


Karol Fułat

Karl-Liebknecht-Straße 24/25, 14476 Potsdam • karol.fulat@uni-potsdam.de • + 49 17641451431
<https://kfulat.github.io/> •  <https://orcid.org/0000-0001-6002-6091>

Besides the elegance of theory, the cleverness, and resourcefulness of experiment, I love how physics broadens our horizons and affects our world perception. On top of the scientific aspect, I believe physics facilities people's lives and showcases problems from a different point of view.

EDUCATION

PhD in Theoretical Astroparticle Physics 07/2021 – 06/2024 (expected)

Institute of Physics and Astronomy, University of Potsdam, Potsdam, Germany

- Supervisor: Prof. Martin Pohl, funded by DFG German Research Foundation, collaboration with THAT group in DESY, Zeuthen
- Investigation of electron acceleration at non-relativistic oblique shocks using massively parallel particle-in-cell simulations
- Developed novel method to study the influence of pre-existing turbulence on shock microphysics
- Awarded 5.5 million CPU hours per year at HLRN (proposal co-author)

M.Sc. in Technical Physics 02/2020 – 06/2021

AGH University of Science and Technology, Krakow, Poland

- Dissertation: “Study of the Conditions for Effective Electron Acceleration in Low Mach Number Shocks”, supervisor: Prof. Jacek Niemiec
- Best theoretical thesis at the Faculty of Physics and Applied Computer Science
- 1st award for a talk at the SKNS student conference

B.Sc. in Technical Physics 10/2016 – 01/2020

AGH University of Science and Technology, Krakow, Poland

- Dissertation: “Shock Waves in Merging Galaxy Clusters”, supervisor: Prof. Jacek Niemiec
- IUVENES Krakowskie Konsorcjum Naukowe scholarship for the best first-year students

INTERNSHIPS

Internship 05/2019 – 11/2021

The Henryk Niewodniczanski Institute of Nuclear Physics, Krakow, Poland

- Studies of electron acceleration at shocks in galaxy clusters using fully kinetic simulations
- Funded by National Science Center Poland, supervisor: Prof. Jacek Niemiec

Internship 06/2021 – 09/2021

European Space Agency ESAC, done remotely due to Covid-19

- Examination of electron populations at interplanetary shocks using the Cluster mission data, supervisor: Dr. Georgina Graham

PROFESSIONAL TRAINING

Potsdam Plasma Workshop 11/2022

Leibniz-Institute for Astrophysics Potsdam, Potsdam, Germany

Discussions with Prof. Christoph Pfrommer's group on the latest results of kinetic shock simulations, presentation of my current research work

The International school of Cosmic Ray Astrophysics 08/2022

Ettore Majorana Center for Scientific Culture, Erice, Sicily, Italy

Lectures on experimental astroparticle physics and multimessenger astronomy

Foundations of Cosmic Ray Astrophysics

06/2022

Villa Monastero, Varenna, Italy

Lectures on sources, acceleration and instabilities of cosmic rays

SKILLS

Programming languages: Python, Fortran, C++, IDL

Technical and software: 5 years of experience with a TRISTAN-based particle-in-cell code, High Performance Computing using MPI, scientific Python packages (NumPy, SciPy, Numba), machine learning basis (scikit-learn), Git, Matlab

Foreign languages: fluent English, basic French, native Polish

TEACHING EXPERIENCE

Laboratory course supervisor

02/2023 – Present

University of Potsdam, Potsdam, Germany

Supervision of the Muon Counter experiment: material preparation, assistance, evaluation

Programming and maths teacher

11/2018 – 07/2020

EDU.EXE Ewelina Kurek, EUREKA Monika Wójcik, Krakow, Poland

Extracurricular courses for children in primary school

FEATURED PUBLICATIONS

Kinetic simulations of perpendicular supernova remnant shocks propagating in turbulent medium

2023

Fułać, K., Bohdan, A., Torralba Paz, G. & Pohl, M.

Submitted to the Astrophysical Journal

PIC simulations of SNR shock waves with a turbulent upstream medium

2023

Fułać, K., Bohdan, A., Torralba Paz, G., Tsirou, M. & Pohl, M.

Published in Proceedings of Science (ICRC2023)

Pre-acceleration in the Electron Foreshock. II. Oblique Whistler Waves

2023

Morris, P. J., Bohdan, A., Weidl, M. S., Tsirou, M., Fułać, K. & Pohl, M.

Published in the Astrophysical Journal

Electron Pre-acceleration Through Stochastic Shock Drift Acceleration at Intracluster Shocks

2021

Niemiec, J., Kobzar, O., Fułać, K., Pohl, M., Amano, T., Hoshino, M., Matsukiyo, S., & Matsumoto, Y.

Published in Proceedings of Science (ICRC2021)

FEATURED CONFERENCES

Poster presentations at the 38th International Cosmic Ray Conference, Nagoya, Japan

2023

Talk at the 13th International Conference on High Energy Density Laboratory Astrophysics, Lisbon, Portugal

2022

Poster presentation at the 7th Heidelberg International Symposium on High-Energy Gamma-Ray Astronomy, Barcelona, Spain

2022

Talk at XXVIII EPIPHANY Conference on Recent Advances in Astroparticle Physics, online

2022

Talk at the SKK Conference, Polish Space Agency, online

2020

Poster presentation at ESA SCI Science Workshop #13, online

2020