

Use Artificial Intelligence to Pinpoint Dark Matter at the LHC

&

our research group at Western Norway University of Applied Sciences



Image credit: NASA

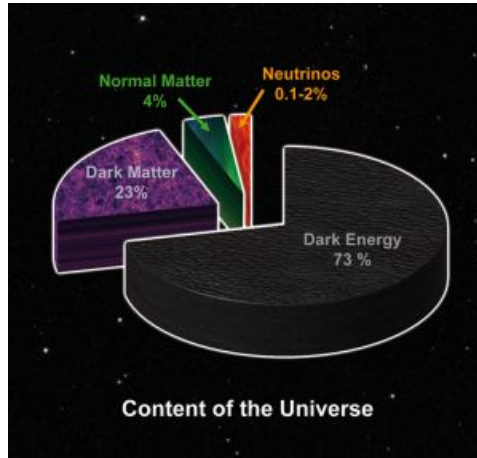


Image credit: NASA

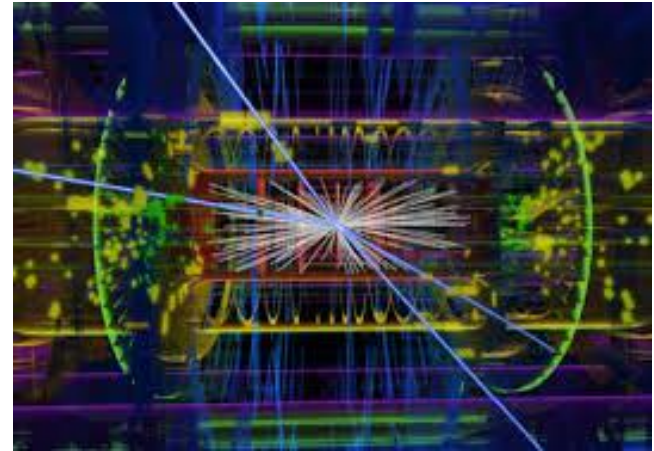


Image credit: The ATLAS Collaboration

Therese Sjursen, Spåtind conference 2023, Jan. 5th 2023



Høgskulen
på Vestlandet



Funded by
The Research
Council of Norway

Our group



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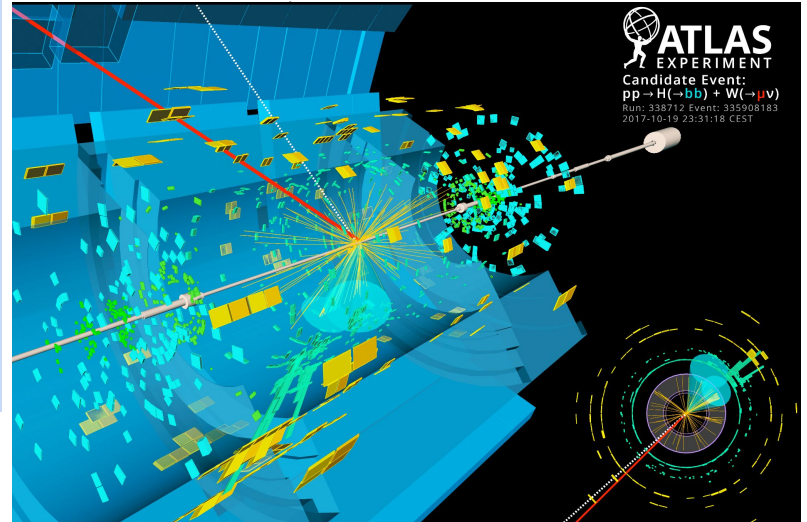
At HVL, we are educating engineers and computer scientists

In our group:

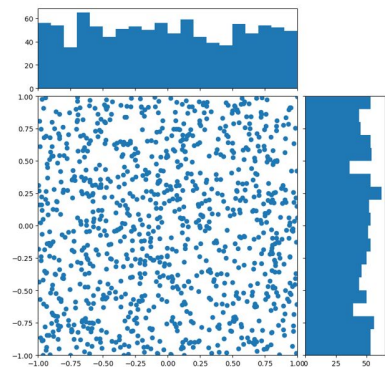
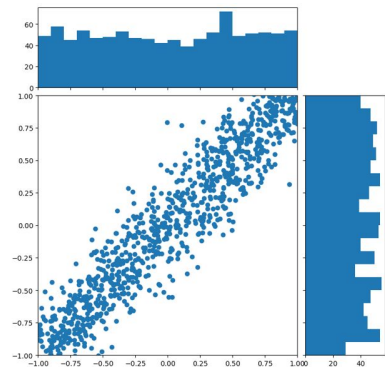
- 5 master students
- 4 bachelor students

Focusing on common main research topics

- Machine learning in dark matter searches in ATLAS
- Computer vision approach to event classification in collider experiments
- Improve tau lepton identification in ATLAS
- Develop robust, trustworthy and explainable machine learning techniques

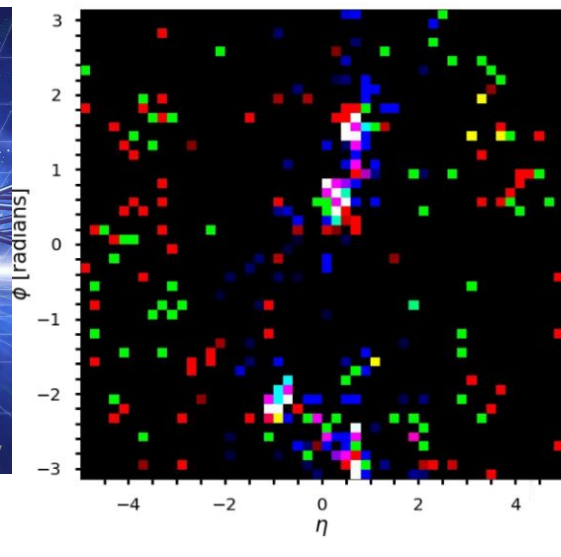
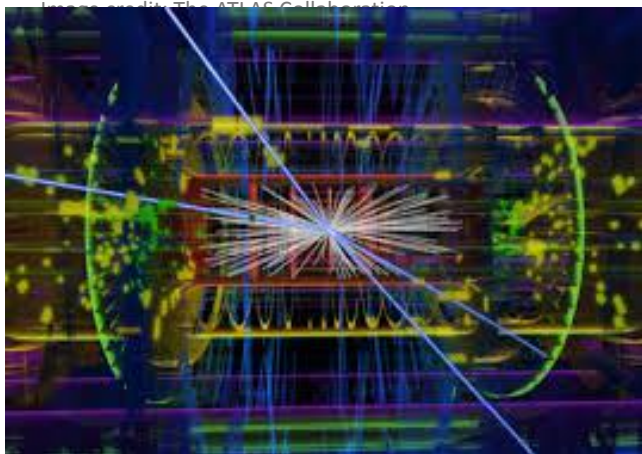


Develop robust, trustworthy and explainable machine learning models



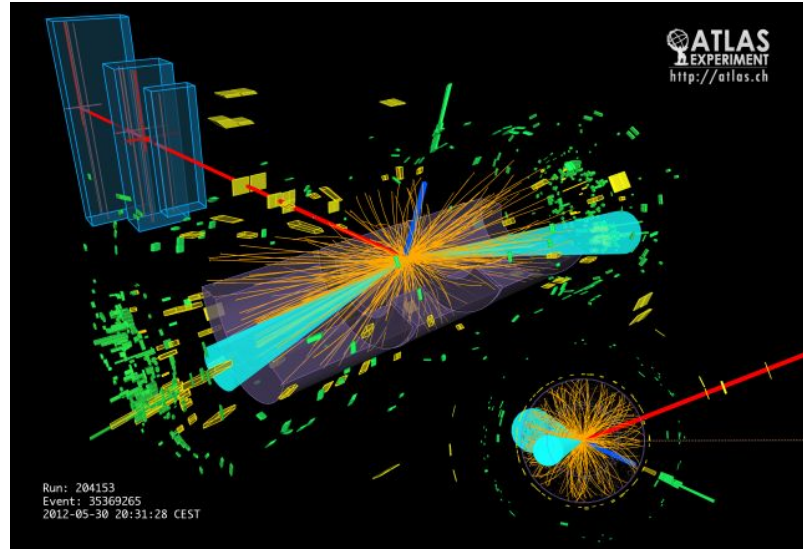
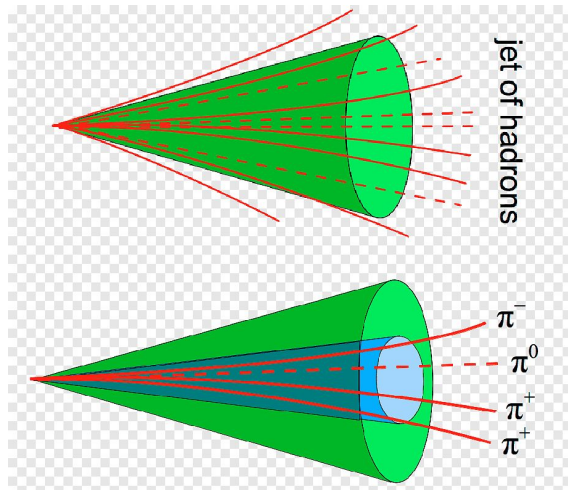
See talk by Steffen Mæland

Computer vision approach to event classification in collider experiments



See talk by Aurora Grefsrud

Improve tau lepton reconstruction in ATLAS



Seed jet, tracks, tau vertex, reconstruction of pi-0 ...

Machine learning based searches for Dark Matter in ATLAS

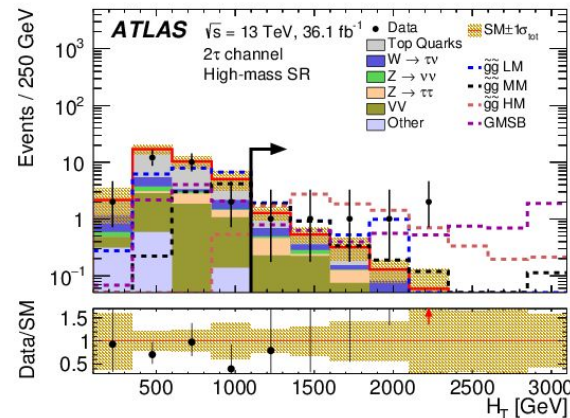
Our plan (not ATLAS plan):

Step 1:

Update run-2 cut-and-count analysis with supervised machine learning

Step 2:

Model independent anomaly detection with signatures including hadronically decaying tau leptons + missing energy - using semi-supervised machine learning



<https://arxiv.org/abs/1808.06358>

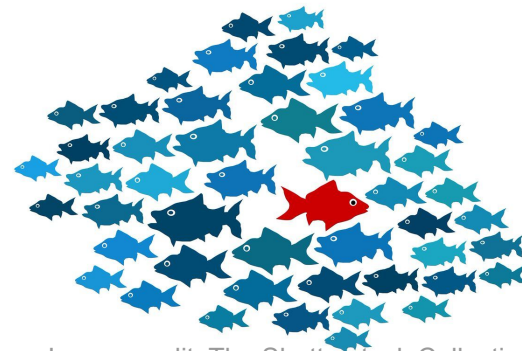


Image credit: The Shutterstock Collection



What we observe is not nature itself, but nature exposed to our method of questioning.

(Werner Heisenberg)

izquotes.com



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Heads up:

Nordic conference on dark matter searches

Spring 2024, Bergen



Western Norway
University of
Applied Sciences