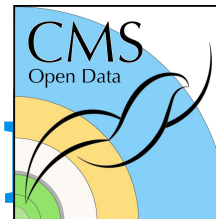


# CMS Open Data Workshop 2024 Hackathon



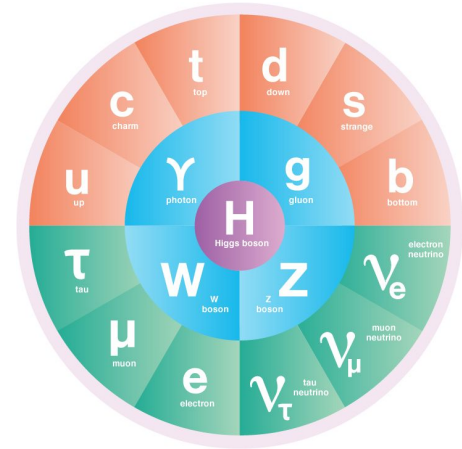
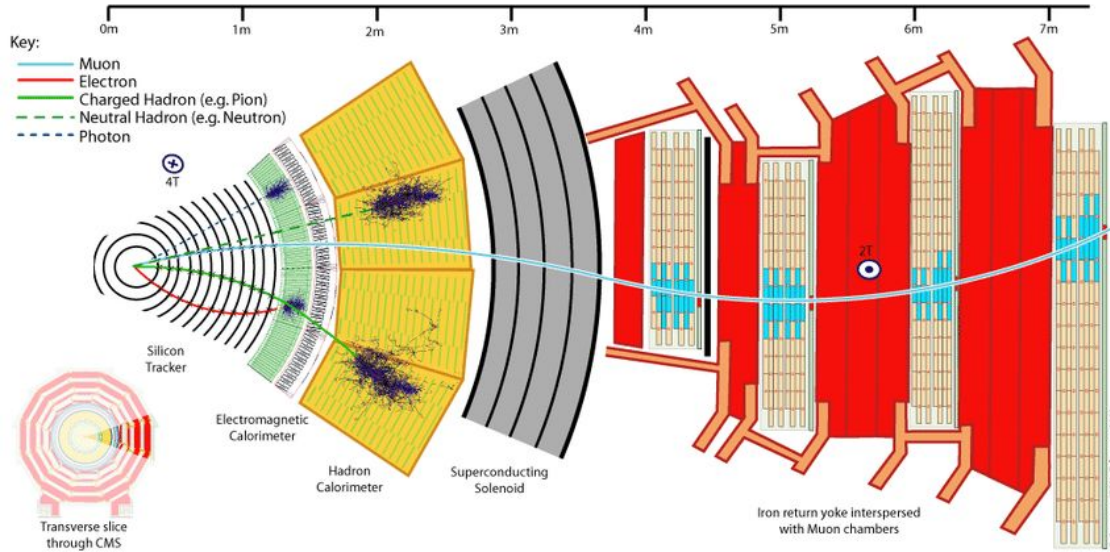
**July 30, 2024**  
**Xavier Tintin**  
Workshop Facilitator  
Escuela Politécnica Nacional (Ecuador)



1.

# Particle Physics Playground

Understand the fundamental concepts in particle physics through practical analysis of CMS Open Data.



Let's get the basics!



2.

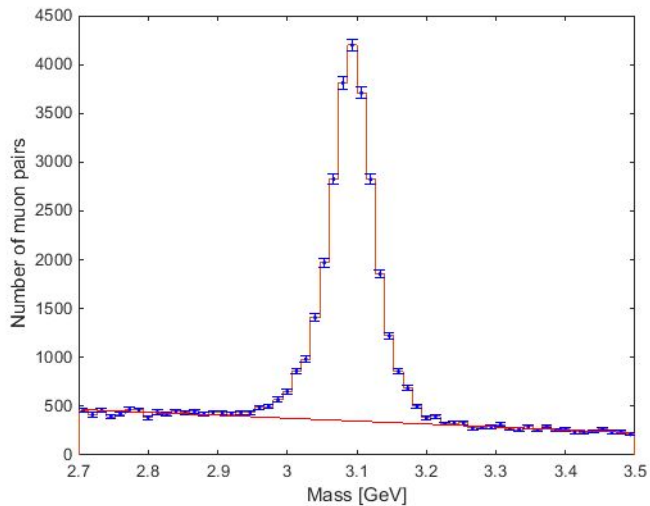
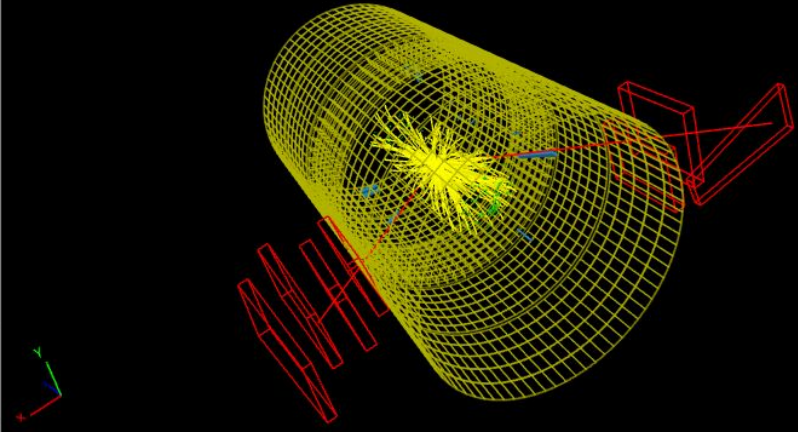
# Particle Discovery Lab

Reconstruct decays of unknown particle X (initial state) to 2 muons (final state).

iSpy WebGL DoubleMuParked\_Run2012B\_0.ig:Events/Run\_195397/Event\_1044502715 [7 of 25]

Matching muon chambers   
Physics  
Vertices (Reco)   
Tracker Muons (Reco)   
Stand-alone Muons (Reco)   
Global Muons (Reco)   
Jets (PF)   
Missing Et (PF)

CMS Experiment at the LHC, CERN  
Data recorded: 2012-Jun-02 11:07:50.156935 GMT  
Run / Event / LS: 195397 / 1044502715 / 817





3.

# Machine Learning in HEP

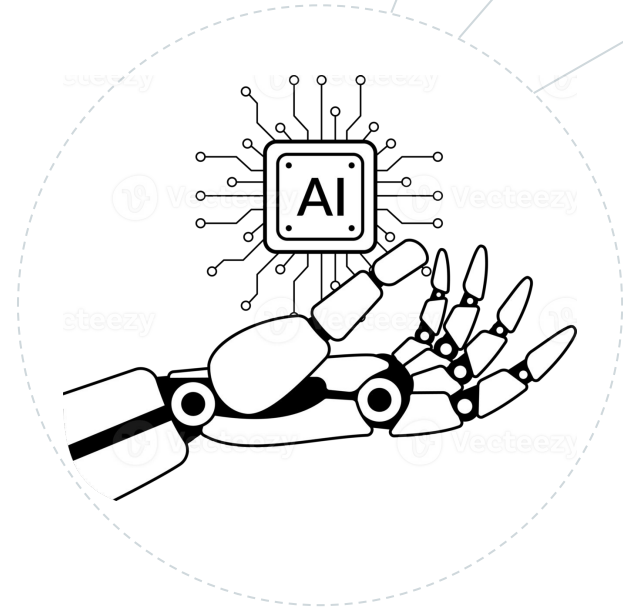
Bridging the gap between AI and  
particle physics

# CMS Open Data Acquisition and Understanding

You want to explore new and novel CMS open data applications!

## Key Points:

- Introduction to machine learning in particle physics.
- Comprehensive data preparation for machine learning analysis.
- Supervised and unsupervised learning techniques specific to HEP.
- Advanced ML applications in particle physics research.



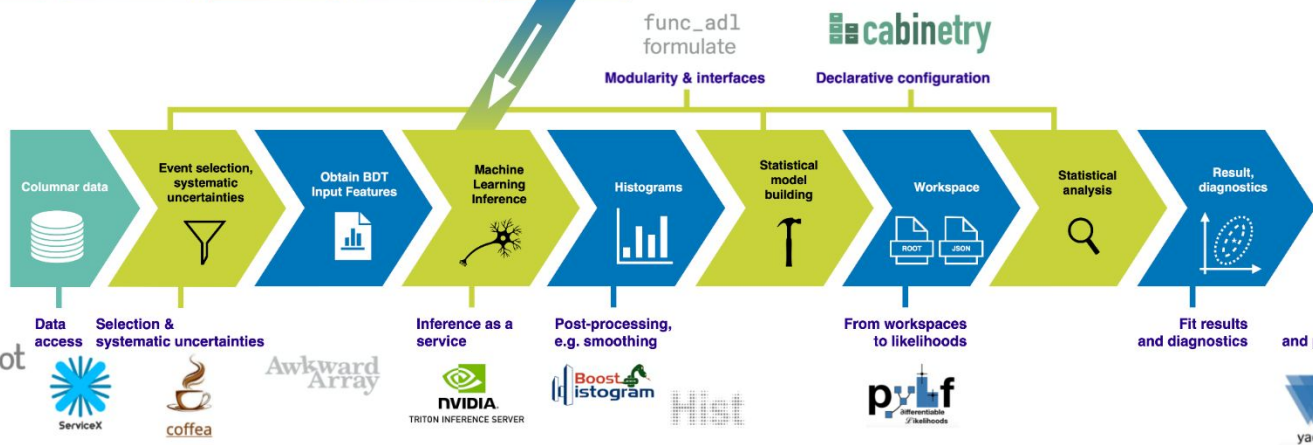
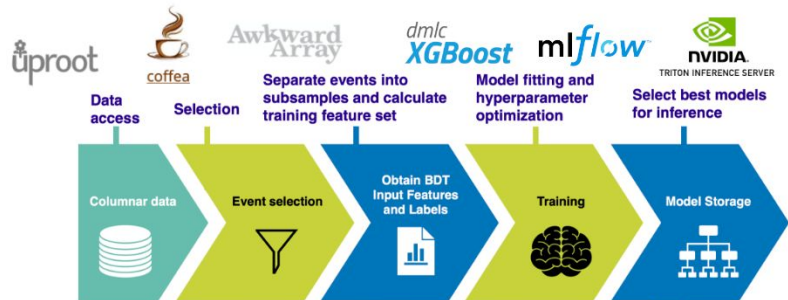


4.

# Analysis Grand Challenge

Perform the last steps in an analysis pipeline at scale to test workflows envisioned for the HL-LHC.







# Thanks!

## Any questions?

Find us in [mattermost](#)

## Credits

Thanks to our colleagues:

- ◎ in the DPOA group in CMS
  - all organizers and contributors
- ◎ in the CERN Data preservation services
  - CERN Open data portal team, and many other services we rely on
- ◎ Thanks to IdeaSquare for the premises!

And great thanks to all CMS open data users!

And thanks to [SlidesCarnival](#) for this free presentation template