

dominika@mit.edu — [dominikadu.github.io](https://github.com/dominikadu)

EDUCATION

- Doctor of Philosophy in Physics** | Massachusetts Institute of Technology, USA 09/2020 - present
 Research advisor: Anna-Christina Eilers, Robert Simcoe
 Research area: High-redshift astrophysics and cosmology ([Cosmic Dawn Group](#))
 Other research areas: Precision quantum metrology for quantum gravity (past member at [Quantum and Precision Measurements Group](#))
- Master of Physics (4-year MPhys)** | University of Oxford, United Kingdom 10/2016 - 07/2020
 Degree classification: First class
 Graduate concentration: Laser Physics and Quantum Information Processing, Theoretical Physics
 Graduate thesis: Cross-Telescopic Super-Resolution Galaxy Images from Generative Adversarial Networks
- International Baccalaureate Diploma** | Gymnazium Jur Hronec, Bratislava, Slovak Republic 09/2014 - 06/2016
 Score: 42/45
 Subjects: Physics HL, Mathematics HL, English B HL, German B SL, Psychology SL, Slovak A SL.

RESEARCH EXPERIENCE

Astrophysics:

- PhD candidate** | [Cosmic Dawn Group](#), MIT Kavli Institute, Cambridge, MA 09/2022 - present
 Advisor: Anna-Christina Eilers, Robert Simcoe
 Interests: quasar damping wings and proximity zones, Epoch of Reionization, quasar lifetimes, supermassive black hole growth
- Student Researcher** | Beecroft Institute of Particle Astrophysics and Cosmology, Oxford, UK 10/2017 - 08/2020
 Advisor: Adrienne Slyz, Julien Devriendt
 Interests: Epoch of Reionization, machine learning, quasar damping wings, galaxy super-resolution imaging, simulations of galaxy formation
- Co-Researcher** | M.R. Štefánik Observatory, Hlohovec, Slovakia 02/2015 - 10/2016
 Advisor: Karol Petrík
 Interests: transiting exoplanets, multiband photometry
 Co-initiated exoplanetary research at the observatory

Precision and quantum metrology:

- Research Assistant** | [Quantum and Precision Measurements Group](#), MIT, Cambridge, MA 09/2020 - 08/2022
 Advisor: Vivishek Sudhir
 Interests: quantum sensing, cavity optomechanics, trapping, interface of quantum physics and general relativity
- Laidlaw Scholar** | [LIGO Laboratory](#), MIT, Cambridge, MA 07/2018 - 09/2018
 Advisor: Nergis Mavalvala
 Interests: gravitational wave detectors, opto-electronic control systems, squeezed states of light

Other:

- Student Intern** | [Tearney Laboratory](#), Massachusetts General Hospital, Boston, MA 07/2019 - 09/2019
 Advisor: Guillermo J. Tearney
 Interests: micro-optical coherence tomography
- Student Intern** | Research Center for Quantum Information, Bratislava, Slovakia 06/2017 - 08/2017
 Advisor: Daniel Nagaš
 Interests: Quantum Approximate Optimization Algorithm (QAOA)

PUBLICATIONS

8. Ďurovčiková, Sudhir. Scheme for continuous force detection with a single electron at the 10^{-27} N level. [arXiv:2402.05998 \(2024\)](#).
7. Ďurovčiková, Eilers, Chen, Satyavolu, Kulkarni, Simcoe, Keating, Haehnelt, Bañados. Chronicling the reionization history at $6 \lesssim z \lesssim 7$ with emergent quasar damping wings. [arXiv:2401.10328 \(2024\)](#).
6. Eilers, Simcoe, Yue, Mackenzie, Matthee, Ďurovčiková, Kashino, Bordoloi, Lilly. EIGER III. JWST/NIRCam observations of the ultra-luminous high-redshift quasar J0100+2802. [ApJ 950, 68 \(2023\)](#).

5. Komori, Ďurovčiková, Sudhir. Quantum theory of feedback cooling of an anelastic macro-mechanical oscillator. *PRA*, 105(4), p.043520 (2022).
4. Bosman, Ďurovčiková, Davies, Eilers. A comparison of quasar emission reconstruction techniques for $z \geq 5.0$ Lyman- α and Lyman- β transmission. *MNRAS*, 503(2), pp.2077–2096 (2021).
3. Reiman, Tamanas, Prochaska, Ďurovčiková. Fully probabilistic quasar continua predictions near Lyman- α with conditional neural spline flows. *arXiv*: 2006.00615 (2020).
2. Katz, Ďurovčiková, Kimm, Rosdahl, Blaizot, Haehnelt, Devriendt, Slyz, Ellis, Laporte. New Methods for Identifying Lyman Continuum Leakers and Reionization-Epoch Analogues. *MNRAS*, 498(1), pp.164–180 (2020).
1. Ďurovčiková, Katz, Bosman, Davies, Devriendt, Slyz. Reionization history constraints from neural network based predictions of high-redshift quasar continua. *MNRAS*, 493(3), pp.4256–4275 (2020).

CONFERENCES & TALKS

* virtual

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| *Talk: | <i>Chronicling the reionization history with $6 < z < 7$ quasars,</i>
Science coffee at Charles University, Prague, Czech Republic | 02/2024 |
| *Talk: | <i>Chronicling the reionization history with $6 < z < 7$ quasars,</i>
State of the Universe seminar, Tata Institute of Fundamental Research, Mumbai, India | 12/2023 |
| Attendee: | Boston-Area Black Hole Accretion Meeting,
Harvard & Smithsonian Center for Astrophysics, Cambridge, MA | 10/2023 |
| Talk: | <i>Machine learning use cases in Reionization studies,</i>
Modern statistics of galaxies seminar, University Observatory of LMU, Munich, Germany | 09/2023 |
| Talk: | <i>Chronicling the reionization history with redshift $6 < z < 7$ quasars,</i>
Reionization in the Summer, Heidelberg, Germany | 06/2023 |
| Poster: | <i>Chronicling the reionization history with redshift $z \sim 6.5$ quasars,</i>
First Light Conference, Cambridge, MA | 06/2023 |
| *Talk: | <i>Theory of ground state cooling of a macroscopic anelastic mechanical oscillator,</i>
Conference on Lasers and Electro-Optics (CLEO), San Jose, CA | 05/2022 |
| *Talk: | <i>Intensity interferometry & more quantum optics,</i> MIT Kavli Institute Journal Club, Cambridge, MA | 02/2022 |
| *Poster: | <i>Prospects for high-sensitivity continuous force detection with a single trapped ion,</i>
MIT QSEC Annual Research Conference, Cambridge, MA | 02/2022 |
| *Talk: | <i>On the Unruh effect and its measurement,</i> MIT Kavli Institute Graduate Lunch, Cambridge, MA | 04/2021 |
| *Workshops: | <i>Solving Laplace equation; Building a precision force detector,</i>
EWAAB Young Professionals Program, online | 03/2021 |
| *Video: | <i>Exploring the Quantum-Gravity Interface through Precision Measurements</i>
Global Young Scientists Summit, Singapore | 01/2021 |
| *Talk: | <i>Neural networks for the early Universe,</i> Summer All Zoom Epoch of Reionization Astronomy Conference (SAZERAC), online | 07/2020 |
| *Attendee: | APS Virtual Division of Atomic, Molecular and Optical Physics (DAMOP) Meeting | 06/2020 |
| Poster: | <i>Neural networks for the early Universe,</i> Royal Society-FAPESP Frontiers of Science Meeting, São Paulo, Brazil | 03/2020 |
| Talk: | <i>Neural networks for the early Universe,</i> Particle Physics/Astrophysics/Machine learning Seminar, Oxford, UK | 02/2020 |
| Attendee: | First Light and Reionisation Epoch Meeting at Royal Astronomical Society, London, UK | 02/2020 |
| Poster: | <i>Developing a motion-weighted micro-optical coherence tomography for in vivo dynamical imaging,</i> Wellman Scientific Retreat, Boston, MA | 09/2019 |
| Poster: | <i>Developing a motion-weighted micro-optical coherence tomography for in vivo dynamical imaging,</i> Harvard-MIT Summer Institute for Biomedical Optics Poster Day, Boston, MA | 08/2019 |
| Talk: | <i>Dynamical micro-OCT: principles and challenges,</i> Harvard-MIT Summer Institute for Biomedical Optics Presentations, Boston, MA | 07/2019 |
| Attendee: | FUTURE of Physics at California Institute of Technology, Pasadena, CA | 11/2018 |
| Poster: | <i>Building a laser intensity stabilisation servo (ISS) for the use of optomechanical squeezing in future GW detectors,</i> Laidlaw Research and Leadership Programme Poster Event, Oxford, UK | 10/2018 |

Talk:	<i>How to quiet a laser? Laser Intensity Stabilisation Servo for Optomechanical Squeezing Experiment</i> , MIT Kavli Institute Undergraduate Research Symposium, Cambridge, MA	08/2018
Talk:	<i>Squeezed States of Light & GW detection</i> , Presentations at New College, Oxford, UK	02/2018

CERTIFICATES & SCHOLARSHIPS

MIT School of Science Service Fellowship	2022
MIT Physics Graduate Service Award	2021
Bruno Rossi Graduate Fellowship	2020 - 2021
Scholarship of the College of the Blessed Mary of Winchester	2017 - 2020
Harvard-MIT Summer Institute for Biomedical Optics Completion Certificate	2019
Institute of Leadership & Management (ILM) Certificate Level 3	2019
McKinsey&Company Next Generation Women Leaders Award	2019
Laidlaw Research and Leadership Scholarship	2018
Distinction in Physics	2017

TEACHING & COMMUNITY ENGAGEMENT

Local Organizing Committee Member First Light Conference	06/2023
Co-director MIT Astrogazers	05/2023 - present
Bringing the wonders of observational astronomy to the streets of Cambridge and Boston (and occasionally beyond).	
Lecturer Discover Summer Academy	08/2020 - present
Designed and taught a week-long course on quantum physics (twice) and on black holes (once) to high school students from Slovakia and Czech Republic.	
Facilitated team-building and self-reflection sessions in three teams of ~10 students.	
Teaching Assistant MIT Department of Mechanical Engineering	02/2022 - 05/2022
Co-developed a new course on classical and quantum stochastic processes (course number 2.S982).	
Created and marked 7 problem sets, hosted weekly office hours, and marked final presentations.	
Vice-President for Admissions MIT Physics Graduate Student Council	08/2021 - 06/2022
Oversaw and coordinated student initiatives related to admissions to the MIT Physics graduate program.	
Collaborated with the Physics Graduate Student Council leadership on improving the student experience at MIT Physics.	
Student Leader MIT Physics Department Graduate Admissions Advisory Council	07/2020 - 06/2022
Co-designed and launched three new student-led resources under the umbrella of PhysGAAP to increase equity in the MIT Physics graduate admissions process.	
Prepared and led weekly council meetings with the Admissions Chair and the Academic Programs Office focused on analysing and assessing the current graduate admissions process and improving its equity and inclusivity to applicants from diverse and untraditional backgrounds.	
Collaborated with student leaders from other MIT departments to achieve a more uniform change in admissions across MIT.	
Co-Founder EWAAB Nonprofit Organisation	06/2019 - present
Co-founded EWAAB as an initiative to support confidence in university-level women. We aim to encourage young women to step out of their comfort zone, to provide them with a set of leadership and communication skills to be able to do so, and to connect them to a global network of peers and supporters.	
Transformed the original initiative into a 501(c)3 nonprofit organisation currently supported by 9 Trustees.	
Co-designed the curriculum of the 2019/20 mentorship program and managed a successful launch of its inaugural year at 8 universities around the world, spanning Canada to Australia, together impacting 27 mentees in 6 countries.	
Featured in the Scientific American and SME (the largest Slovak newspaper).	
President, STEM Leader, STEM Advisor Unimak	09/2016 - 09/2020
Led over 80 members of this organisation to spread awareness of the possibilities for young Slovaks and Czechs to study at world leading universities via outreach talks, online media, and advice on issues related to choosing and applying to universities.	