachelor's theses while studying at Moscow Institute of Physics and Technology

## Publications

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[1] V.R. Munirov, L. Friedland, J.S. Wurtele, *Multiphase nonlinear electron plasma waves*, [Phys. Rev. E 106, 055201 \(2022\)](#)

[2] V.R. Munirov, L. Friedland, J.S. Wurtele, *Autoresonant excitation of space-time quasicrystals in plasma*, [Phys. Rev. Research 4, 023150 \(2022\)](#), ([Editors' Suggestion](#)), ([Featured in Physics](#))

[3] M.R. Edwards, V.R. Munirov, A. Singh, N.M. Fasano, E. Kur, N. Lemos, J.M. Mikhailova, J.S. Wurtele, and P. Michel,

*Holographic plasma lenses*, [Phys. Rev. Lett.](#), **128**, 065003 (2022), ([Featured in Physics](#))

- [4] **V.R. Munirov**, N.J. Fisch, *Radiation in equilibrium with plasma and plasma effects on cosmic microwave background*, [Phys. Rev. E](#), **100**, 023202 (2019)
- [5] **V.R. Munirov**, N.J. Fisch, *Inverse Bremsstrahlung current drive*, [Phys. Rev. E](#), **96**, 053211 (2017), ([Editors' Suggestion](#))
- [6] **V.R. Munirov**, N.J. Fisch, *Radiative transfer dynamo effect*, [Phys. Rev. E](#), **95**, 013205 (2017)
- [7] **V.R. Munirov**, A.V. Filippov, *Interaction of two dielectric macroparticles*, [J. Exp. Theor. Phys.](#), **117**, 809-819 (2013)
- [8] **V.R. Munirov**, A.V. Filippov, *Interaction of a dielectric macroparticle with a point charge in plasma*, [J. Exp. Theor. Phys.](#), **115**, 527-534 (2012)
- [9] **V.R. Munirov**, A.A. Kaurov, *Influence of turbulence on Lyman-alpha scattering*, [arXiv:2208.13103](#), submitted to [MNRAS](#) (2022)
- [10] M.E. Mlodik, **V.R. Munirov**, T. Rubin, N.J. Fisch, *Sensitivity of synchrotron radiation to the superthermal electron population in mildly relativistic plasma*, [arXiv:2212.14455](#), accepted to [Phys. Plasmas](#) (2022)
- [11] I.E. Ochs, **V.R. Munirov**, N.J. Fisch, *Confinement time and ambipolar potential in a relativistic mirror-confined plasma*, [arXiv:2302.12346](#), submitted to [Phys. Plasmas](#) (2023)

## Talks/Conferences/Visits

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- 2023 ARPA-E Energy Innovation Summit. National Harbor, MD, Mar 22–24, 2023
- 64th Annual Meeting of the APS Division of Plasma Physics. Spokane, WA, Oct 17–21, 2022
- Journal Club of LULI, CNRS, CEA, Sorbonne Université, École Polytechnique. Paris, France (over zoom), Sep 28, 2022
- Hebrew University of Jerusalem, Racah Institute of Physics. Jerusalem, Israel, May 10–Jun 10 and Sep 7–25, 2022
- 63rd Annual Meeting of the APS Division of Plasma Physics. Pittsburgh, PA, Nov 8–12, 2021
- CLEO: QELS Fundamental Science 2021. San Jose, CA, May 9–14, 2021
- 61st Annual Meeting of the APS Division of Plasma Physics. Fort Lauderdale, FL, Oct 21–25, 2019
- Astro Coffee Seminar, Institute for Advanced Study. Princeton, NJ, Oct 2, 2019
- Space Physics Seminar, UC Berkeley. Berkeley, CA, Sep 10, 2019
- 60th Annual Meeting of the APS Division of Plasma Physics. Portland, OR, Nov 5–9, 2018
- 59th Annual Meeting of the APS Division of Plasma Physics. Milwaukee, WI, Oct 23–27, 2017
- 58th Annual Meeting of the APS Division of Plasma Physics. San Jose, CA, Oct 31–Nov 4, 2016
- Princeton Graduate Seminar in Plasma Physics. Princeton, NJ, Nov, 2015, 2016
- Contest for Young Scientists in Memory of Academician A.P. Alexandrov. Troitsk, Russia, Feb 27, 2013
- RAS Scientific-Coordination Session "Non-Ideal Plasma Physics". Moscow, Russia, Dec 6–7, 2012
- Moscow Institute of Physics and Technology 55th Scientific Conference. Dolgoprudny, Russia, Nov 19, 2012
- VII International Conference on Plasma Physics and Plasma Technology PPPT-7. Minsk, Belarus, Sep 17–21, 2012

## Awards and Prizes

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- Bronze medal: Kaggle Dstl Satellite Imagery Feature Detection (Dec 2016 – Mar 2017)
- Gold medal: WorldQuant Challenge Autumn Alphathon 2015 (Oct 2015 – Dec 2015)
- Russian Presidential Scholarship for outstanding academic and research achievements (Mar 2012 – Jun 2013)
- Scholarship of Abramov-Frolov's fund (Feb 2008 – Jun 2011)

## Skills and Professional Service

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**Computer skills:** Python, LaTeX, MS Office, exposure to C/C++, Fortran, MATLAB, AWS, Mathematica, R

**Language skills:** Russian (native), English (fluent), Tatar (basic)

**Service:** Reviewer for Physical Review Research, Europhysics Letters