

Nikita Blinov

Curriculum Vitae

Department of Physics & Astronomy
University of Victoria
Victoria, BC

Web: nblinov.github.io
Email: nblinov@uvic.ca

Employment

University of Victoria, Victoria, BC	09/2021 - Present
Postdoctoral Fellow, Theoretical Physics Group	
Fermi National Accelerator Laboratory, Batavia, IL	10/2018 - 09/2021
Research associate, Theoretical Physics and Particle Astrophysics Departments	
University of Chicago, Chicago, IL	10/2018 - 09/2021
Associate fellow, Kavli Institute for Cosmological Physics	
SLAC National Accelerator Laboratory, Menlo Park, CA	10/2015 - 09/2018
Research associate, Theory Group	
University of California, Santa Cruz, CA	10/2014 - 01/2015
Graduate research assistant, Santa Cruz Institute for Particle Physics	
TRIUMF, Vancouver, BC	11/2010 - 08/2015
Graduate research assistant, Theory Department	

Supervisory Experience

Margaret Wynne (undergrad)	06/2021 - 08/2021
Project: Gluon-Coupled Axion-like Particles at the DarkQuest Experiment	
Elizabeth Kowalczyk (undergrad)	06/2020 - 08/2020
Project: Photon-Coupled Axion-like Particles at the DarkQuest Experiment	

Teaching Experience

Guest Lecturer, Stanford University	02/2017 - 02/2017
PHYS331 “Quantum Field Theory II” (grad)	
Guest Lecturer, Stanford University	05/2016 - 05/2016
PHYS152 “Introduction to Elementary Particle Physics” (undergrad/grad)	

Teaching assistant, University of British Columbia PHYS102 “Electricity, Light and Radiation” (undergrad)	01/2013 - 04/2013
Teaching assistant, University of British Columbia PHYS526 “Quantum Electrodynamics” (grad)	09/2012 - 12/2012
Teaching assistant, University of British Columbia PHYS312 “Introduction to Mathematical Physics” (undergrad)	09/2012 - 12/2012
Teaching assistant, University of British Columbia PHYS102 “Electricity, Light and Radiation” (undergrad)	01/2011 - 04/2011
Teaching assistant, University of British Columbia PHYS101 “Energy and Waves” (undergrad)	09/2010 - 12/2010
Tutor, University of Alberta Third year electrodynamics (undergrad)	10/2009 - 12/2009

Education

PhD in Physics, University of British Columbia Advisor: David Morrissey Thesis: “Phase transitions: applications to physics beyond the Standard Model”	09/2010 - 08/2015
BSc (Honors) in Mathematical Physics, University of Alberta Advisor: Andrzej Czarnecki Thesis: “Dimensional scaling and the positronium ion”	09/2006 - 06/2010

Publications

-
- [B1] N. Blinov, E. Kowalczyk and M. Wynne, “Axion-like Particle Searches at DarkQuest,” JHEP **02** (2022), 036, [arXiv:2112.09814 \[hep-ph\]](#).
 - [B2] N. Blinov, G. Krnjaic and S. W. Li, “Towards a Realistic Model of Dark Atoms to Resolve the Hubble Tension,” Phys. Rev. D **105**, no.9, 095005 (2022), [arXiv:2108.11386 \[hep-ph\]](#).
 - [B3] G. Barenboim, N. Blinov and A. Stebbins, “Smallest Remnants of Early Matter Domination,” JCAP **12**, no.12, 026 (2021), [arXiv:2107.10293 \[astro-ph.CO\]](#).
 - [B4] N. Blinov and P. Draper, “Densities of States and the CKN Bound,” Phys. Rev. D **104**, no.7, 076024 (2021), [arXiv:2107.03530 \[hep-ph\]](#).
 - [B5] M. Acevedo, A. Blackburn, N. Blinov, B. Shuve and M. Stone, “Multi-track Displaced Vertices at B-Factories,” JHEP **09**, 154 (2021), [arXiv:2105.12744 \[hep-ph\]](#).

- [B6] N. Blinov, M. J. Dolan, P. Draper and J. Shelton, “Dark Matter Microhalos From Simplified Models,” *Phys. Rev. D* **103**, no. 10, 103514 (2021), [arXiv:2102.05070 \[astro-ph.CO\]](#).
- [B7] N. Blinov, G. Krnjaic and D. Tuckler, “Characterizing Dark Matter Signals with Missing Momentum Experiments,” *Phys. Rev. D* **103**, no. 3, 035030 (2021), [arXiv:2010.03577 \[hep-ph\]](#).
- [B8] C. Keith, D. Hooper, N. Blinov and S. D. McDermott, “Constraints on Primordial Black Holes From Big Bang Nucleosynthesis Revisited,” *Phys. Rev. D* **102**, no. 10, 103512 (2020), [arXiv:2006.03608 \[astro-ph.CO\]](#).
- [B9] N. Blinov, C. Keith and D. Hooper, “Warm Decaying Dark Matter and the Hubble Tension,” *JCAP* **06**, 005, 2020, [arXiv:2004.06114 \[astro-ph.CO\]](#).
- [B10] N. Blinov and G. Marques-Tavares, “Interacting radiation after Planck and its implications for the Hubble Tension,” *JCAP* **09**, 029, 2020, [arXiv:2003.08387 \[astro-ph.CO\]](#).
- [B11] N. Blinov, M. J. Dolan and P. Draper, “Imprints of the Early Universe on Axion Dark Matter Substructure,” *Phys. Rev. D* **101**, 035002, [arXiv:1911.07853 \[astro-ph.CO\]](#).
- [B12] N. Blinov, K. J. Kelly, G. Z. Krnjaic and S. D. McDermott, “Constraining the Self-Interacting Neutrino Interpretation of the Hubble Tension,” *Phys. Rev. Lett.* **123**, 191102, [arXiv:1905.02727 \[astro-ph.CO\]](#).
- [B13] N. Blinov, M. J. Dolan, P. Draper and J. Kozaczuk, “Dark Matter Targets for Axion-like Particle Searches,” *Phys. Rev. D* **100**, 015049, [arXiv:1905.06952 \[hep-ph\]](#).
- [B14] A. Berlin, N. Blinov and S. W. Li, “Dark Sector Equilibration During Nucleosynthesis,” *Phys. Rev. D* **100**, 015038, [arXiv:1904.04256 \[hep-ph\]](#).
- [B15] T. Åkesson, A. Berlin, N. Blinov *et al.*, “Light Dark Matter eXperiment (LDMX),” [arXiv:1808.05219 \[hep-ex\]](#).
- [B16] N. Blinov, S. A. R. Ellis and A. Hook, “Consequences of Fine-Tuning for Fifth Force Searches,” *JHEP* **1811**, 029 (2018), [arXiv:1807.11508 \[hep-ph\]](#).
- [B17] A. Berlin and N. Blinov, “A Thermal Neutrino Portal to Sub-MeV Dark Matter,” *Phys. Rev. D* **99**, 095030, [arXiv:1807.04282 \[hep-ph\]](#).
- [B18] A. Berlin, N. Blinov, G. Krnjaic, P. Schuster and N. Toro, “Dark Matter, Millicharges, Axion and Scalar Particles, Gauge Bosons, and Other New Physics with LDMX,” *Phys. Rev. D* **99**, 075001 (2019), [arXiv:1807.01730 \[hep-ph\]](#).
- [B19] A. Berlin, N. Blinov, S. Gori, P. Schuster and N. Toro, “Cosmology and Accelerator Tests of Strongly Interacting Dark Matter,” *Phys. Rev. D* **97**, no. 5, 055033 (2018), [arXiv:1801.05805 \[hep-ph\]](#).

- [B20] N. Blinov, E. Izaguirre and B. Shuve, “Rare Z Boson Decays to a Hidden Sector,” *Phys. Rev. D* **97**, no. 1, 015009 (2018), [arXiv:1710.07635 \[hep-ph\]](#).
- [B21] A. Berlin and N. Blinov, “Thermal Dark Matter Below an MeV,” *Phys. Rev. Lett* **120**, no. 2, 021801 (2018), [arXiv:1706.07046 \[hep-ph\]](#).
- [B22] N. Blinov and A. Hook, “Particle Asymmetries from Quantum Statistics,” *Phys. Rev. D* **95**, no. 9, 095014 (2017), [arXiv:1703.04759 \[hep-ph\]](#).
- [B23] N. Blinov and A. Hook, “Solving the Wrong Hierarchy Problem,” *JHEP* **1606**, 176 (2016), [arXiv:1605.03178 \[hep-ph\]](#).
- [B24] N. Blinov, J. Kozaczuk, D. E. Morrissey and A. de la Puente, “Compressing the Inert Doublet Model,” *Phys. Rev. D* **93**, no. 3, 035020 (2016), [arXiv:1510.08069 \[hep-ph\]](#).
- [B25] N. Blinov, S. Profumo and T. Stefaniak, “The Electroweak Phase Transition in the Inert Doublet Model,” *JCAP* **1507**, no. 07, 028 (2015), [arXiv:1504.05949 \[hep-ph\]](#).
- [B26] N. Blinov, J. Kozaczuk, D. E. Morrissey and C. Tamarit, “Electroweak Baryogenesis from Exotic Electroweak Symmetry Breaking,” *Phys. Rev. D* **92**, no. 3, 035012 (2015), [arXiv:1504.05195 \[hep-ph\]](#).
- [B27] N. Blinov, J. Kozaczuk, A. Menon and D. E. Morrissey, “Confronting the moduli-induced lightest-superpartner problem,” *Phys. Rev. D* **91**, no. 3, 035026 (2015), [arXiv:1409.1222 \[hep-ph\]](#).
- [B28] N. Blinov and D. E. Morrissey, “Vacuum Stability and the MSSM Higgs Mass,” *JHEP* **1403**, 106 (2014), [arXiv:1310.4174 \[hep-ph\]](#).
- [B29] N. Blinov, D. E. Morrissey, K. Sigurdson and S. Tulin, “Dark Matter Antibaryons from a Supersymmetric Hidden Sector,” *Phys. Rev. D* **86**, 095021 (2012), [arXiv:1206.3304 \[hep-ph\]](#).
- [B30] N. Blinov and A. Czarnecki, “Binding energy of the positronium negative ion via dimensional scaling,” *Phys. Rev. A* **85**, 012522 (2012), [arXiv:1201.2226 \[hep-ph\]](#).

Reports and Conference Proceedings

Significant contributions are marked with *

- [W1] D. Green, N. Blinov, *et al.* “Snowmass Theory Frontier: Astrophysics and Cosmology,” [arXiv:2209.06854 \[hep-ph\]](#).
- [W2] S. Gori, M. Williams, P. Ilten, N. Tran, G. Krnjaic, N. Toro, B. Batell, N. Blinov, C. Hearty and R. McGehee, *et al.* “Dark Sector Physics at High-Intensity Experiments,” [arXiv:2209.04671 \[hep-ph\]](#).
- [W3] * B. Batell, N. Blinov, C. Hearty and R. McGehee, “Exploring Dark Sector Portals with High Intensity Experiments,” [arXiv:2207.06905 \[hep-ph\]](#).

- [W4] * G. Krnjaic, N. Toro, A. Berlin, B. Batell, N. Blinov, *et al.* “Snowmass 2021 Rare & Precision Frontier (RF6): Dark Matter Production at Intensity-Frontier Experiments,” [arXiv:2207.00597 \[hep-ph\]](#).
- [W5] T. Åkesson, N. Blinov, *et al.* , “Current Status and Future Prospects for the Light Dark Matter eXperiment,” [arXiv:2203.08192 \[hep-ex\]](#)
- [W6] * A. Apyan, B. Batell, A. Berlin, N. Blinov, *et al.* “DarkQuest: A dark sector upgrade to SpinQuest at the 120 GeV Fermilab Main Injector,” [arXiv:2203.08322 \[hep-ex\]](#)
- [W7] * K. N. Abazajian, N. Blinov, *et al.* “Synergy between cosmological and laboratory searches in neutrino physics: a white paper,” [arXiv:2203.07377 \[hep-ph\]](#)
- [W8] K. Bechtol, S. Birrer, F. Y. Cyr-Racine, K. Schutz, S. Adhikari, A. Banerjee, S. Bird, N. Blinov, *et al.* “Snowmass2021 Cosmic Frontier White Paper: Dark Matter Physics from Halo Measurements,” [arXiv:2203.07354 \[hep-ph\]](#)
- [W9] N. Blinov, N. Craig, M. J. Dolan, J. de Vries, P. Draper, I. G. Garcia, B. Lillard and J. Shelton, “Snowmass White Paper: Strong CP Beyond Axion Direct Detection,” [arXiv:2203.07218 \[hep-ph\]](#).
- [W10] G. Elor, J. Harz, S. Ipek, B. Shakya, N. Blinov, *et al.* “New Ideas in Baryogenesis: A Snowmass White Paper,” [arXiv:2203.05010 \[hep-ph\]](#).
- [W11] J. Arrington, J. Barrow, B. Batell, R. Bernstein, N. Blinov, *et al.* “Physics Opportunities for the Fermilab Booster Replacement,” [arXiv:2203.03925 \[hep-ph\]](#).
- [W12] * J. M. Berryman, N. Blinov (ed.), *et al.* “Neutrino Self-Interactions: A White Paper,” [arXiv:2203.01955 \[hep-ph\]](#).
- [W13] * E. Kowalczyk and N. Blinov, “Searching for Axion-like Particles at DarkQuest,” [FERMILAB-FN-1105-T](#).
- [W14] D. Curtin *et al.*, “Long-Lived Particles at the Energy Frontier: The MATHUSLA Physics Case,” [arXiv:1806.07396 \[hep-ph\]](#).
- [W15] M. Battaglieri *et al.*, “US Cosmic Visions: New Ideas in Dark Matter 2017: Community Report,” [arXiv:1707.04591 \[hep-ph\]](#).
- [W16] J. Alexander *et al.*, “Dark Sectors 2016 Workshop: Community Report,” [arXiv:1608.08632 \[hep-ph\]](#).
- [W17] * N. Blinov and D. E. Morrissey, “Charge and Color Breaking Constraints in the Minimal Supersymmetric Standard Model,” [arXiv:1309.7397 \[hep-ph\]](#).

Professional Activities

- Referee for Physical Review Letters, Journal of High Energy Physics, Journal of Cosmology and Astroparticle Physics, Monthly Notices of the Royal Astronomical Society, SciPost Physics and Physics Lecture Notes
- Co-organizer of FNAL Cosmic Physics Center Seminars (May 2019 - May 2020)
- Co-organizer of “Hidden Sector Fixed Target Experiments at Fermilab” Symposium at FNAL (September 4, 2019)
- Organizer of the SLAC Theory Seminars (Sept - Dec 2016)
- Co-organizer of the TRIUMF Workshop on Discoveries at the Dawn of LHC Run 2 (October 2015)
- Co-organizer of the TRIUMF Workshop on Searches for New Phenomena at the Upgraded LHC (September 2014)
- Co-organizer of the TRIUMF Workshop on Cosmology at Colliders (December 2013)
- Organizer of the weekly TRIUMF/UBC Particle-Cosmology meetings (2012-2013)

Proposals and Grant Applications

- “Accelerator-based Dark Matter Initiatives at Fermilab”, Fermilab Laboratory Directed Research and Development 2019. Co-Investigator. (funded)
- “Search for Dark Sectors with the DarkQuest Experiment at Fermilab”, DOE Basic Research Needs: New Dark Matter Initiatives 2019. Co-Investigator.
- “LDMX, an electron missing momentum search for sub-GeV Dark Matter”, DOE Basic Research Needs: New Dark Matter Initiatives 2019. (funded)
- NSERC Postdoctoral Fellowship 2015. (declined)

Invited Colloquia, Seminars and Conference Presentations

- “Theory Priors in the Search for Light Dark Matter”
September 8, 2022, GUINEAPIG Workshop on Light Dark Matter, TRIUMF, Vancouver, Canada
- “Simple Targets for CMB-S4”
May 5, 2022, Maps2Cell Telecon (virtual)
- “Experimental Bounds on Densities of States”

April 29, 2022, Pacific Northwest Particle Theory Seminar, University of British Columbia, Vancouver, Canada

- “A Mirror Dark Sector for the Hubble Tension?”
 - March 29, 2022, University of Washington, Seattle, Washington
 - March 25, 2022, University of Southampton, Southampton, England (virtual)
 - March 9, 2022, University of Michigan, Ann Arbor, Michigan (virtual)
- “The (Really) Small Scale Structure of Dark Matter”
 - April 22, 2022, TRIUMF DM Forum, TRIUMF, Vancouver, Canada (virtual)
 - August 6, 2021, COSMO 21 (plenary)
- “The Early Universe as a Laboratory for Particle Physics” (colloquium)
 - April 6, 2021, York University, Toronto, Ontario (virtual)
- “Multi-track Signals of Long-Lived Particles from an Effective Field Theory Perspective”
 - March 23, 2021, BaBar Collaboration Meeting, SLAC, Menlo Park, California (virtual)
 - December 11, 2020, Long-lived particles at Belle II, DESY, Hamburg, Germany (virtual)
- “Opportunities for Missing Momentum Experiments”
 - November 5, 2020, Developing New Directions in Fundamental Physics, TRIUMF, Vancouver, Canada (virtual)
- “Light Dark Matter Targets for Accelerator Searches”
 - October 6, 2020, Snowmass Community Planning Meeting (virtual)
- “The (Really) Small Scale Structure of Dark Matter”
 - September 15, 2020, BSM PANDEMIC Seminar (virtual)
- “Cosmology of Light Hidden Sectors and the Hubble Tension”
 - October 6, 2020, University of Notre Dame, Notre Dame, Indiana (virtual)
 - June 26, 2020, MIT, Boston, Massachusetts (virtual)
 - June 9, 2020, Perimeter Institute, Waterloo, Ontario (virtual)
 - May 27, 2020, UC Berkeley/LBL, Berkeley, California (virtual)
 - May 14, 2020, TH BSM Forum, CERN, Switzerland (virtual)
- “Exploring the Early Universe with Accelerators and Astrophysics” (colloquium)
 - March 5, 2020, Carleton University, Ottawa, Ontario
- “Imprints of the Early Universe on Dark Matter Substructure”

- December 13, 2019, University of Chicago, Chicago, Illinois
- December 2, 2019, University of Maryland, College Park, Maryland
- November 26, 2019, University of Cincinnati, Cincinnati, Ohio
- November 20, 2019, Cornell University, Ithaca, New York
- November 1, 2019, TRIUMF, Vancouver, British Columbia
- October 23, 2019, University of Wisconsin-Madison, Madison, Wisconsin
- September 23, 2019, “Next Frontiers in the Search for Dark Matter” Workshop, Galileo Galilei Institute, Arcetri, Firenze, Italy
- “Freeze-in, Misalignment, and Non-Standard Thermal Histories”
 - June 4, 2019, “New Directions in the Search for Light Dark Matter Particles” Workshop, Batavia, Illinois
 - “Cosmology with Sub-MeV Thermal Relics”
 - May 2, 2019, Fermilab National Laboratory, Batavia, Illinois
 - April 16, 2019, Argonne National Laboratory, Lemont, Illinois
 - December 5, 2018, University of Michigan, Ann Arbor, Michigan
 - November 16, 2018, University of Illinois, Urbana-Champaign, Illinois
 - October 16, 2018, Harvard, Boston, Massachusetts
 - June 19, 2018, TRIUMF, Vancouver, British Columbia
 - “Visible Signals at LDMX”
 - May 7, 2018, LDMX Collaboration Meeting, SLAC, Menlo Park, California
 - “Rare Z Decays to a Hidden Sector”
 - October 31, 2017, SLAC, Menlo Park, California
 - “Cosmology and Signals of Strongly Interacting Dark Sectors”
 - November 21, 2017, Perimeter Institute, Waterloo, Ontario
 - October 11, 2017, UC Berkeley, Berkeley, California
 - June 14, 2017, BaBar Collaboration Meeting, Menlo Park, California
 - May 4, 2017, “New Lampposts for Dark Matter” Workshop, Eugene, Oregon
 - April 5, 2017, HPS Collaboration Meeting (remote), Menlo Park, California
 - April 4, 2017, University of Victoria, Victoria, British Columbia
 - March 24, 2017, US Cosmic Visions, College Park, Maryland
 - February 27, 2017, UC Davis Seminar, Davis, California
 - “Solution to a Hierarchy Problem”

October 6, 2016, York U., Toronto, Ontario

June 23, 2016, DESY Seminar, Hamburg, Germany

June 20, 2016, EPFL Seminar, Lausanne, Switzerland

June 17, 2016, TH BSM Forum, CERN, Switzerland

- “Electroweak Phase Transition Beyond the Standard Model”

June 3, 2016, MIAPP “More Matter” Program, Garching, Germany

October 23, 2015, SITP Wine and Cheese, Stanford, California

- “Direct Detection of Non-Thermal Dark Matter”,

April 29, 2016, Dark Sectors 2016, SLAC National Accelerator Laboratory, California

- “Light Moduli: Applications to Dark Matter and Baryogenesis”

November 28, 2014, Perimeter Institute, Waterloo, Ontario

October 20, 2014, UC Santa Cruz, Santa Cruz, California

August 26, 2014, COSMO 2014, Chicago, Illinois

Outreach

- Superheroes in STEM 2021 High School Conference, May 1, 2021, Fermilab (virtual)

Conferences and Workshops Attended

- Summiting the Unknown: New Physics, New Opportunities, New Voices, July 14-16, 2022, University of Washington, Seattle, Washington
- Long-lived particles at Belle II, December 10-11, 2020, DESY, Hamburg, Germany (virtual)
- Developing New Directions in Fundamental Physics, November 4-6, 2020, TRIUMF, Vancouver, Canada (virtual)
- Snowmass Community Planning Meeting, October 5-8, 2020 (virtual)
- Topics in Cosmic Neutrino Physics, October 9-11, 2019, Batavia, Illinois
- Cosmic Controversies, October 5-8, 2019, Chicago, Illinois
- Next Frontiers in the Search for Dark Matter, September 16-29, 2019, Arcetri, Firenze, Italy

- New Directions in the Search for Light Dark Matter Particles, June 4-7, 2019, Batavia, Illinois
- Nu Physics in the CMB, November 7-9, 2018, San Diego, California
- High Energy Physics at the Sensitivity Frontier, March 26-April 20, 2018, Santa Barbara, California
- Developing New Tools for Dark Matter Searches, September 3-17, 2017, Aspen, Colorado
- Beyond WIMPs: from Theory to Detection, March 27-29, 2017, Stony Brook, New York
- US Cosmic Visions: New Ideas in Dark Matter, March 23-25, 2017, College Park, Maryland
- MIAPP Workshop “Why is there more matter than antimatter in the Universe?”, May 30 - June 11 2016, Garching, Germany
- Dark Sectors Workshop 2016, April 28-30 2016, SLAC National Accelerator Laboratory, California
- TRIUMF Workshop on Discoveries at the Dawn of LHC Run 2, October 28-30 2015, Vancouver, British Columbia
- Theory Canada 10, June 11-13 2015, Calgary, Alberta
- TRIUMF Workshop on Searches for New Phenomena at the Upgraded LHC, September 8-10 2014, Vancouver, British Columbia
- COSMO 2014, August 25-29 2014, Chicago, Illinois
- US ATLAS Physics Workshop 2014 Open Day, August 4 2014, Seattle, Washington
- Phenomenology 2014 Symposium, May 5-7 2014, Pittsburgh, Pennsylvania
- TRIUMF Workshop on Cosmology at Colliders, December 9-11 2013, Vancouver, British Columbia
- APS Division of Particles and Fields 2013 Meeting, August 13-17 2013, Santa Cruz, California
- TRIUMF Workshop on Neutrinos and New Physics, November 12-14 2012, Vancouver, British Columbia
- APS Northwest Section Meeting, October 18-20 2012, Vancouver, British Columbia
- Physics at LHC, June 4-9 2012, Vancouver, British Columbia
- 49th Winter Nuclear and Particle Physics Conference, February 23-26 2012, Mont Tremblant, Québec
- TRIUMF Workshop on LHC Results, December 14-16 2011, Vancouver, British Columbia