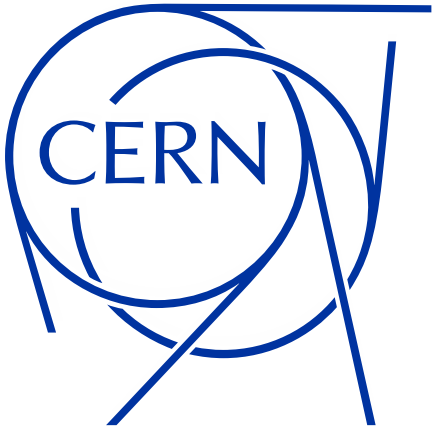

TAU Identification Improvements for ATLAS Phase-1 Upgrades in L1Calo Trigger System

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Supervisor: Ralf Gugel

August 10, 2023


ATLAS
EXPERIMENT

*

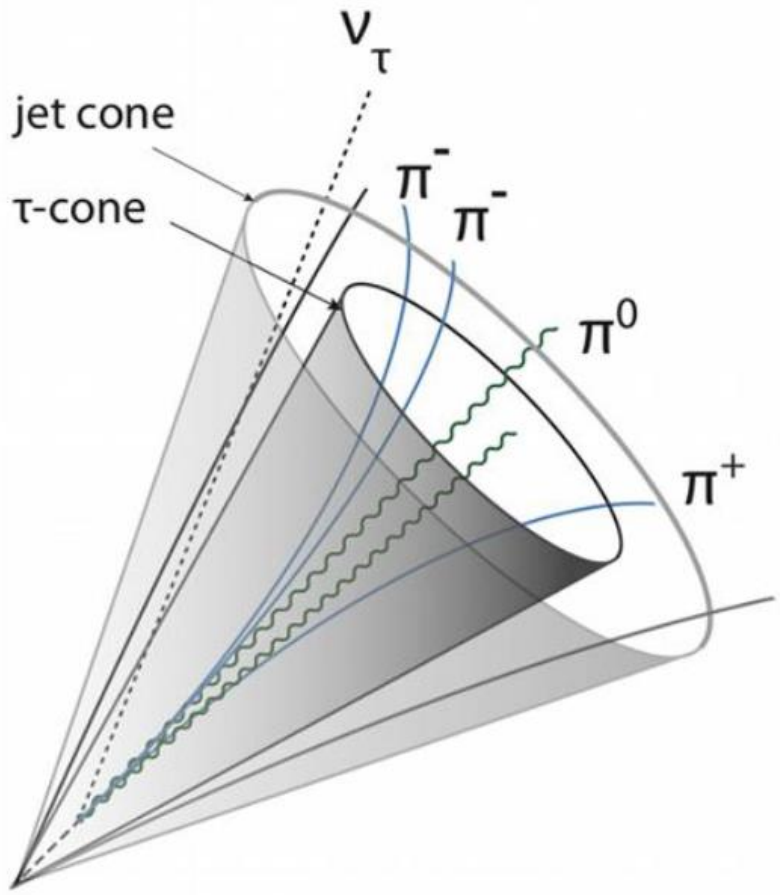
Goal of Project

Taus

- ~2/3 decay hadronically
- Narrow spray of a few hadrons

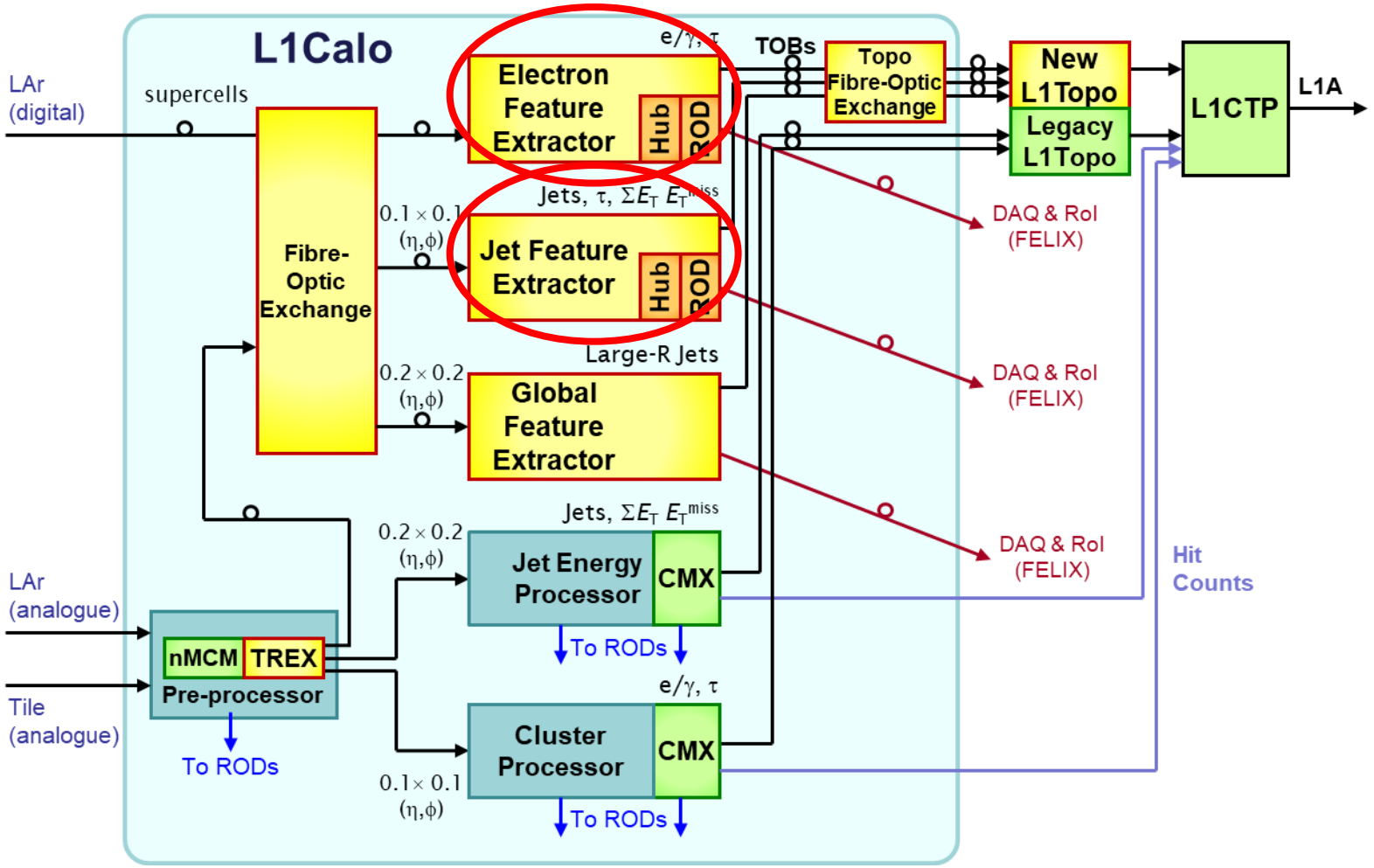
Jets

- Wide spray of many hadrons
- Not very interesting



Primary Goal of Project: Find ways in which the current algorithm can be improved so that it is more efficient in identifying the taus

L1Calo – Calorimeter Trigger



- 1st stage of ATLAS data selection process
- Rapidly selects interesting collisions

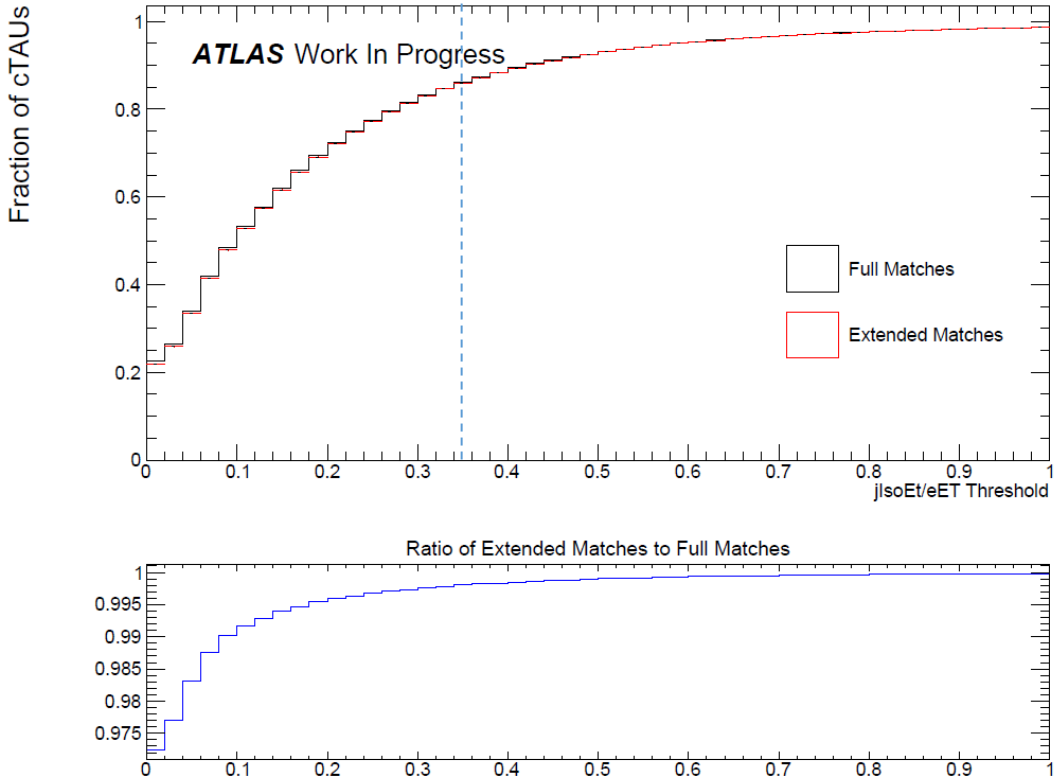
Overview of Project

Studying the matching algorithm efficiency of the eFEX tau candidates and jFEX taus

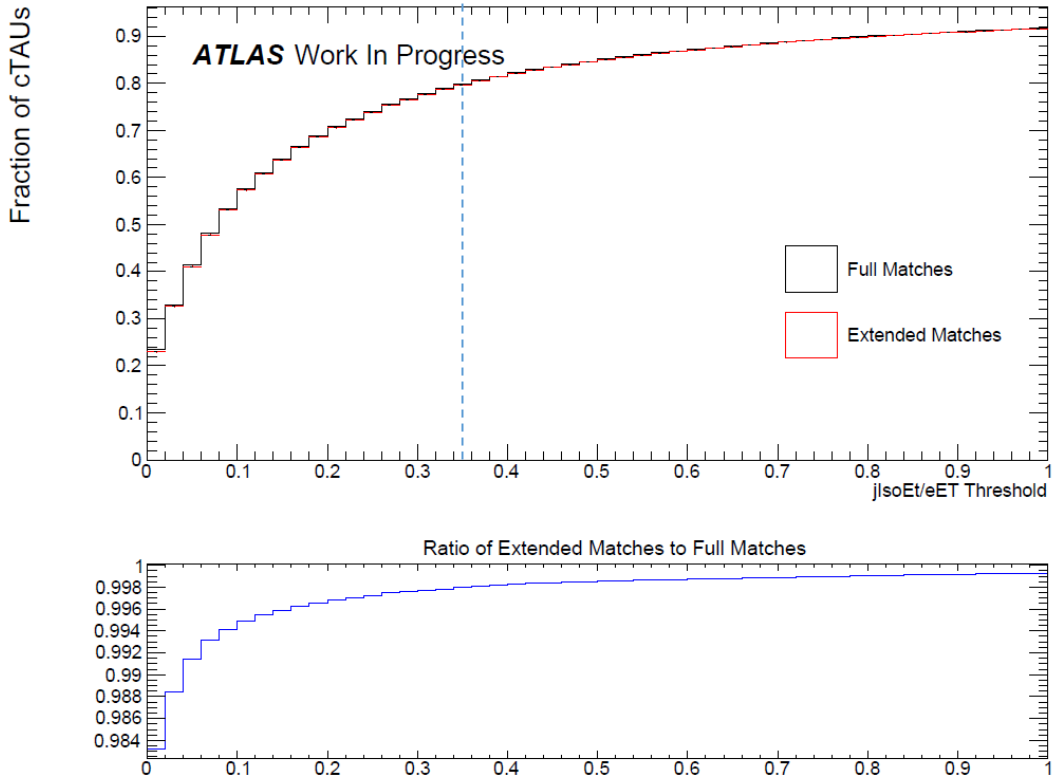
Studying the rCore Property of the tau

Matching Efficiency

Signal MC

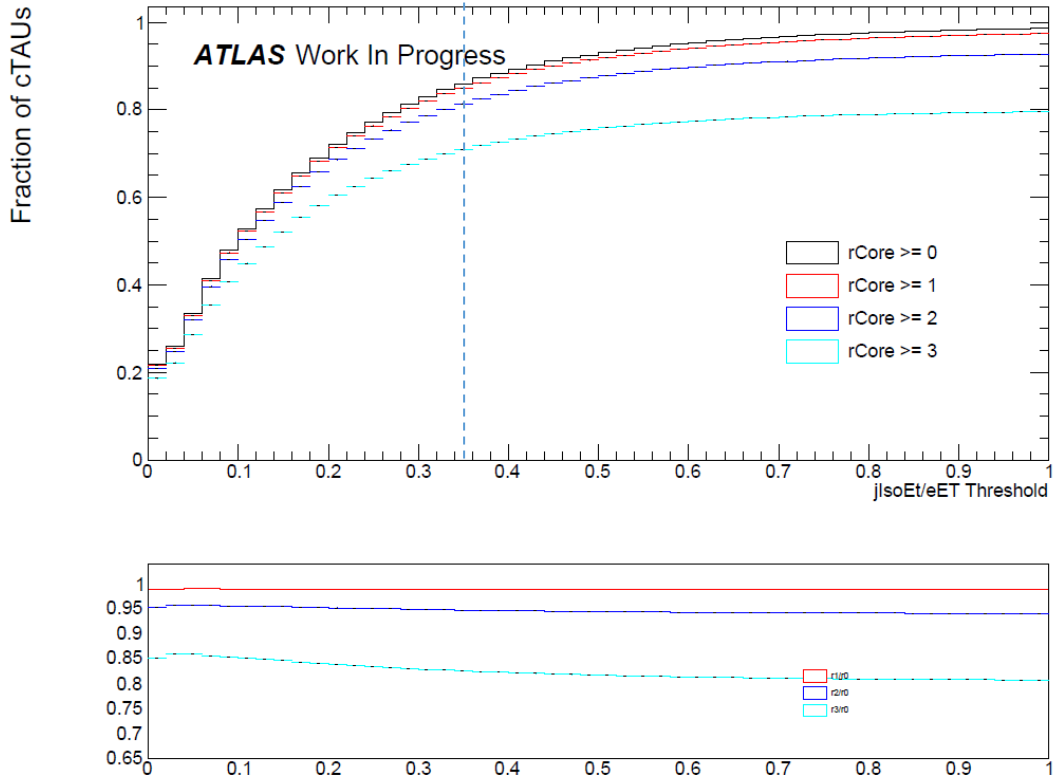


Background MC

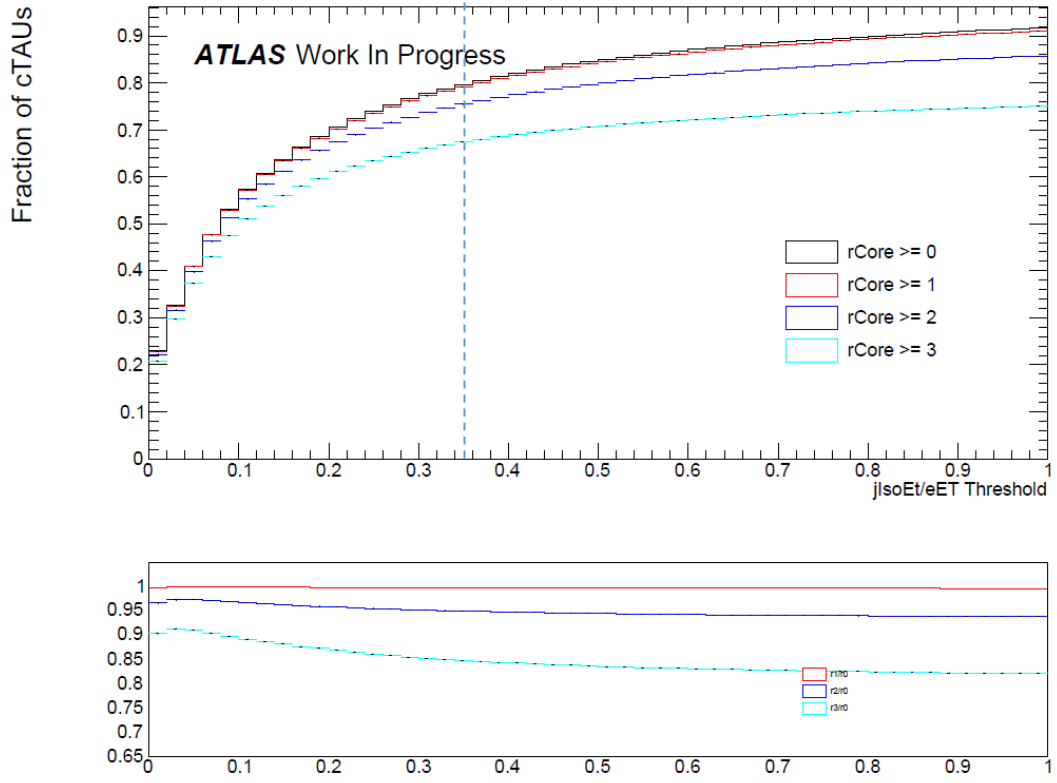


rCore

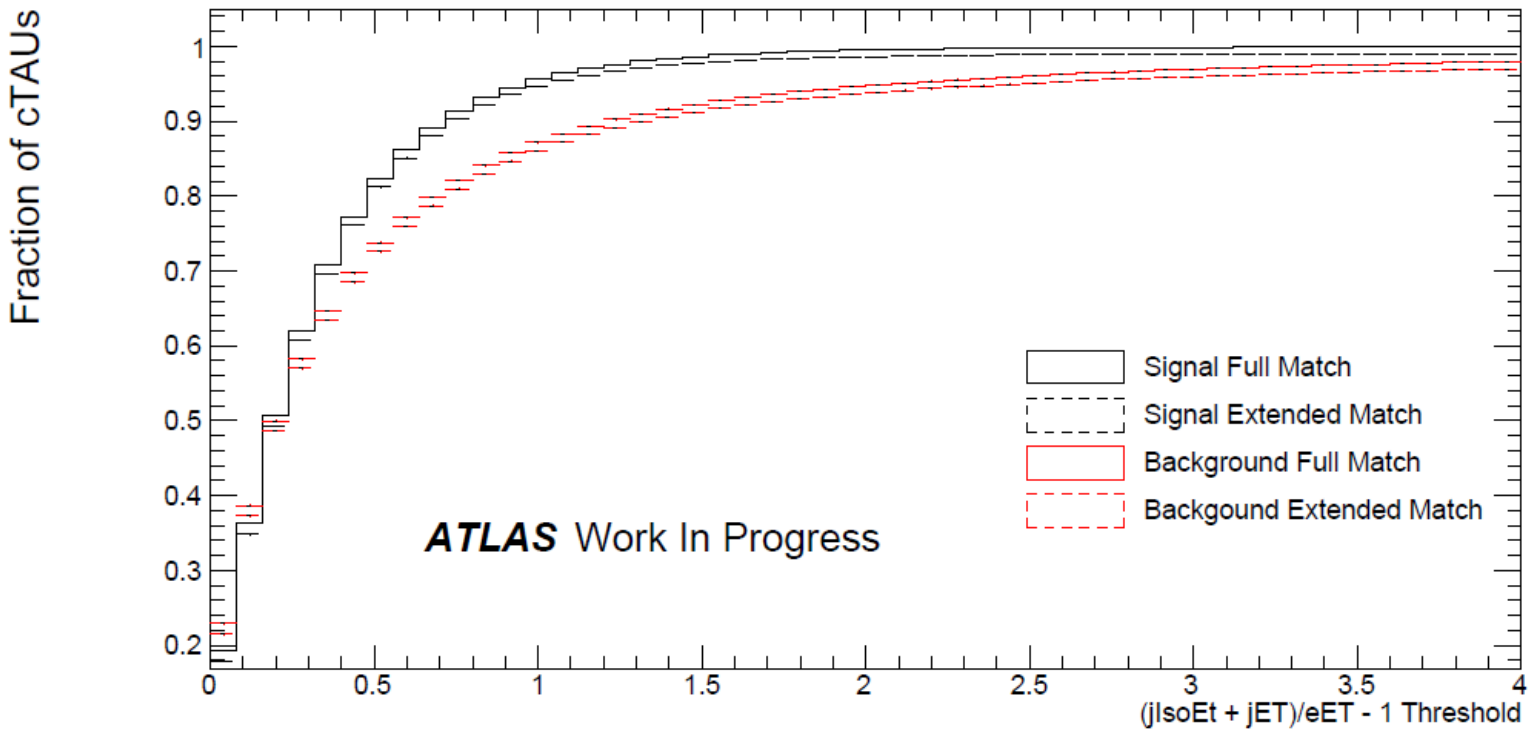
Signal MC

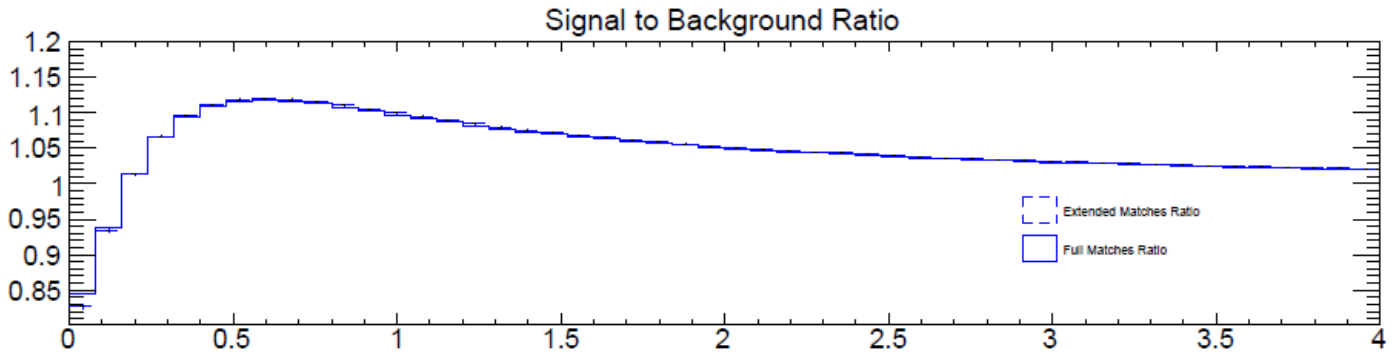


Background MC



Further Studies - jJet





Skills Learned

- Learned how to use Linux better
- Computer science and physics crossover
- Work-life balance







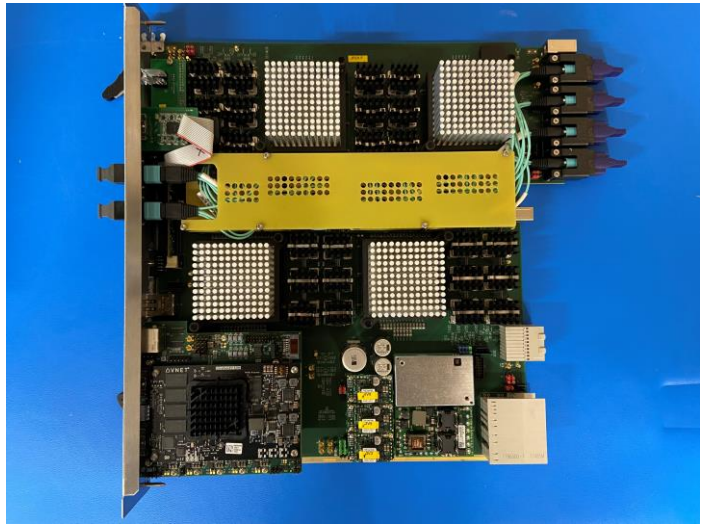


What are eFEX and jFEX?

- eFEX module uses the full granularity of the calorimeter data and detects electron/photons and tau-like showers
- jFEX operates at reduced granularity and detects jet-like objects

eFEX Module

jFEX Module

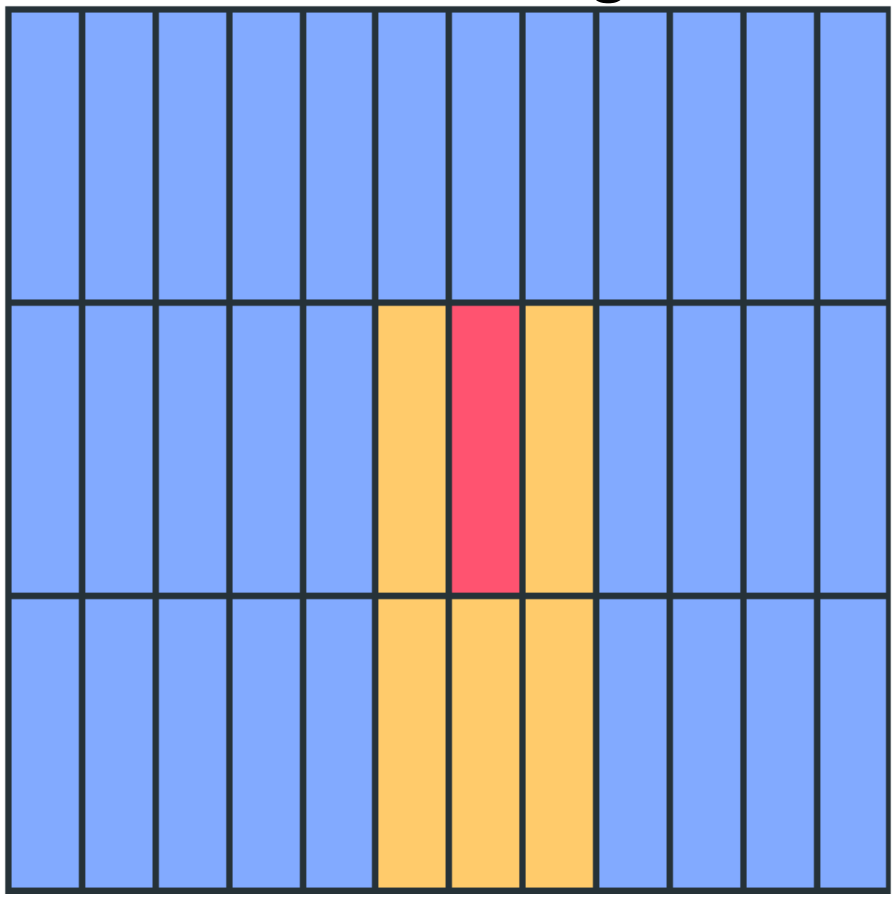


What is the Matching Algorithm?

1. For each tau candidate found by eFEX, the matching algorithm checks if there is a matching tau candidate in the jFEX
2. If there is not, the tau is assumed to be isolated, if there is, the isolation of the tau is plotted
3. The extended matching algorithm allows for there to be a slight difference between the two taus for them to be considered a match

What is rCore?

rCore Core Region



rCore Environment Region