Daria Trotsenko

Ph.D. student in Theoretical Physics, Harvard University

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Education

Ph.D., Physics Sep. 2025–present
Harvard University, Cambridge, MA
Specialization: Theoretical Particle Physics; supervisor: M. D. Schwartz

M.Sc., Physics and Astronomy 2023–2025
University of Amsterdam and Vrije Universiteit Amsterdam, Amsterdam, Netherlands
Track: Gravitation, Astro-, and Particle Physics; GPA: 9.3/10, *cum laude*

Thesis: *"Complete Analytic Calculation of Drell–Yan Angular Coefficients at $\mathcal{O}(\alpha_s^2)$"*;
supervisors: W. J. Waalewijn and J. K. L. Michel
Research conducted at the Dutch National Institute for Subatomic Physics – Nikhef

B.Sc., Physics and Astronomy 2022–2023
University of Amsterdam and Vrije Universiteit Amsterdam, Amsterdam, Netherlands
Transferred from Taras Shevchenko National University of Kyiv; GPA: 8.88/10

Thesis: *"Measuring Oscillating Axion Fields Using Paul Traps"*;
supervisors: A. Safavi Naini and J. de Vries

Undergraduate studies, Physics and Astronomy 2020–2022
Taras Shevchenko National University of Kyiv, Kyiv, Ukraine

Teaching experience

Teaching Fellow, Quantum Field Theory I Fall 2026
Harvard University, Cambridge, MA
Prepare and lead recitation sections; hold office hours and provide student support; contribute to the writing and grading of problem sets and exams; and manage course communications.

Research highlights

- **Forward neutrons at electron-proton colliders:** Developing a SCET-based factorization framework for forward neutron production in the small-x $ep \to eXn$ process, examining the limitations of conventional pion-exchange descriptions and working toward systematically improvable predictions for future lepton–hadron colliders, with Stella T. Schindler.
- **Perturbative QCD and collider phenomenology:** DESY Summer Student Program project (Deutsches Elektronen-Synchrotron), later continued as a Master's thesis at UvA and Nikhef (University of Amsterdam and National Institute for Subatomic Physics), on the fully analytic computation of Drell–Yan helicity cross sections and angular coefficients through $\mathcal{O}(\alpha_s^2)$, including a helicity-resolved NNLO prediction for the q_T spectrum, with W. Waalewijn, J. Michel, F. Tackmann, A. Gavardi, and B. Dehnadi.
- **Axion physics and quantum sensing:** Bachelor's thesis on axion electrodynamics in Paul traps, deriving the induced ion displacement in terms of axion parameters and estimating the region of parameter space accessible through force-sensing experiments, with A. Safavi Naini and J. de Vries.
- **Quantum trajectories:** IoP/DPA (Institute of Physics (UvA)/ Department of Physics and Astronomy (VU)) summer internship extending the axion-sensing project to quantum trajectories, including master-equation and quantum-jump methods aimed at improving sensitivity in ion-trap experiments, with A. Safavi Naini.
- **Astrophysics:** LEAPS Summer Program project (Leiden University) on molecular gas and star formation in jellyfish galaxies using ALMA and MaNGA observations, contributing to a publication in *The Astrophysical Journal*, with A. R. Bemis, I. D. Roberts, and S. K. Leslie.
- **Additional projects:** Fermi acceleration in a chaotic billiard with A. Polkovnikov; determining masses of binary UV-active AGNs with A. Tugay.

Research visits and talks

EFT Group Meeting, Massachusetts Institute of Technology, Cambridge, MA

- *"Complete Analytic Calculation of Drell–Yan Angular Coefficients at $\mathcal{O}(\alpha_s^2)$"* Nov. 2026
- *"Forward Neutrons in Electron-Proton Colliders"* May 2026

Schwartz Group Meeting, Harvard University, Cambridge, MA September 2026
"Forward Neutrons in Electron-Proton Colliders"

Guest research visit, Los Alamos National Laboratory, Los Alamos, NM July–Aug. 2026

- T-2/P-3 Seminar: *"Forward Neutrons in Electron-Proton Colliders"*
- T-Division Lightning Talk Competition **1st place**:
  "Unveiling the True Mechanism of Forward Neutron Production"

Honors and fellowships

KHMW Young Talent Award: Theoretical Physics 2025
Annual KHMW/Holland Society award recognizing exceptional achievement in a MSc thesis in theoretical physics.
Purcell Fellowship, Harvard Department of Physics 2025–2026
Covers the full stipend for the first two semesters, as well as tuition and fees.
Amsterdam Ukrainian Refugee Physics & Astronomy Scholarship (AURS) 2023–2025
Awarded to talented Ukrainian students in the UvA-VU Physics and Astronomy program.

Regional Olympiads: Silver in English and Silver in Physics 2020
Award from the Mayor of Vinnytsia for the highest score on the Unified State Exam 2020
Gold Medal for Outstanding Academic Performance 2020

Leadership, service, and outreach

Public outreach

Speaker, Science in the News (SITN) × Beacon Hill Seminars, Fall 2026, Online (Zoom) Oct. 2026
"What happens when you smash a proton?" – 40-minute public talk and one-hour roundtable for lifelong learners
Volunteer, Physics Demo Day, Somerville High School, Somerville, MA Jan. 2026
Parabolic mirror demonstration for high-school students
Volunteer, Open Day and Science Day, Amsterdam Science Park, Netherlands Oct. 2023, Oct. 2024
3D TV physics demonstration for children and the public

Mentoring and community

Mentor, POLARIS Mentorship Program, Harvard University 2026–present
Member, Gender Minorities and Women in Physics (GWiP), Harvard University 2025–present
Participant, NWO-I Women+ in STEM, Netherlands 2024–2025
Member, Physics Student Association; Lead Designer, Student Events Team, Kyiv 2020–2022

Organizing and service

Chair, DESY Summer Student Program Presentations, DESY, Hamburg, Germany Sep. 2024
Organizer, 28th Young Scientists' Conference on Astronomy and Space Physics, Kyiv Oct. 2022
Judge, Experimental Physics Olympiad ExPhO, Kyiv Dec. 2021

Publications

Roberts, I. D., Lang, M., **Trotsenko, D.**, *et al.* (2022). *LoTSS Jellyfish Galaxies. IV. Enhanced Star Formation on the Leading Half of Cluster Galaxies and Gas Compression in IC3949. The Astrophysical Journal*, **941**, 77. arXiv:2210.16013.

Skills

Programming: Python, pyROOT, C++, Wolfram Mathematica
Typesetting and design: LaTeX, Adobe Photoshop, Adobe Illustrator
Languages: English, Ukrainian, Russian