Jelena Köhler (she/her)

Doctoral Researcher

Work Experience

Doctoral Researcher
Institution: Karlsruhe Institute of Technology
since July 2022

Collaborations: Pierre Auger Collaboration, GRAND
Research Topic: Development of a Second-Level Trigger for the Autonomous Detection of Air-Shower Radio Emission

Education

Master of Science, Physics
Institution: University of Wuppertal
Year of Graduation: 2022

Master Thesis: Optimization of Radio Reconstruction for Inclined Air Showers with AERA at the Pierre Auger Observatory

Bachelor of Science, Physics
Institution: University of Wuppertal
Year of Graduation: 2020

Bachelor Thesis: The Size-Mass Distribution of Galaxies and the Merging History of Massive Galaxies
Institution: Ludwig-Maximilians-Universität München

Outreach

Science Communicator
Netzwerk Teilchenwelt
since August 2023

Other

PhD Fellow Representative
KSETA
since March 2023

Personal Info

KIT Campus Nord
Hermann-von-Helmholtz-Platz 1
76344 Eggenstein-Leopoldshafen

jelena.koehler@kit.edu
jelenakhlr.github.io
linkedin.com/in/jelena-koehler
github.com/jelenakhlr

Relevant Skills

- Python
- C++
- LaTeX
- SQL
- XML
- HTML, CSS

Languages

- German
- English
- French
- Russian
- Chinese

Scientific Background

Jelena Köhler Karlsruhe Institute of Technology

My research focuses on novel radio techniques for cosmic ray air showers. This rapidly growing field allows cost-effective deployment of large detector arrays like GRAND. However, current radio trigger systems, relying solely on timing information, struggle with background noise.

To address this, I'm developing a novel event-level trigger for GRAND that analyzes the radio footprint – the spatial distribution of signal strength across triggered antennas. This approach offers a more comprehensive picture of the event, improving background rejection and sensitivity.

My work explores multiple techniques to analyze the footprint, including deriving formulas, using plane wave fits, and leveraging machine learning. This research presents the first comprehensive exploration of the radio footprint for event-level triggering, with the potential to significantly enhance GRAND's capabilities.
I'm actively developing and testing these methods with simulated data, aiming for future implementation on real GRAND data. This work paves the way for improved event selection in next-generation cosmic ray experiments by unlocking the power of the radio footprint.