



QUEST vs FUSION



GSSI & INFN LNGS

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Data Taken 7/11/23

- MANGOlino: GEM 430V Drift 1kV/cm
- Fusion: Focus 0.3 one thin spacer 19.5 from MANGOlino outer black box
- Fusion: Focus 0.37 one thin spacer 21.5 from MANGOlino outer black box (Square window acquisition to m atch Fusion)
- 55Fe irradiation
- 1500 Pictures for each camera
- Everything reconstructed with the last reco version
- Possible Humidity issue in this data!



Pedestal - Mean







Pedestal - RMS







Pedestal – Border Noise





Fusion

Quest

Square cut has been made on Y coordinate (long ORCA side)

- Huge reduction of noise on border
- 15 noisy row instead of 300 ('bottom' side)
- Only on one side (no 'top' noise)



55Fe LY spectra







Calibrated Spectrum





Example nsigma=1 min_neighbour=1.2 (always the same)



Zoom - Calibrated Histogram Quest









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How to get the thresold?



Zoom - Calibrated Histogram Quest



I can fit the negative exponential part of the noise and check when it becomes compatible with noise: • Fit with expo range=(noise peak, 0.7keV) • $f(x) = e^{p0+\lambda x}$ • Get the energy thresold $x = \frac{\ln(1-CL)}{\lambda}$ • I chose 99% Scan nsigma values!





2

1.5

1



Conclusion



- Quest is definitely better in terms of noise RMS (and also granularity)
 - Almost factor 2 in RMS value
- With this early dataset, we demonstrated that the energy threshold can be 15-20% less than with Fusion in the same configuration
 - Procedure is not validated. However, it is data-based differently from using the datasheet value of the counts/electron
 - Dataset may be affected by nonuniform humidity between the two cameras
- We now have (5-6/02/2024) a new dataset to compare Fusion and Quest
 - With different distances (i.e., different granularity and LY)
 - Uniform temperature/pressure/humidity between two cameras
- More in the next episode!



BACKUP

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MANGO LY vs Humidity



