Michał Mogielnicki | Curriculum Vitae

michal@mogielnicki.com • mogielnicki.com • GitHub LinkedIn

Education

Trinity College Dublin — **Dublin, Ireland**
Bachelor of Arts, Theoretical Physics — *2025–2029 (expected)*
First-year: First Class Honours (86%)
Awards: TCD's top scorer in the UK Integration Bee
Activities: Co-created problems for the TCD Integration Bee; active member of MathSoc problem-solving sessions

ICM, University of Warsaw — **Warsaw, Poland**
Maths for the Curious of the World — *2022, 2024*
High-school outreach programmes. Applied group theory to music theory; built a Python population simulation with resource and predator constraints; studied differential calculus, numerical methods, networking, and Bash scripting

Research Experience

Axiom Math — **Remote**
Research Engineer Intern — *May 2026–November 2026*
Continued part-time during term.
Reference: Prof. Ken Ono

- Co-authored two public combinatorics preprints addressing open problems in record compositions and partition bijections; final proofs were formally verified in Lean
- Refactored the Lean formalisation of a recent OpenAI paper on the 2D area law (quantum information), removing $\approx 75\,000$ lines of code
- Helped run AxiomProver on IMO problems
- Additional research work subject to confidentiality obligations

University of Warsaw — **Warsaw, Poland**
Student Researcher — *2025–2026*

- Wrote a report on gravitational-wave detector noise sources
- Built numerical simulations of the stochastic gravitational-wave background from populations of merging black-hole binaries, modelling up to hundreds of binaries per population

Publications

arXiv:2607.12873
Record compositions of alternating permutations and noncommutative symmetric functions — *2026*
Evan Chen, Michał Mogielnicki, and Ken Ono

arXiv:2608.05142
A bijective proof of a partition theorem of Berkovich and Uncu — *2026*
Michał Mogielnicki, Ken Ono, Niels Voss, and Jujian Zhang

Projects

PhysLib (Lean 4 physics library)
Contributor — *2026–present*

- Leading the formalisation of classical mechanics: designing the configuration-space and Lagrangian-system API on smooth manifolds and authoring the module roadmap
- Contributed a formalisation of the Euler–Lagrange equations on normed spaces and charts
- Help maintain the library, including the recent toolchain bump and minimising imports.

Last updated: November 10, 2026

Computer-Vision-Controlled N-Body Simulation
Personal Project *2025*

- Built an N-body simulation in Python using the Barnes–Hut algorithm and NumPy, reducing complexity from $O(N^2)$ to $O(N \log N)$
- Added gesture control via OpenCV and MediaPipe, visualising 500+ particles

Technical Skills

Programming Languages: Python, Bash, Lean 4

Systems & Tools: NumPy, Matplotlib, Linux (Artix, Gentoo), Git, LaTeX, Neovim

Volunteering

HackEurope **Dublin, Ireland**
Associate *2026*

- Supported registration and participant logistics

Polish Astronomical Society **Warsaw, Poland**
Student Volunteer *2025*

- Collaborated with University of Warsaw students and professors to support a conference for more than 200 participants
- Assisted with registration, poster setup and event logistics

Academic Partners – Warsaw IT Days (WID) **Warsaw, Poland**
Volunteer *2024–2025*

- Managed lecture halls for the Data Science track (2024) and Main Track (2025), resolving technical issues and coordinating event flow

Languages

Polish: Native

English: Fluent

Spanish: Intermediate

Citizenship: Polish (EU citizen)

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