



# Simon Klüttermann

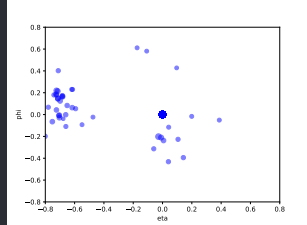
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Presentation for the Numerics PHD Programm

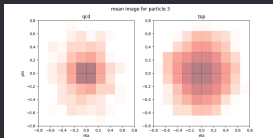
# About me

- Simon Klüttermann
- 23-year old german
- Master of Particle Physics from RWTH Aachen University
- Programmer for a decade
- Currently: Startup CTO
- Machine learning expert
- 2 Theses about ML in physics
- Strong interest in
  - Unsupervised Learning
  - Trustable ML
  - Small datasets
- Strong interest in scientific work

# About my masters thesis



- Use Machine Learning to filter for anomalous jets to find signs of non-qcd physics
- Apply Graph ML
- Highly complicated data, Lots of symmetries and arbitrary anomalies



- Wrote my own graph layer
- Noticed that existing methods don't really work
- Invented my own anomaly detection algorithm
- Drastically improved generality of this method

**grapaf 0.6**

`pip install grapaf`



# About the Project

## FCC-hh

- Proposed Replacement for LHC ( 7x Energy)
- Hopefully able to answer questions like DM, Gravity, Matter asymmetry

## Machine Learning

- Automatic intellectual work
- Drastically improved other regions of physics

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### Task 1 Dynamic Aperture Simulations

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Accelerate Tracking Simulations

Calculate DA using recurrent ML

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### Task 2 Correction Schemes

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Implement LHC correction schemes

Try to improve them using ML

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### Task 3 Denoise Beam Measurements

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Use Autoencoder to remove Noise from Beam Measurables

Correct higher order resonances

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Thank You!