Daniel Ctvrtecka

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Imperial Physics undergraduate specialising in the intersection of physics and machine learning.

Education

Imperial College London   *Sept 2024 – present*
MSci in Physics

- Achieved **80%** in the first year and earned the **Dean's List award** for outstanding results (top 10% in the cohort)
- Completed modules in Electromagnetism, Computing, Differential equations, Quantum Physics

Christian Doppler Grammar School   *Sept 2021 – June 2024*
High school diploma (Maturita) - achieved best possible marks

- Acquired IEP (individual education plan) for outstanding talents to lead my advanced independent self-education and collaborate on research at the Czech Academy of Sciences
- Awarded director's commendation for school representation on the international STEM Olympiads

Experience

Paid research intern (invited)   *Oxford, UK*
University of Oxford, Denys Wilkinson Laboratory   *Aug 2025 – Sept 2025*

- Carried out research to accelerate numerical simulations and investigate limitations and possible further applications of developed methods
- Designed a pipeline based on a symbolic regression (evolutionary machine learning technique) to find accurate approximations to special functions
- Presented my findings at the Oxford intern symposium in front of senior members of the department

Paid research intern   *Ondřejov, Czechia*
Czech Academy of Sciences, Institute of Astronomy   *2021 – 2024*

- Lead an initiative to build a data analysis pipeline in Python to obtain the first scientifically relevant results from a new wide-range spectrometer
- Diagnosed crucial equipment limitations, based on which new hardware solutions were proposed
- Results of my work published in a peer-reviewed journal as part of an international solar flare campaign investigation (see publications)
- Presented my work every month as a member of an international team
- Helped with the organisation of Hinode/IRIS conference in 2022 in Prague (150 participants)

Research intern   *Prague, Czechia*
Czech Academy of Sciences, Institute of Physics & CEICO   *2023 – 2024*

- Independently developed and implemented a Python library for simulating the thermal history of the universe
- Designed a coupled differential equation solver with multiple constraints and regime switch methods

Skills

Programming languages: Python (PyTorch, SciPy, sklearn), Julia, LaTeX, C (basic use), Git (version control), Bash & Linux

Programmed in topics: Machine learning (Deep Neural Networks, Physics Informed Neural Networks, Symbolic Regression), Finite difference methods, Big data (visualisation, analysis)

Languages: Czech, English (CAE/C1)

Publications

Flare heating of the chromosphere: Observations of flare continuum from GREGOR and IRIS *2024*

M. García-Rivas, J. Kašparová, A. Berlicki, M. Švanda, J. Dudík, **D. Ctvrtecka**, M. Zapiór, W. Liu, M. Sobotka, M. Pavelková, and G. G. Motorina

[García-Rivas et al., Astronomy & Astrophysics, Vol.690](#) ↗

- Verified, using results from numerical simulations, a new method for the estimation of plasma temperature in the solar chromosphere

Awards and achievements

Bakala foundation Scholarship *2024*

- Obtained one of the most prestigious scholarships in Czechia (acceptance rate of 5 %) to cover overseas fees for four years of studies at Imperial College London
- Presented and communicated my motivation, work and vision in front of twelve internationally recognised researchers and innovators as a part of a many-staged application process

Kellner foundation Scholarship *2024*

- Another established prestigious scholarship in Czechia to cover the remaining costs for education at Imperial College London
- Secured another prestigious scholarship in Czechia to cover remaining education costs at Imperial College London. Demonstrated my career vision and motivation, and exhibited my results to a multi-member committee, including the CEO of PPF, the largest company in Central and Eastern Europe.

George Placzek Scholarship *2024*

- Secured a highly selective scholarship annually awarded to the most talented Czech physics students transferring from high school to university

IOAA & IAO bronze medals, EuPho participation

- Received two bronze medals and one honourable mention for the International Astronomy Olympiads
- Applied advanced analytical reasoning to model complex (astro)physics problems and interpret observational data, often developing creative solutions under significant time constraints.

Interests and hobbies

- Deep-tech startups environment and VCs (member of Imperial entrepreneurship society)
- Amateur guitar player
- Playing chess and table tennis