Michael (Misha, Mykhailo) Rashkovetskyi ⓘ

Postdoctoral researcher in astrophysics (cosmology)
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Fields of interest

Large-scale structure: galaxy clustering; cosmic microwave background; Hubble tension; nature of dark energy; primordial Universe

Employment

- **The Ohio State University** — Columbus, OH, USA
  CCAPP (Center for Cosmology and AstroParticle Physics) Fellow — *2025 – 2028*
    - From late July 2025

- **Harvard College Observatory** — Cambridge, MA, USA
  Postdoctoral Fellow — *2025*

Education

- **Harvard University** — Cambridge, MA, USA
  Ph.D. in Astronomy and Astrophysics — *2020 – 2025*
  M.A. in Astronomy and Astrophysics, in passing — *2022*
    - Thesis: *Enhancing the analysis of the large-scale structure of the Universe for cutting-edge cosmological surveys with two-point correlation function and beyond* (May 2025)
    - Advisor: Prof. Daniel Eisenstein
    - Center for Astrophysics | Harvard & Smithsonian

- **Tel Aviv University** — Tel Aviv-Yafo, Israel
  B.Sc. in Physics, Summa Cum Laude (GPA: 98/100) — *2019 – 2020*
    - Raymond & Beverly Sackler School of Physics & Astronomy
    - Advisor: Dr. Omer Bromberg

- **Moscow Institute of Physics and Technology** — Dolgoprudny, Russia
  B.Sc. in Applied Mathematics and Physics, unfinished — *2015 – 2018*
    - Department of General and Applied Physics
    - Advisor: Prof. Vasily Beskin

- **Richelieu Lyceum** — Odesa, Ukraine
  High school, specialization in physics — *2010 – 2015*

Research topics and publications

- Extracting more information from DESI galaxy clustering using moderate thermal Sunyaev-Zeldovich detections

– M. **Rashkovetskyi**, D. J. Eisenstein, *et al.*, "Clustering of DESI galaxies split by thermal Sunyaev-Zeldovich effect", *in preparation*, 2025a

- Semi-analytical, semi-empirical covariance matrices for DESI with RASCALC code

  – M. **Rashkovetskyi**, D. Forero-Sánchez, A. de Mattia, D. J. Eisenstein, N. Padmanabhan, H. Seo, A. J. Ross, *et al.*, "Semi-analytical covariance matrices for two-point correlation function for DESI 2024 data", J. Cosmology Astropart. Phys. **2025** January (2025)b 145, `arXiv:2404.03007`

  – M. **Rashkovetskyi**, D. J. Eisenstein, *et al.*, "Validation of semi-analytical, semi-empirical covariance matrices for two-point correlation function for early DESI data", MNRAS **524** September (2023) 3894–3911, `arXiv:2306.06320`

- Contributions to DESI BAO analysis and clustering catalogs

  – J. Moon, D. Valcin, M. **Rashkovetskyi**, C. Saulder, *et al.*, "First detection of the BAO signal from early DESI data", MNRAS **525** November (2023) 5406–5422, `arXiv:2304.08427`

  – D. Forero-Sánchez, M. **Rashkovetskyi**, O. Alves, *et al.*, "Analytical and EZmock covariance validation for the DESI 2024 results", J. Cosmology Astropart. Phys. **2025** April (2025) 055, `arXiv:2411.12027`

  – DESI Collaboration *et al.*, "DESI DR2 Results II: Measurements of Baryon Acoustic Oscillations and Cosmological Constraints", March 2025a, `arXiv:2503.14738`

  – DESI Collaboration *et al.*, "DESI 2024 III: baryon acoustic oscillations from galaxies and quasars", J. Cosmology Astropart. Phys. **2025** April (2025)b 012, `arXiv:2404.03000`

  – DESI Collaboration *et al.*, "DESI 2024 II: sample definitions, characteristics, and two-point clustering statistics", J. Cosmology Astropart. Phys. **2025** July (2025)c 017, `arXiv:2411.12020`

  – DESI Collaboration *et al.*, "DESI 2024 V: Full-Shape Galaxy Clustering from Galaxies and Quasars", November 2024, `arXiv:2411.12021`

  – DESI Collaboration *et al.*, "DESI 2024 VI: cosmological constraints from the measurements of baryon acoustic oscillations", J. Cosmology Astropart. Phys. **2025** February (2025)a 021, `arXiv:2404.03002`

  – DESI Collaboration *et al.*, "DESI 2024 VII: cosmological constraints from the full-shape modeling of clustering measurements", J. Cosmology Astropart. Phys. **2025** July (2025)b 028, `arXiv:2411.12022`

  – DESI Collaboration *et al.*, "Data Release 1 of the Dark Energy Spectroscopic Instrument", March 2025c, `arXiv:2503.14745`

  – DESI Collaboration *et al.*, "Validation of the Scientific Program for the Dark Energy Spectroscopic Instrument", AJ **167** February (2024)a 62, `arXiv:2306.06307`

  – DESI Collaboration *et al.*, "The Early Data Release of the Dark Energy Spectroscopic Instrument", AJ **168** August (2024)b 58, `arXiv:2306.06308`

  – DESI Collaboration *et al.*, "DESI DR2 Results I: Baryon Acoustic Oscillations from the Lyman Alpha Forest", March 2025a, `arXiv:2503.14739`

  – DESI Collaboration *et al.*, "DESI 2024 IV: Baryon Acoustic Oscillations from the Lyman alpha forest", J. Cosmology Astropart. Phys. **2025** January (2025)b 124, `arXiv:2404.03001`

  – U. Andrade, E. Paillas, J. Mena-Fernández, Q. Li, A. J. Ross, S. Nadathur, M. **Rashkovetskyi**, A. Pérez-Fernández, H. Seo, N. Sanders, O. Alves, X. Chen, N. Deiosso, A. de Mattia, M. White, *et al.*, "Validation of the DESI DR2 Measurements of Baryon Acoustic Oscillations from Galaxies and Quasars", March 2025, `arXiv:2503.14742`

– J. Mena-Fernández, C. Garcia-Quintero, S. Yuan, B. Hadzhiyska, O. Alves, M. **Rashkovetskyi**, H. Seo, N. Padmanabhan, S. Nadathur, C. Howlett, S. Alam, A. Rocher, A. J. Ross, E. Sanchez, M. Ishak, *et al.*, "HOD-dependent systematics for luminous red galaxies in the DESI 2024 BAO analysis", J. Cosmology Astropart. Phys. **2025** January (2025) 133, `arXiv:2404.03008`

– C. Garcia-Quintero, J. Mena-Fernández, A. Rocher, S. Yuan, B. Hadzhiyska, O. Alves, M. **Rashkovetskyi**, H. Seo, N. Padmanabhan, S. Nadathur, C. Howlett, M. Ishak, L. Medina-Varela, P. McDonald, A. J. Ross, Y. Xie, X. Chen, A. Bera, *et al.*, "HOD-dependent systematics in Emission Line Galaxies for the DESI 2024 BAO analysis", J. Cosmology Astropart. Phys. **2025** January (2025) 132, `arXiv:2404.03009`

– K. Lodha, R. Calderon, W. L. Matthewson, A. Shafieloo, M. Ishak, J. Pan, C. Garcia-Quintero, D. Huterer, G. Valogiannis, L. A. Ureña-López, N. V. Kamble, D. Parkinson, A. G. Kim, G. B. Zhao, J. L. Cervantes-Cota, J. Rohlf, F. Lozano-Rodríguez, J. O. Román-Herrera, *et al.*, "Extended Dark Energy analysis using DESI DR2 BAO measurements", March 2025, `arXiv:2503.14743`

– W. Elbers, A. Aviles, H. E. Noriega, D. Chebat, A. Menegas, C. S. Frenk, C. Garcia-Quintero, D. Gonzalez, M. Ishak, O. Lahav, K. Naidoo, G. Niz, C. Yèche, *et al.*, "Constraints on Neutrino Physics from DESI DR2 BAO and DR1 Full Shape", March 2025, `arXiv:2503.14744`

– C. Garcia-Quintero, H. E. Noriega, A. de Mattia, A. Aviles, K. Lodha, D. Chebat, J. Rohlf, S. Nadathur, W. Elbers, *et al.*, "Cosmological implications of DESI DR2 BAO measurements in light of the latest ACT DR6 CMB data", April 2025, `arXiv:2504.18464`

– U. Andrade, J. Mena-Fernández, H. Awan, A. J. Ross, S. Brieden, J. Pan, A. de Mattia, *et al.*, "Validating the galaxy and quasar catalog-level blinding scheme for the DESI 2024 analysis", J. Cosmology Astropart. Phys. **2025** January (2025) 128, `arXiv:2404.07282`

– E. Paillas, Z. Ding, X. Chen, H. Seo, N. Padmanabhan, A. de Mattia, A. J. Ross, S. Nadathur, C. Howlett, *et al.*, "Optimal reconstruction of baryon acoustic oscillations for DESI 2024", J. Cosmology Astropart. Phys. **2025** January (2025) 142, `arXiv:2404.03005`

– X. Chen, Z. Ding, E. Paillas, S. Nadathur, H. Seo, S. Chen, N. Padmanabhan, M. White, A. de Mattia, P. McDonald, A. J. Ross, A. Variu, A. Carnero Rosell, B. Hadzhiyska, M. M. S. Hanif, D. Forero-Sánchez, *et al.*, "Extensive analysis of reconstruction algorithms for DESI 2024 baryon acoustic oscillations", November 2024, `arXiv:2411.19738`

– J. Yu, A. J. Ross, A. Rocher, O. Alves, A. de Mattia, D. Forero-Sánchez, J.-P. Kneib, A. Krolewski, T. Lan, M. **Rashkovetskyi**, *et al.*, "ELG spectroscopic systematics analysis of the DESI Data Release 1", J. Cosmology Astropart. Phys. **2025** January (2025) 126, `arXiv:2405.16657`

– A. Pérez-Fernández, L. Medina-Varela, R. Ruggeri, M. Vargas-Magaña, H. Seo, N. Padmanabhan, M. Ishak, *et al.*, "Fiducial-cosmology-dependent systematics for the DESI 2024 BAO analysis", J. Cosmology Astropart. Phys. **2025** January (2025) 144, `arXiv:2406.06085`

– S. F. Chen, C. Howlett, M. White, P. McDonald, A. J. Ross, H. J. Seo, N. Padmanabhan, *et al.*, "Baryon acoustic oscillation theory and modelling systematics for the DESI 2024 results", MNRAS **534** October (2024) 544–574, `arXiv:2402.14070`

- Inhomogeneous recombination relieving Hubble tension

  – M. **Rashkovetskyi**, J. B. Muñoz, D. J. Eisenstein, and C. Dvorkin, "Small-scale clumping at recombination and the Hubble tension", Phys. Rev. D **104** November (2021) 103517, `arXiv:2108.02747`

- The dynamics of highly magnetized jets propagating in the medium

- Orthogonal radiopulsars and their statistics

– E. M. Novoselov, V. S. Beskin, A. K. Galishnikova, M. M. **Rashkovetskyi**, and A. V. Biryukov, "Orthogonal pulsars as a key test for pulsar evolution", MNRAS **494** April (2020) 3899–3911, `arXiv:2004.03211`

- Pulsar losses mechanisms

  – V. S. Beskin, A. K. Galishnikova, E. M. Novoselov, A. A. Philippov, and M. M. **Rashkovetskyi**, "So how do radio pulsars slow-down?", in "Journal of Physics Conference Series", vol. 932, p. 012012. December 2017

Teaching experience

- **Astronomy 200: Radiative Processes in Astrophysics**   Harvard University
  Teaching Fellow   *Fall 2023*
- **Astronomy 201: Astrophysical Fluids & Plasmas**   Harvard University
  Teaching Fellow   *Spring 2023*
- **Astronomy 130: Introduction to Cosmology**   Harvard College
  Teaching Fellow   *Fall 2022*

Public presentations

- **APS April meeting (contributed talk)**   Minneapolis, MN, USA
  First Detection of the BAO Signal from Early DESI Data   *April 18, 2023*
- **Cosmology from Home 2023 (contributed talk co-presenter)**   online
  First Detection of the BAO Signal from Early DESI Data (on YouTube)   *July 4, 2023*
- **ITC Luncheon (talk)**   Cambridge, MA, USA
  Semi-analytic covariance matrices for 2PCF of DESI galaxies (on YouTube)   *September 28, 2023*
- **APS Global Physics Summit (contributed talk)**   Anaheim, CA, USA
  Clustering of DESI LRG selected based on ACT DR6 + Planck tSZ map   *March 18, 2025*
- **IX Essential Cosmology for the Next Generation (talk)**   Playa del Carmen, Mexico
  Clustering of DESI galaxies selected based on ACT thermal SZ map   *December 5, 2024*
- **Frontiers in Cosmology and Gravitational Physics (poster)**   Portsmouth, UK
  Fast semi-analytical covariance matrices for 2PCF of galaxies and quasars   *May 20-23, 2024*
- **VIII Essential Cosmology for the Next Generation (poster)**   Playa del Carmen, Mexico
  `RascalC`: *Empirical 2PCF Covariance Matrices without Mocks*   *Nov 30 - Dec 3, 2022*
- **CMB-S4 Summer Meeting (poster)**   online
  Small-scale Clumping at Recombination and the Hubble Tension   *August 9-13, 2021*
- **CMB-S4 Spring Meeting (poster)**   online
  Hubble Tension with Small-Scale Clumping   *March 8-12, 2021*
- **Physics of Neutron Stars - 2017 (poster)**   Saint-Petersburg, Russia
  On the light-curve anomalies of radio pulsars   *July 10-14, 2017*

Other conferences and schools

- **DESI December** — Cancún, Mexico
  DESI Collaboration — *December 10-13, 2024*
- **DESI July** — Marseille, France
  DESI Collaboration — *July 9-12, 2024*
- **Fundamental Physics from Future Spectroscopic Surveys** — Berkeley, CA, USA
  Lawrence Berkeley National Laboratory — *May 6-8, 2024*
- **DESI December** — Waikoloa, HI, USA
  DESI Collaboration — *December 11-14, 2023*
- **DESI July** — Durham, UK
  DESI Collaboration — *July 17-21, 2023*
- **Michigan Cosmology Summer School** — Ann Arbor, MI, USA
  University of Michigan — *June 5-9, 2023*
- **DESI December** — Cancún, Mexico
  DESI Collaboration — *December 5-9, 2022*
- **DESI June** — Berkeley, CA, USA
  DESI Collaboration — *June 21-24, 2022*
- **15th School of Modern Astrophysics** — Dolgoprudny, Russia
  Moscow Insitute of Physics and Technology — *July 1-12, 2019*
- **13th School of Modern Astrophysics** — Dolgoprudny, Russia
  Moscow Insitute of Physics and Technology — *July 3-21, 2017*
- **International School of Subnuclear Physics - 2017** — Erice, Italy
  "Ettore Majorana" Foundation and Centre for Scientific Culture — *June 14-23, 2017*
- **International school on particles, fields and strings** — Moscow, Russia
  National Research University "High School of Economics" — *April 17-24, 2017*
- **Astronomical practice** — Nizhniy Arkhyz, Russia
  Special Astrophysical Observatory — *June 25 – July 2, 2016*

Awards, grants and honors

Dean's Certificate in Recognition of Outstanding Academic Achievements (TAU) 2019–2020
Stipend for excellent students of MIPT in the name of A.Abramov 2016–2017
International Physics Olympiad, bronze medal . . . . Mumbai, 2015
International Physics Olympiad, silver medal . . . . Astana, 2014

Selected open source contributions (https://github.com/misharash)

- RASCALC — C++ & Python
  Fast semi-analytic covariance matrices library/program — *2022-2024*
- RASCALC **scripts** — Python
  DESI covariance matrix pipeline for 2-point correlation function (scripts) — *2024*
- PYCORR — Python
  Library for 2-point correlation function estimation — *2024*

Outreach

- **DESI redshift-space distortions animations**   with Claire Lamman+
  Early version used in the press-release and following news articles   *Nov 19, 2024 – Mar 2, 2025*

Languages

- **Russian: native**
- **Ukrainian: fluent**
- **English: advanced**
- **Hebrew: advanced**
- **German: intermediate**