Erik Hettwer Benitez

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Education

Karlsruhe Institute of Technology (KIT), **M.Sc.**, Physics — Oct 2022 – Sept 2024

- **Thesis:** "Probing deep learning methods to study $\mathbf{H \rightarrow \mu\mu}$ events in the VH and VBF production channels" with Prof. Markus Klute at the CMS Experiment (CERN)
- **Relevant Coursework:** Modern methods of data analysis, Computational methods in experimental particle physics, Data analysis at the Karlsruhe Tritium Neutrino Experiment, Quantum mechanics, Quantum field theory.

Karlsruhe Institute of Technology, **B.Sc.**, Physics — Oct 2016 – Sept 2022

- **Thesis:** "The Schroedinger Poisson System in the WKB Approximation" with Prof. Thomas Schwetz-Mangold
- **Relevant Coursework:** Computational methods of statistics, Quantum mechanics, Statistical mechanics, Electrodynamics, Particle physics.

German Embassy School in Beijing, **German Abitur**, High School — Jan 2013 – June 2016

Research Experience

KIT & CERN, Research Assistant, High Energy Physics — Aug 2023 – Sept 2024

- Developed and implemented deep neural networks for signal-to-background discrimination in possible Higgs boson events using Python (PyTorch, Numpy, Pandas), resulting in up to 35% improvements compared to classical methods.
- Created data selection algorithms for specific decay channels using C++, collaborating with a small team of specialists at CERN to prepare and transform data for training and testing.
- Utilized Matplotlib and Seaborn to create data visualizations that effectively presented analysis results, enhancing communication and understanding among collaboration members.

KIT, Research Assistant, Theoretical Physics — Feb 2022 – Sept 2022

- Calculated analytical solutions to the Schroedinger-Poisson System in the WKB approximation, providing insights into the behavior of quantum systems in the semiclassical limit.
- Developed and implemented numerical methods to solve the Schroedinger-Poisson System, using Python to simulate the behavior of quantum systems in the presence of self-sustaining external potentials.

Extracurricular Experience

KIT - Division 5 Board, Student Representative — 2021 – 2023

- Represented student interests at the division level as the only student representative on the board, providing feedback on academic programs.

KIT Faculty of Physics - Faculty Board, Student Representative — 2021 – 2023

- Represented student interests at the faculty level as one of five student representatives on the board, providing feedback on new hires and curriculum development.

KIT Faculty of Physics - Working Group on the Reformation of the Physics Curriculum, Student Representative — 2022

- Collaborated with faculty members to develop a new curriculum for the physics bachelor program.
- Recognized for Exceptional Extracurricular Commitment by the KIT president for contributions to curriculum development.

KIT Physics Student Association, President — 2021 – 2023

- Led multiple initiatives as President of the Physics Student Association, managing projects and collaborating across international teams in English, German, and Spanish.
- Developed a brand-new career fair concept for the physics department in a team of three, resulting in the first-time participation of 15 companies and around 30% of all physics students.
- Served as a student representative on multiple search committees for new hires in the physics department.

KIT Physics Student Association, Vice President — 2020 – 2021

- Led multiple initiatives as Vice President of the Physics Student Association, managing projects and collaborating across international teams.
- Served as a student representative on multiple search committees for new hires in the physics department.

Teaching

Faculty of Physics, Mentor — 2017 – 2024

- Introduced new students to the physics department through talks and office hours, providing guidance and support to help them navigate the academic environment.

Faculty of Physics, Teaching Assistant and Tutor — 2020 – 2023

- Experimental Particle Physics
- Classical Electrodynamics
- Classical Mechanics

Faculty of Physics, Lab Supervisor - Classical Experimental Physics — 2019 – 2020

- Supervised students in the lab, providing guidance and support to help them complete their experiments and understand the underlying physics.

Skills

Programming Languages: Python (advanced), C++ (basic)

Libraries & Tools: PyTorch, Numpy, Pandas, Scikit-learn, Matplotlib, Seaborn

Other Tools: Git, LaTeX, Linux, HPC environments, Excel

Languages: German, English, Spanish