UFJF Team Collaboration
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Overview

- Team
- Past projects
- On-going activities
- Projects overview

Team

- We are in an University with undergraduate and graduate students involved in CYGNO Experiment
  - Undergraduate students → training
  - Graduate students → training and contribution
  - Postgraduate → contribution

- Past and Present in CYGNO
  - Igor Abritta → Phd student (Postgraduate in Rome)
  - Guilherme Lopes → Master and PhD student
  - Bernardo Deps → Master student
  - Mariana Migliorini → Undergraduate and Master student
  - Igor Pains → Undergraduate and Master student
  - Lucas Coelho → Undergraduate student
  - Amaro → Undergraduate student

sometimes, the student is also working and is not full time with us

Past projects

- Clustering - iDBSCAN
  - *JINST journal (2020) and PhD thesis (2020)*

- Filtering impact on CYGNO data applied to LEMON
  - *book chapter (2019) and Master thesis (2021)*

- Long track clustering - Directional DBSCAN
  - *sent to PubCom (2022) and Graduation thesis (2021)*

- Sensors noise analysis
  - *sent to PubCom, first review (2022)*

- Image noise simulation algorithm based on ECDF

On-going activities

- Finishing two papers (Noise and DDBSCAN)

- Checking energy characteristics of ^{55}Fe (Lucas Coelho - Undergraduate)

- Noise analysis and detection efficiency for ^{55}Fe for different VGEM (Bernardo Deps - Master)

- Filtering impact on CYGNO data (including CNN) (Igor Pains - Master)

- Image triggering using CNN (Guilherme Lopes - PhD)

- PMT simulation (Mariana Migliorini - Master)

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Projects overview

Checking energy characteristics of ^{55}Fe

Lucas Coelho - Undergraduate

- Objectives:

    - Measure iron energy profile from the center to the border
        - Radius value to get ~100% of spot energy?

    - Evaluate reconstruction algorithm performance
        - How much of the iron energy is it measuring?

   - Study impact of threshold and DBSCAN parameters
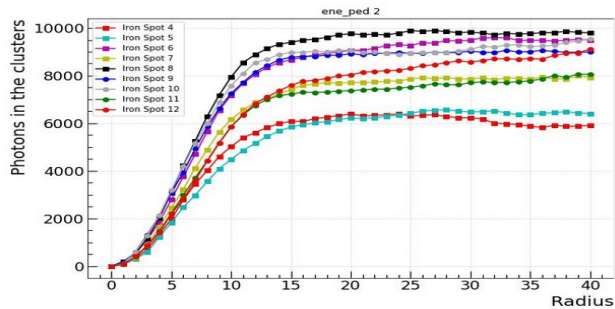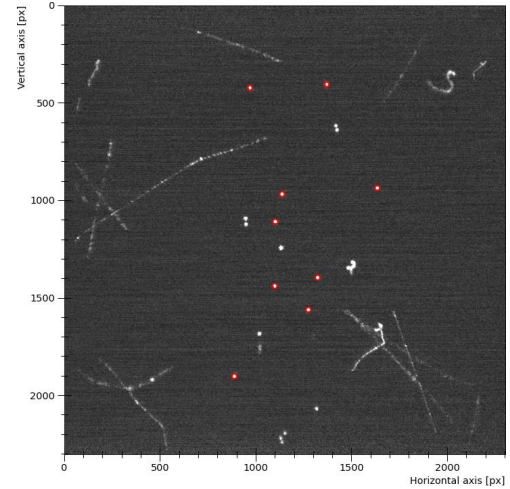
Noise analysis and detection efficiency for ^{55}Fe for different VGEM

Bernardo Deps - Master

- **Objectives:**

  - Measure noise of different sensors
    - Orca Fusion BT
    - Orca Quest
    - Thorit

  - Evaluate sensitivity (ADC count per keV) and energy resolution of each sensor

  - Evaluate detection performance for different Vgem values
    - ~ [6, 5, 2, 1, 0.5, 0.3] keV
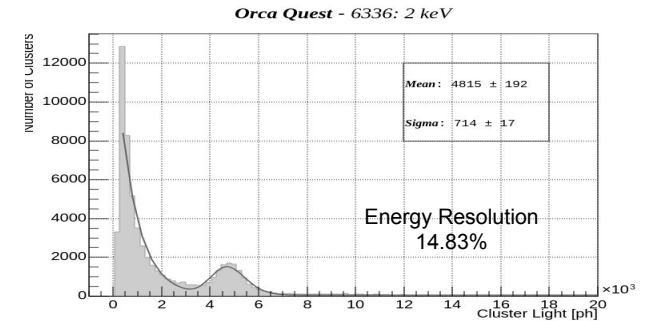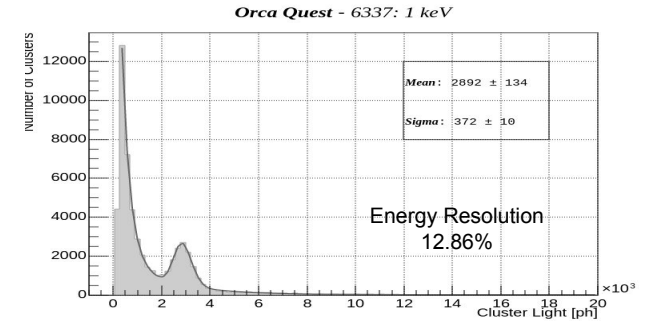
Filtering impact on CYGNO data (including CNN)

Igor Pains - Master

- **Objectives**

    - Study the impact of different filters applied to CYGNO images
        - Average filter
        - Gaussian filter
        - Median filter
        - U-net

    - Evaluate
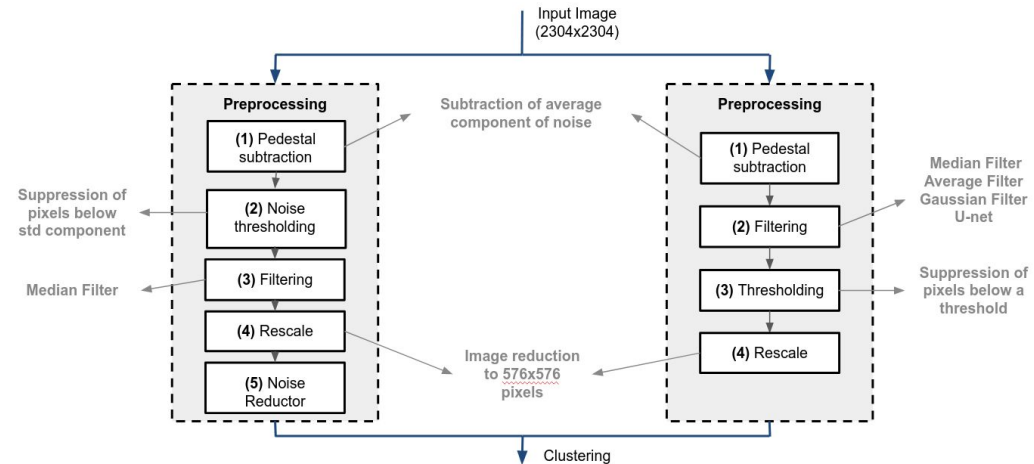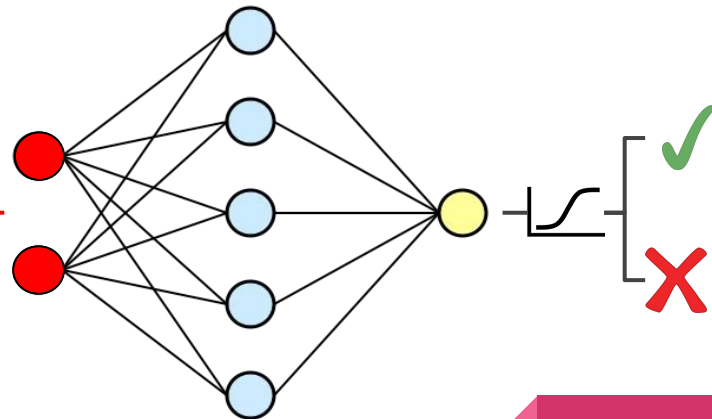   - detection performance
        - energy estimation performance

Image triggering using CNN

Guilherme Lopes - PhD

- Objectives:

  - Test a image trigger based on an U-net structure

PMT simulation

Mariana Migliorini - Master

- Objectives

  - Simulate photons propagation GEM → PMTs

  - Simulate PMT signals