Karol Fułat

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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 a novel method to study from first principles 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

SCHOLARSHIPS AND INTERNSHIPS

Research scholarship 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 (AIP), Potsdam, Germany

Discussions with Prof. Christoph Pfommer's group from AIP 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 PRESENTATIONS

Invited talk at the Astroplasmas Seminar 2023
Department of Astrophysical Sciences, Princeton University

Poster presentations at the 38th International Cosmic Ray 2023
Conference, Nagoya, Japan

Talk at the 13th International Conference on High Energy Density 2022
Laboratory Astrophysics, Lisbon, Portugal

Poster presentation at the 7th Heidelberg International Symposium 2022
on High-Energy Gamma-Ray Astronomy, Barcelona, Spain

Talk at XXVIII EPIPHANY Conference on Recent Advances 2022
in Astroparticle Physics, online