# ERIC SCHANET

PARTICLE PHYSICIST WITH DATA SCIENCE EXPERIENCE

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Luxembourgish national, located in Munich (Germany) and Zurich (Switzerland).

## PROFILE

Research fellow and PhD candidate in particle physics, performing petabyte-scale data analysis to search for new physics phenomena in data recorded with the ATLAS experiment at the Large Hadron Collider at CERN. My core competencies include exploratory data analysis, predictive modelling using machine learning, statistical inference, quantitative problem solving in cross-functional teams, and data visualization and its interpretation. My work relies on implementing workflows for scalable, distributed statistical data analysis. I am a co-author of over 80 peer-reviewed scientific publications (ORCID), and regularly speak about my work at international workshops and conferences. I have experience working in large international collaborations and coordinating projects from initiation to completion.

## EDUCATION

2021 **PHD PHYSICS** (EXPECTED)
Ludwig-Maximilians-University Munich

PhD candidate in experimental particle physics. Searching for new physics using data recorded at the Large Hadron Collider at CERN.
Expected graduation date: June 2021.

2018 **M.SC. PHYSICS**
Ludwig-Maximilians-University Munich

**Selected coursework:** computational physics, advanced theoretical physics.
**Thesis:** particle physics, performing exploratory data analysis using machine learning methods for feature engineering. Grade: *very good*.

2016 **B.SC. PHYSICS**
Ludwig-Maximilians-University Munich
Leopold-Franzens-University Innsbruck

**Selected coursework:** numerical physics, statistical physics, mathematical methods for theoretical physics, software development for physicists
**Thesis:** data analysis in particle physics. Grade: *very good*.

## PROJECTS

### Fast statistical models

Research Fellow, ATLAS Collaboration
Github, Public Talk

Developed a method to approximate statistical models of searches for new physics.

- Implemented in python using NumPy and SciPy stack, relying on PyTorch tensor algebra and automatic differentiation of log-likelihood gradients.
- Leveraged PCA for optimal compromise between efficiency and accuracy.
- Achieved 250x performance improvement for MLE-based statistical inference.
- Method heavily used in ATLAS large-scale interpretations of 200 million models to deliver actionable insight into the search program of the collaboration.

### Grid computing anomaly detection

Research Fellow, ATLAS Collaboration
Github

Implemented a low-latency grid computing monitoring and anomaly detection system.

- Built pipelines to pull raw data from multiple sources, cleaning and consolidating into InfluxDB time-series and MySQL metadata databases.
- Implemented visualizations and dashboards using Grafana.
- Used by ATLAS computing shifters for anomaly detection and investigation, yielding 6x improvement in latency over alternative system.

### Petabyte-scale data analysis

Research Fellow, ATLAS Collaboration

Performed petabyte-scale analysis of data recorded with the ATLAS experiment at CERN, resulting in multiple peer-reviewed publications.

- Conducted exploratory data analysis, identifying relevant predictors and classifiers.
- Performed 20-dimensional distributed hyperparameter optimization, testing 500 million unique parameter combinations by using SciPy and Scikit software stacks.
- Leveraged RNNs, BDTs and clustering for engineering new discriminative features.
- Developed containerized workflows for scalable *data analysis as a service*.

## EXPERIENCE

Mar. 2016 – Oct. 2018
**Full-Stack Software Developer**
Weabe S.A., Luxembourg

Frontend and backend development of a digital marketplace platform for iOS. The application I developed was crucial for securing the venture capital needed for founding the start-up and expanding onto other platforms.

- Swift frontend, JavaScript backend, MongoDB and PostgreSQL as databases.
- Co-founded the start-up *Weabe S.A*, a software firm with 7 full-time employees.
- Reached 100k unique users in the first year of operation.

Mar. 2014 – Oct. 2018
**Software Developer & Consultant**
Codelight, Freelance

Development of various iOS applications using Objective-C and Swift. Offered consulting services in IT-related business problems. Some of my projects include:

- Developed real-time chat app in Objective-C using Firebase database.
- Developed and launched a social networking app marketed for Luxembourg.
- Implemented software solution allowing client to meet financial audit deadline.

Apr. 2015 – Jul. 2018
**Teaching Assistant**
Ludwig-Maximilians-University Munich

Teaching assistant for practical course in physics for about 800 medical students. The tasks I was responsible for included:

- Assisting students with assignments and general inquiries.
- Supervision of students during practical course.
- Organization and grading of final exams.

## SKILLS

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|---|---|
| **Programming Languages** | **Proficient:** Python, Unix Shell Scripting, Objective-C, Swift, TeX<br>**Knowledge in:** C/C++, JavaScript, R |
| **Libraries** | NumPy, Pandas, Keras, Scikit-Learn, Scikit-hep, SciPy, Matplotlib |
| **Databases** | SQL (MySQL, SQLite), NoSQL (InfluxDB, MongoDB, ElasticSearch) |
| **Operating Systems** | Linux, MacOS, Windows |
| **Tools and software** | Docker, CI/CD, AWS, Open-Shift, XCode |
| **Version control** | Git, SVN |
| **Languages** | Luxembourgish (native), English (fluent), German (fluent), French (fluent) |

## ACHIEVEMENTS

March 2019
**PhD Project Grant**
Fellow of the Luxembourg National Research Fund

Selected for prestigious grant by the Luxembourg National Research Fund for research project searching for new physics using data from the LHC at CERN. Granted 110.000 EUR over the course of 2.5 years.

June 2019
**Lindau Nobel Laureate Meetings**
Fellow of the Wilhelm & Else Heraeus Foundation

Participation in the 69$^{th}$ Lindau Nobel Laureate Meetings, where 580 selected young scientists met 39 Nobel Laureates in Physics for an inspiring week-long dialogue. Extraordinary scientific and networking opportunity.

## EXTRACURRICULAR

Nov. 2018 – PRESENT
**Particle Physics Masterclasses**
Speaker and Supervisor

Giving regular regional masterclasses on particle physics, conveying the complex fundamental laws of nature to young students and high school teachers. Speaker at multiple international CERN masterclasses with diverse audiences.

Oct. 2005 – PRESENT
**Volleyball**
Player and Coach

Active player and coach in Luxembourg and Germany. Team captain at 2012 CEV Small Countries Division Championship Finals with Luxembourgish national team. Valuable experience in teamwork and perseverance.

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