Contribution ID: **31** Type: **On-site planned, but remote also possible**

Topping the artificial intelligence

Elementary particles like top quarks create a signature that can be three different particles (and the jets that come from these particles). Distinguishing resolved top quarks from other particles/three-jet combinations is a difficult problem that particle physicists have been tackling for a very long time. But now there are many new ways of machine learning available, and it is worthwhile examining if this cannot be done even smarter.

The project, which relies on software and physics expertise, is to use new artificial intelligence tools such as graph neural networks to identify hadronically decaying (resolved) top quarks. Or maybe these algorithms are now even smart enough to learn how to identify top quarks without us telling them what to do? (this is called unsupervised learning) If successful, these new software tools will then be used to find top quarks in the CMS experiment at the LHC, and maybe even to search for new particles that are made together with top quarks.

This project can be classified as 60% software and 40% physics, and any physics student that already has experience with python and is enthusiastic to learn more about particle physics and artificial intelligence should be able to contribute to this exciting project!

Field

B1: Particle physics analysis (software-oriented)

DESY Place

Hamburg

DESY Division

FH

DESY Group

CMS

Special Qualifications:

python
machine learning is bonus, enthusiasm to learn is sufficient

Primary author: Prof. BLEKMAN, Freya (DESY/University of Hamburg)

Co-authors: Dr KOMM, Matthias (CMS (CMS Fachgruppe Searches)); Mr MILELLA, Gabriele (CMS (CMS Fachgruppe Searches))