$^{55}$Fe Cluster Energy Analysis

Lucas Coelho

Rafael Nóbrega, Igor Pains and Igor Abritta

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Outline

- Introduction
- Cluster centering
- Energy and radius analysis
- Reconstruction algorithm deviation
- Conclusions
Introduction

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
The spot center has been measured using the mean of the coordinates values of the pixels with energy greater than a threshold.

Figure: Event 32 - Run 5890
Energy and radius analysis

The plateau is generally achieved above radius 10 and below radius 20.

Figure: Event 32: cluster energy versus radius

Photons in the clusters

Radius

Iron Spot 4
Iron Spot 5
Iron Spot 6
Iron Spot 7
Iron Spot 8
Iron Spot 9
Iron Spot 10
Iron Spot 11
Iron Spot 12

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A S-curve fitting is used to estimate the cluster energy evolution.

Figure: S-curve fitting

Radius for 90% of the iron spot energy.

Figure: Radius histogram for 90% cluster energy with maximum estimated by s-curve fitting
Reconstruction algorithm deviation

400 images were used to measure the deviation between the energy estimated with this analysis (radius = 20) and the energy computed by the reconstruction algorithm.

Figure: Percentage of reconstruction energy deviation to cluster analysis with radius equal 20
Conclusions

- 90% of the iron energy falls between 10 and 20 (radius)
- The reconstruction algorithm seems to be measuring the $^{55}$Fe cluster energy with no bias and small deviation

Next steps

- Evaluate impact of threshold and DBSCAN parameters