Martin Murin, PhD

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I am a doctoral researcher in data science applied to particle physics with a distinctive skill set that combines proficiency in mathematical problem-solving leveraging a solid physics background to gain fundamental understanding and intuition. Proven ability to develop and optimise machine learning models and interpret the results. Proficient in code collaboration using Git. Recognized for my fast learning curve, I thrive in fast-paced environments and contribute effectively to projects that demand agility and adaptability. Willing to relocate.

EDUCATION

PhD in Particle Physics — **University of Manchester and CERN**   Manchester, UK — 2019 - 2023

- Member of the ATLAS Collaboration at CERN since 2019, earning authorship in 2020
- Engaged in a year-long attachment at CERN, contributing to the operation of the ATLAS experiment

MPHYS Physics with Astrophysics (1st class) — **University of Manchester**   Manchester, UK — 2015 - 2019

- 2017 Richard Davis Prize: Awarded for the best laboratory work in the 2nd year (92%)

Education abroad programme — **University of California Los Angeles**   Los Angeles, USA — 2017 - 2018

- One year exchange programme. GPA: 3.56/4.00.

International Baccalaureate — **Gymnázium Jura Hronca**   Bratislava, Slovakia — 2011 - 2015

- IB Diploma points: 41/45.

RESEARCH EXPERIENCE

Doctoral Researcher — **ATLAS Experiment at CERN**   Manchester, UK — 2019 - 2023

- Developed and optimized a Boosted Decision Tree model for binary classification, involving variable selection, hyper-parameter tuning, and GPU-accelerated performance studies (link to repository)
- Corrected mismodelling of background with a data-driven method allowing extraction of a rare signal (5%) and leading to statistically significant evidence of the four top quark process (link to publication)
- Conducted profile likelihood fits and tested the impact of various setups on fit stability
- Configured and processed large data sets on the CERN's high performance computing cluster, extended existing software frameworks for DNN performance calibration

Graduate Researcher — **Jodrell Bank Centre for Astrophysics**   Manchester, UK — 2018 - 2019

- Analysed multidimensional data to identify galactic cluster substructures in cosmological simulations, directly contributing to the most comprehensive study of the rotational kinematic Sunayev-Zeldovich effect
- Evaluated the potential of current and future telescopes to detect the kinematic Sunayev-Zeldovich effect

Summer Intern — **Department of Nuclear Physics**   Bratislava, Slovakia — June 2018

- Assembled a vacuum apparatus for the 4 MeV tandem electrostatic proton/alpha accelerator
- Characterised the spectrum produced by the proton beam interaction with the experimental assembly

Summer Intern — **National Oceanography Centre**   Southampton, UK — June - August 2017

- Reconstructed climate and geomagnetic change information preserved in marine sediments
- Operated various scientific instruments and analysed their physical and technical limitations

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LEADERSHIP AND TEAMWORK

Doctoral Researcher — **ATLAS Collaboration**   Manchester, UK — 2019 - 2023

- Integrating my code into the larger framework using Git and adapting packages from other team members.
- Managed multiple projects simultaneously, collaborating with both local and remote research teams.
- Mentored a junior student, providing guidance on project methodologies and objectives.

ATLAS Run Control shifter — **CERN**   Geneva, Switzerland — 2022

- Configured detector setup as required for various subsystem tests and resolved problems with experts
- Wrote event logs, bug reports, and efficiently communicated ongoing situation at the end of the shift

Teaching Assistant — **University of Manchester**   Manchester, UK — 2019 - 2020

- Conducted over 60 workshops in C++ and Python programming, explaining technical concepts and resolving code, compiler or dependency-related errors
- Graded 100s of students' assignments, semestral projects, and final exams providing detailed feedback

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TECHNICAL SKILLS

Programming	C++, Python, Bash
Machine Learning	XGBoost, sklearn, developed and optimized BDT models, hyperparameter tuning, familiar with DNN and ANN
Data Analysis	ROOT, numpy, pandas, data cleaning and pre-processing
Statistics	Chi-square tests, template likelihood fits, profile likelihood fits for hypothesis testing and significance estimation, fit stability tests
High-Performance Computing	Experience with configuring and processing large data sets (100s TB) on CERN's high-performance computing cluster, optimizing code for CPU efficiency
Visualization	Matplotlib, Seaborn, Mathematica, Adobe Illustrator for vector graphics, MS/Libre Office and LaTeX for presentations and documentation
Quantum Computing	Participated in hackathons like QHack2023 and Pennylane code camp, designed simple circuits with Quirk
Collaboration Tools	Experience with collaborative software development, proficient in using version control systems like Git
Project Management	Managed multiple projects simultaneously, experience with task prioritization and timeline management
Problem Solving	Strong analytical and troubleshooting skills, developed through complex data analysis and research tasks
Communication	Collaborating with a research team, experience in public outreach, trained students, communicated complex ideas to non-specialist audiences
Languages	English (professional), Slovak (native), French and German (conversational)

PERSONAL INTERESTS

- **Astronomy:** Passionate about astronomy, leading numerous outreach activities to share this interest with the wider community.

- **Traveling:** Avid traveler with solo adventures across Southeast Asia, gaining diverse cultural experiences from living and studying in multiple countries.

- **Physical Activities:** Engaged in a variety of sports including weight lifting, swimming, cycling, hiking, and snowboarding to maintain a balanced and healthy lifestyle.