Dominika Ďurovčíková

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EDUCATION

Master of Physics (4-year MPhys) | University of Oxford, United Kingdom 10/2016 - present
Degree expected: June 2020
Graduate concentration: Laser Physics and Quantum Information Processing, Theoretical Physics
Graduate thesis: Super-Resolution Galaxy Images from Generative Adversarial Networks

- Passed the BSc part of the course as a first-class student (equivalent to US GPA 3.7+/4.0), thus being awarded the Scholarship of the College of the Blessed Mary of Winchester for three consecutive years.
- Received consistent feedback from my college tutors saying I am a hardworking, thorough, perceptive student who thinks deeply about any problem being presented.
- Relevant coursework: laser physics and quantum information processing (2019/20), theoretical physics (2019/20), atomic, molecular and laser physics, quantum physics, condensed matter physics, general relativity and cosmology, particle physics, electromagnetism, optics, biophysics, fluid dynamics, statistical and thermal physics, special relativity, classical mechanics, complex variable calculus, calculus, linear algebra.

International Baccalaureate Diploma | Gymnazium Jur Hronec, Bratislava, Slovak Republic 9/2014 - 6/2016
Subjects: Physics HL, Mathematics HL, English B HL, German B SL, Psychology SL, Slovak A SL.
Score: 42/45

RESEARCH EXPERIENCE

Student Intern | Tearney Laboratory, Massachusetts General Hospital, Boston, MA 7/2019 - 9/2019
Supervisor: Professor Guillermo J. Tearney, MD, PhD

- Created a proof of concept of a new version of the micro-optical coherence tomography, which extends the medical imaging technology to include information about cellular dynamics in addition to the currently available structural information.
- Designed and modelled the optical system in Zemax, built a proof-of-concept setup and developed an original image post-processing algorithm in MATLAB.
- Completed the Harvard-MIT Summer Institute for Biomedical Optics.

Student Researcher | Beecroft Institute of Particle Astrophysics and Cosmology, Oxford, UK 10/2018 - 6/2019
Supervisor: Professor Adrianne Slyz, PhD, Professor Julien Devriendt, PhD

- Developed a machine learning based approach to reconstructing high-redshift quasar spectra around Lyα to study the Epoch of Reionization that improves on the state-of-the-art model by 14.2%.
- Tasks included: manipulating spectral data from the SDSS and eBOSS surveys, developing a novel spectral smoothing algorithm in Python, and building, training and applying a committee of neural networks in Python to constrain the neutral fraction at redshifts of $\sim$7 and $\sim$7.5.
- Paper published in Monthly Notices of Royal Astronomical Society.

Laidlaw Scholar | LIGO Laboratory, Massachusetts Institute of Technology, Cambridge, MA 7/2018 - 9/2018
Supervisor: Professor Nergis Mavalvala, PhD

- One of University of Oxford's 25 holders of the Laidlaw Research and Leadership Scholarship 2018 to undertake their proposed research project at a world-leading institution.
- Designed and built an opto-electronic control system called the laser intensity stabilisation servo to produce a shot-noise limited laser beam at 100 Hz - 50 kHz. This system is now used to produce optomechanically squeezed states of light to explore their possible use in future gravitational wave detectors.
- Nominated for the Caltech FUTURE of Physics program after 5 weeks of working with the group.

Student Researcher | Beecroft Institute of Particle Astrophysics and Cosmology Oxford, UK 10/2017 - 6/2018
Supervisor: Professor Adrianne Slyz, PhD, Professor Julien Devriendt, PhD

- Completed a project on the effect of radiative cooling on galaxy star formation rates in cosmological simulations, comparing the RAMSES and FIRE cooling functions.
- Ran over 16 hydrodynamical N-body simulations on the Linux-based computing cluster Glamdring and developed Python routines for data analysis.

Student Intern | Research Center for Quantum Information, Bratislava, Slovakia 6/2017 - 8/2017
Supervisor: Daniel Nagaj, PhD

- Completed a project on the Quantum Approximate Optimization Algorithm (QAOA) and its possible variations in relation to the NP-complete problem called MAXCUT.
- Created MATLAB simulations and minimized their complexity by developing direct mapping subroutines mimicking the application of X and Z gates on the computational basis states.

Co-Researcher | M.R. Štefánik Observatory, Hlohovec, Slovakia 2/2015 - 10/2016
Supervisor: Karol Petrík, PhD

- Co-initiated exoplanetary research at the observatory and investigated the transiting exoplanet TrES-1 b in Lyra through multi-band photometric observations, data reduction in Muniwin, and transit light curve analysis.
- Submitted 5 transit light curves of TrES-1 b to the Exoplanet Transit Database (ETD).

CERTIFICATES & SCHOLARSHIPS

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

CONFERENCES & TALKS

Poster:	*Neural networks for the early Universe*, UK-Brazil Frontiers of Science Meeting, Sao Paulo	3/2020
Talk:	*Neural networks for the early Universe*, Particle Physics/Astrophysics/Machine learning Seminar, Oxford	2/2020
Attendee:	First Light and Reionisation Epoch Meeting at Royal Astronomical Society, London	2/2020
Poster:	*Developing a motion-weighted micro-optical coherence tomography for in vivo dynamical imaging*, Wellman Scientific Retreat, Boston, MA	9/2019
Poster:	*Developing a motion-weighted micro-optical coherence tomography for in vivo dynamical imaging*, Harvard-MIT Summer Institute for Biomedical Optics Poster Day, Boston, MA	8/2019
Talk:	*Dynamical micro-OCT: principles and challenges*, Harvard-MIT Summer Institute for Biomedical Optics Presentations, Boston, MA	7/2019
Attendee:	FUTURE of Physics at California Institute of Technology, Pasadena, CA	11/2018
Poster:	*Building a laser intensity stabilisation servo (ISS) for the use of optomechanical squeezing in future GW detectors*, Laidlaw Research and Leadership Programme Poster Event, Oxford	10/2018
Talk:	*How to quiet a laser? Laser Intensity Stabilisation Servo for Optomechanical Squeezing Experiment*, MIT Kavli Institute Undergraduate Research Symposium, Cambridge, MA	8/2018
Talk:	*Squeezed States of Light & GW detection*, Presentations at New College, Oxford	2/2018

PUBLICATIONS

Ďurovčíková, D., Katz, H., Bosman, S.E.I., Davies, F.B., Devriendt, J., Slyz, A., 2019. Reionization history constraints from neural network based predictions of high-redshift quasar continua. Monthly Notices of the Royal Astronomical Society, Volume 493, Issue 3, April 2020, Pages 4256–4275. https://doi.org/10.1093/mnras/staa505

COMMUNITY ENGAGEMENT

Co-Founder, Mentor | Encouraging Women Across All Borders (EWAAB) | ewaab.org 6/2019 - present
Co-designed a mentorship program targeting first-year female undergraduate students. We aim to encourage women to be more confident and open-minded, to provide them with a set of leadership and communication tools, and to connect them to a global network of inspirational women currently spanning 8 universities around the world.

President, STEM Leader, STEM Advisor | Unimak 9/2016 - present
Leading over 60 members 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.

Vice-President | Oxford University Czech and Slovak Society 3/2017 - 3/2018
Co-organized 15 events throughout the year, ranging from the annual dinner commemorating the Velvet Revolution, discussions with interesting Czech and Slovak citizens, to movie nights, thus connecting Czechs and Slovaks in Oxford.

SKILLS & INTERESTS

IT Proficiency: Python, MATLAB, Latex, Zemax, Muniwin
Language Proficiency: Slovak (native), Czech (native), English (fluent), German (advanced), Spanish (beginner)
Interests: ukulele, drawing and painting, baking