

ANALYSIS OF LST-1 MISPOINTING IN CRAB NEBULA OBSERVATIONS

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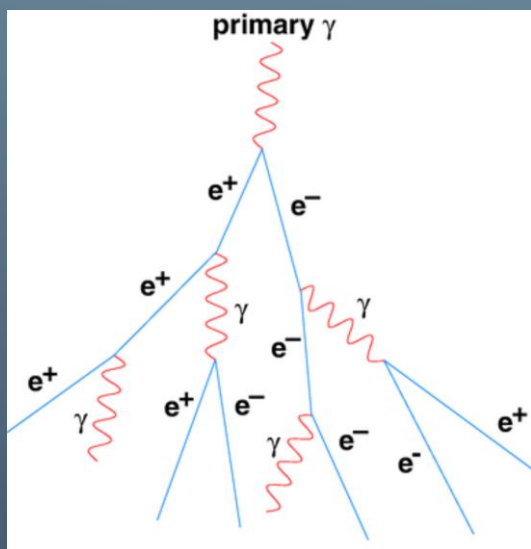


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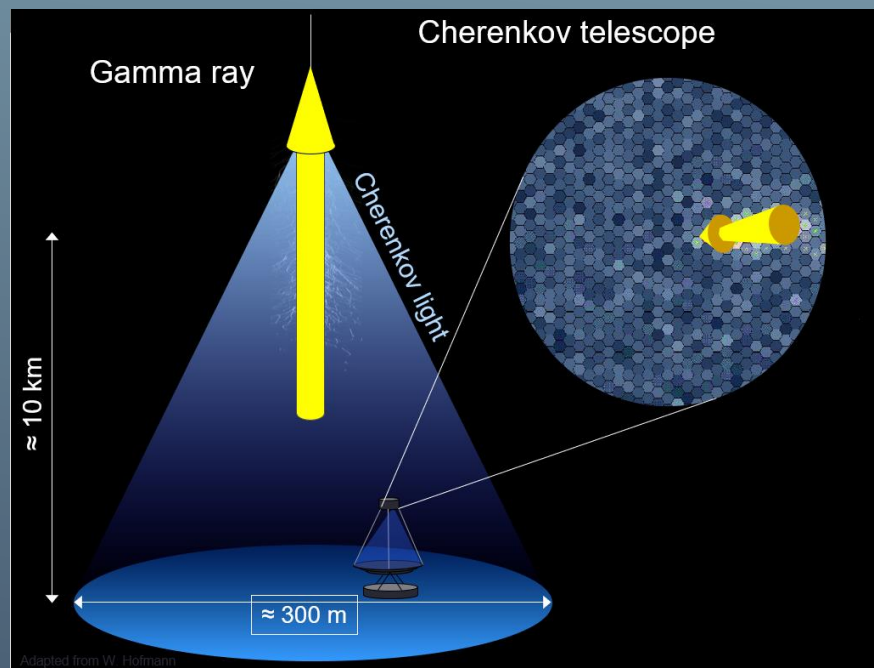
LST-1 AND CHERENKOV TELESCOPES



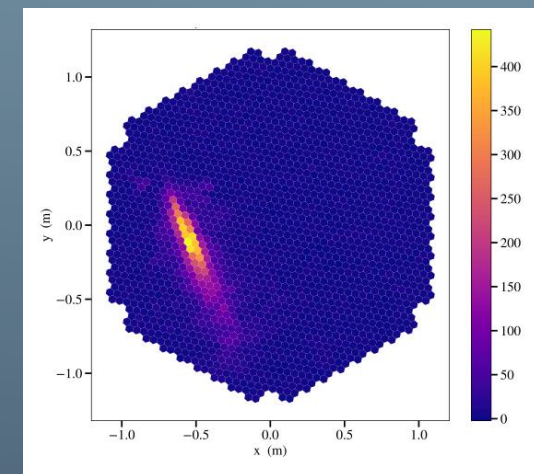
Tomohiro Inada



OrianaMansutti

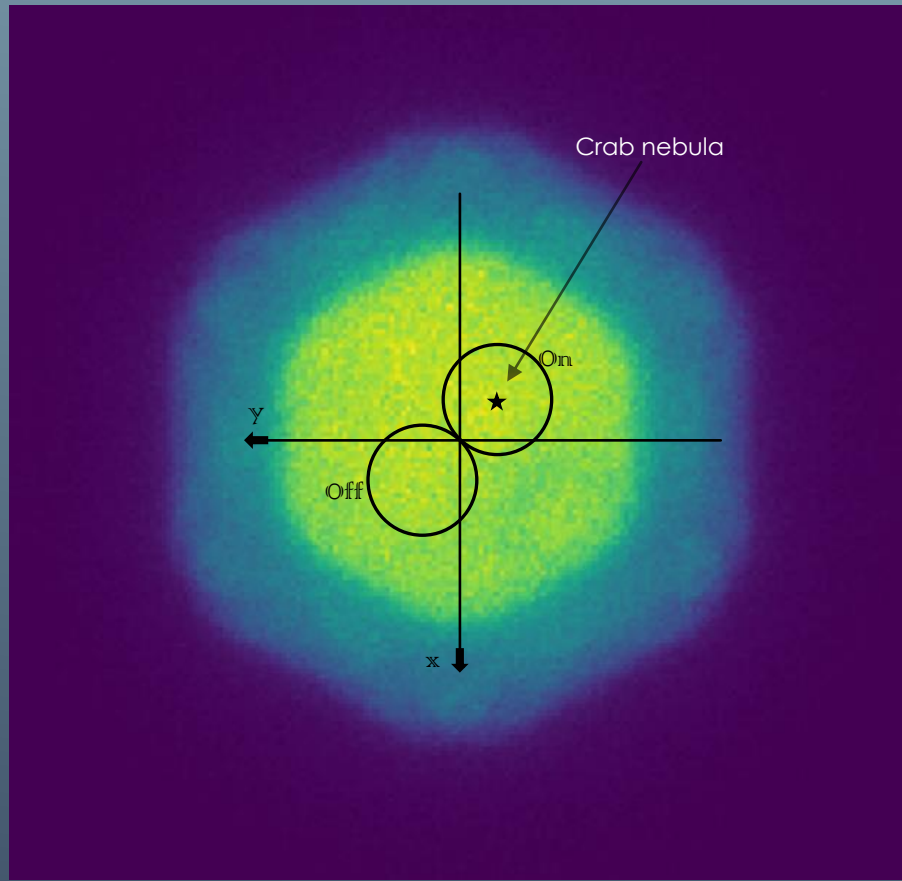


A.Moralejo, bojos per la ciencia

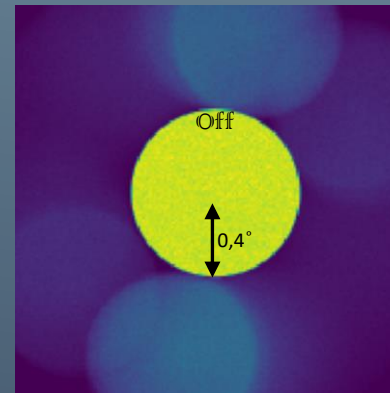
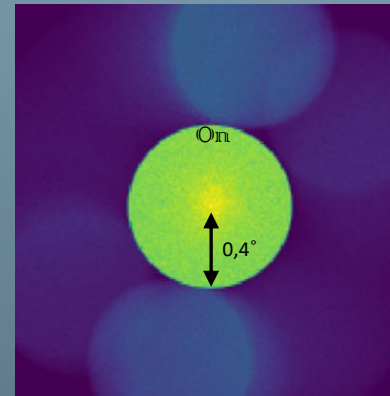


A.Moralejo, bojos per la ciencia

DATA CLEANING



reconstructed rays directions



- Cut around source
- Gammaness
- Intensity
- On - Off

DATA CLEANING

Symmetry about origin

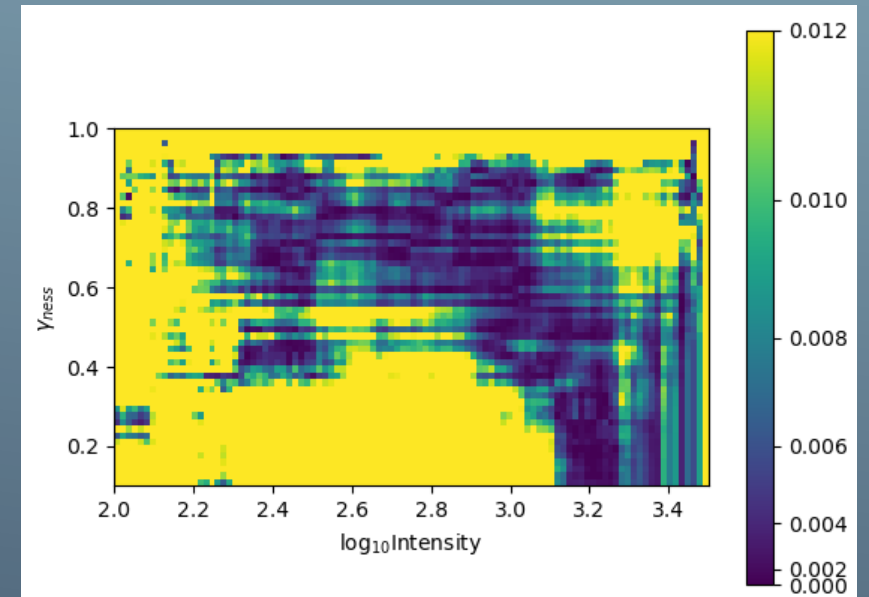
$$\sum_{Off} x_i = \sum_{bg'} (-x_i)$$

$$\frac{\sum_{On} x_i + \sum_{Off} x_i}{\sum_{On} N - \sum_{Off} N} = \frac{\sum_{\gamma} x_i + \sum_{bg} x_i + \sum_{Off} x_i}{\sum_{\gamma} N + \sum_{bg} N - \sum_{Off} N}$$

$$\frac{\sum_{\gamma} x_i + \sum_{bg} x_i - \sum_{bg'} x_i}{\sum_{\gamma} N + \sum_{bg} N - \sum_{bg'} N} \approx \frac{\sum_{\gamma} x_i}{\sum_{\gamma} N}$$

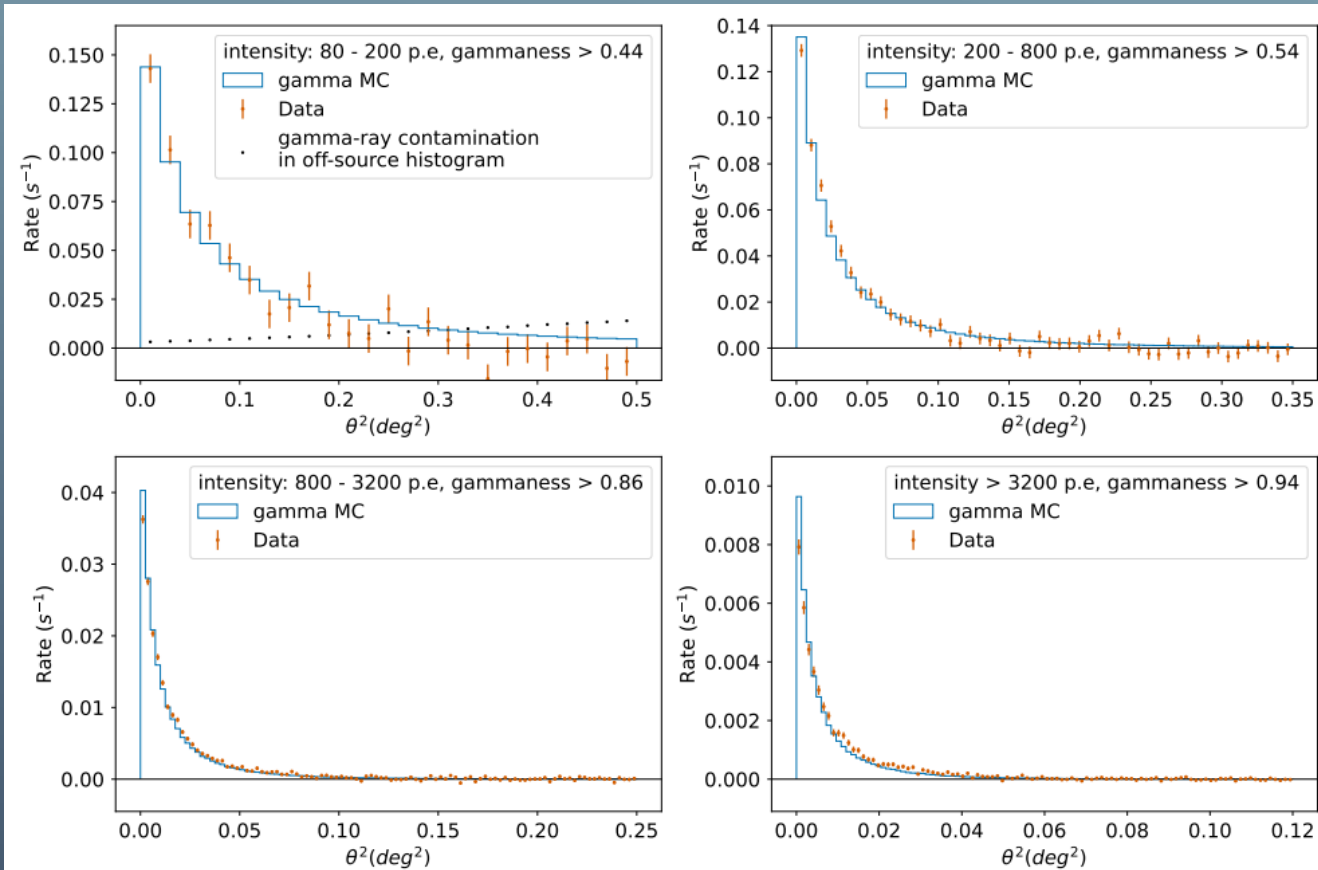
Gamma rays mean position

CUTS OPTIMIZATION



Optimal gammaness and intensity

CRAB NEBULA OBSERVATIONS

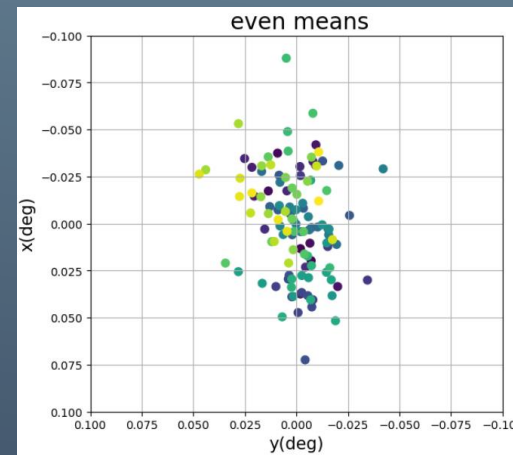
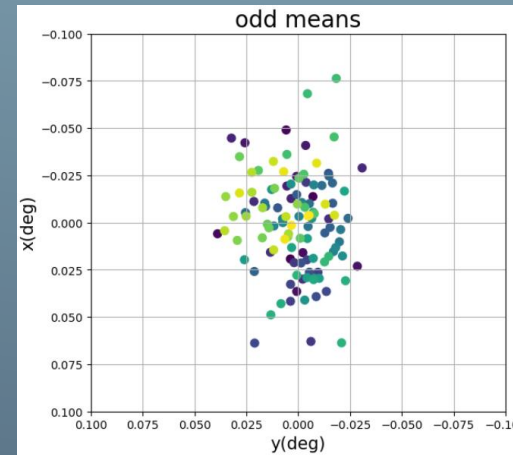
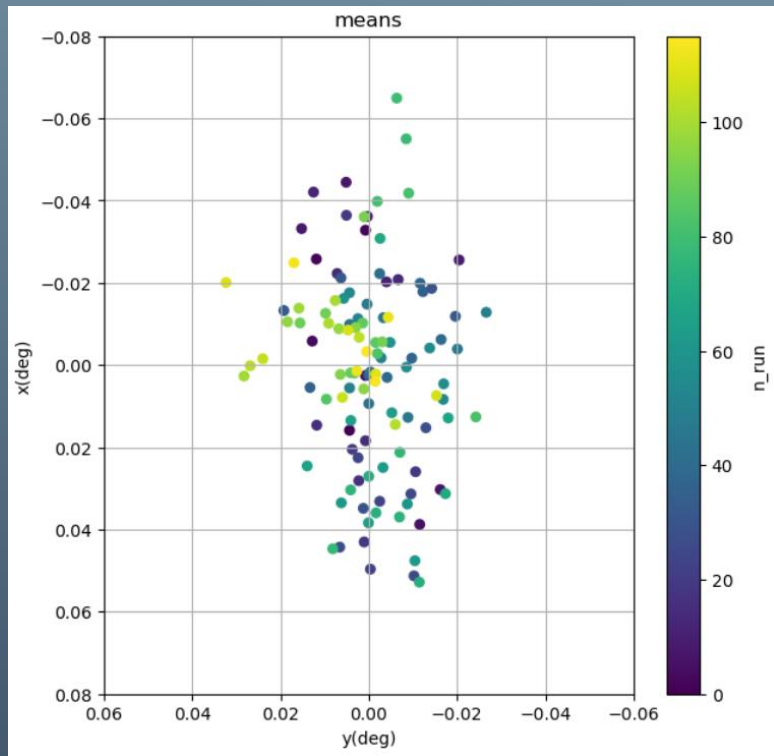


Disagreement consistent with variable gaussian mispointing

$$\sigma = 0.025^\circ$$

Figure 11. Comparison of θ^2 distributions, gamma MC simulations vs. Crab Nebula excess events. The observed discrepancies may be partly due to arcminute-scale mispointing of the telescope.

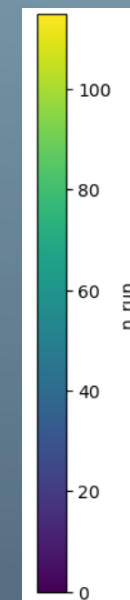
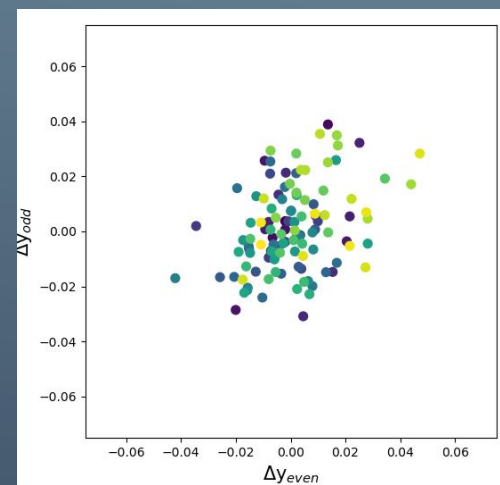
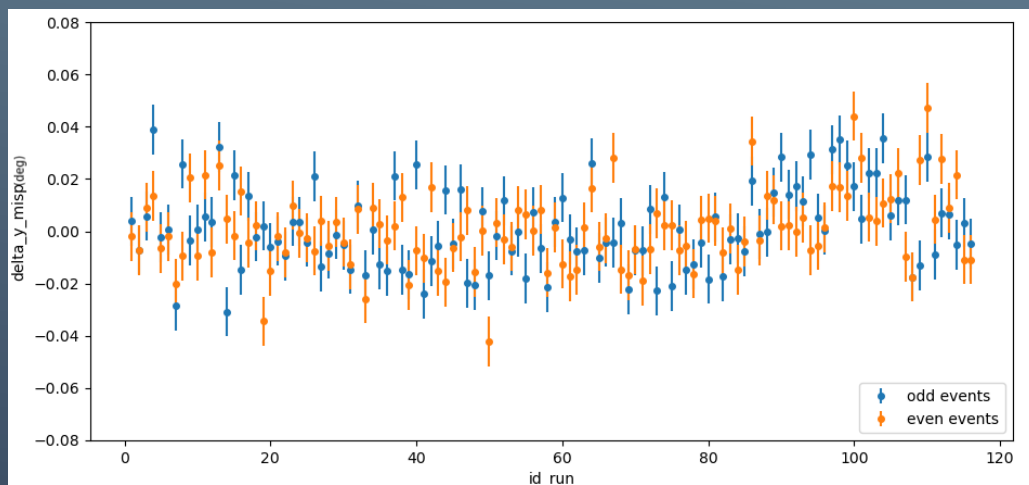
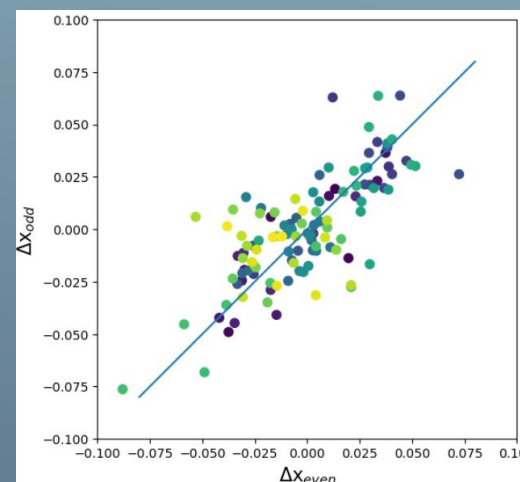
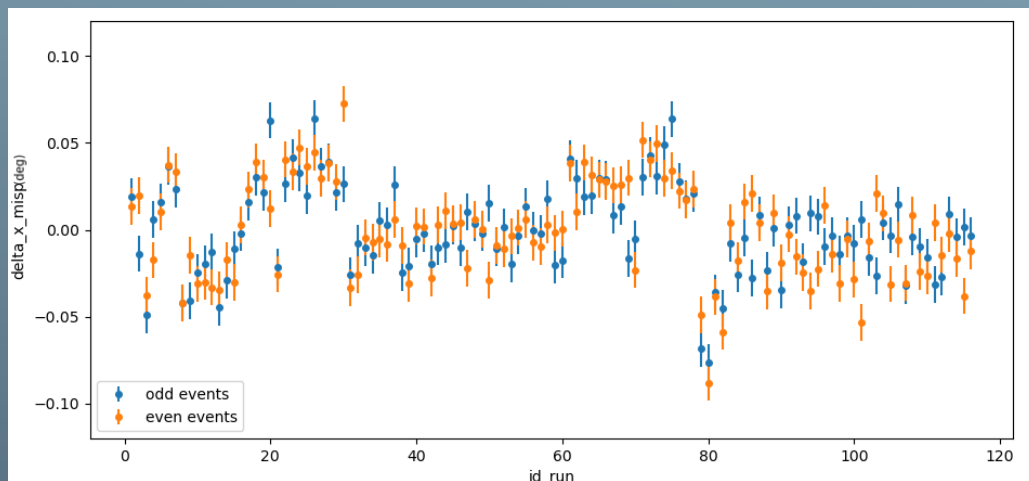
MEANS OF THE CRAB EXPECTED POSITION



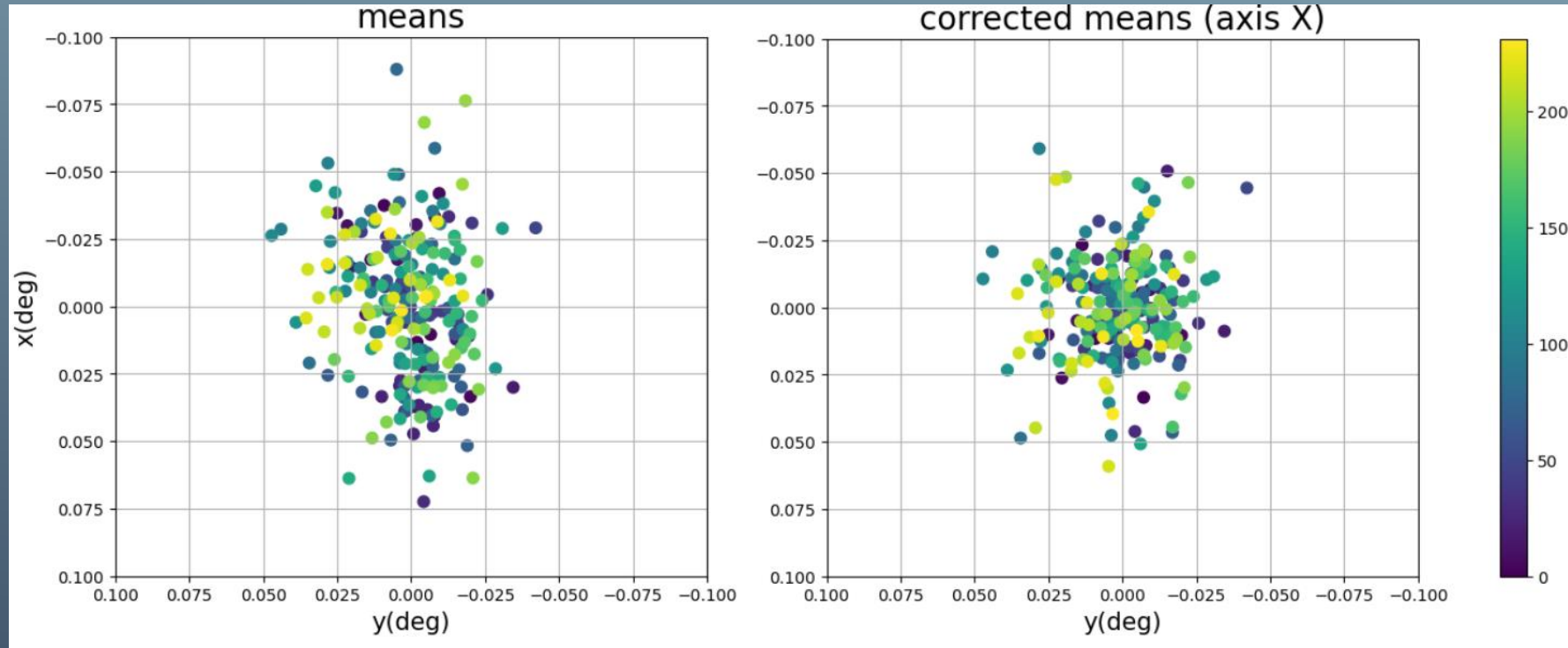
Odd and even events are statistically independent.

Run time \approx 20min

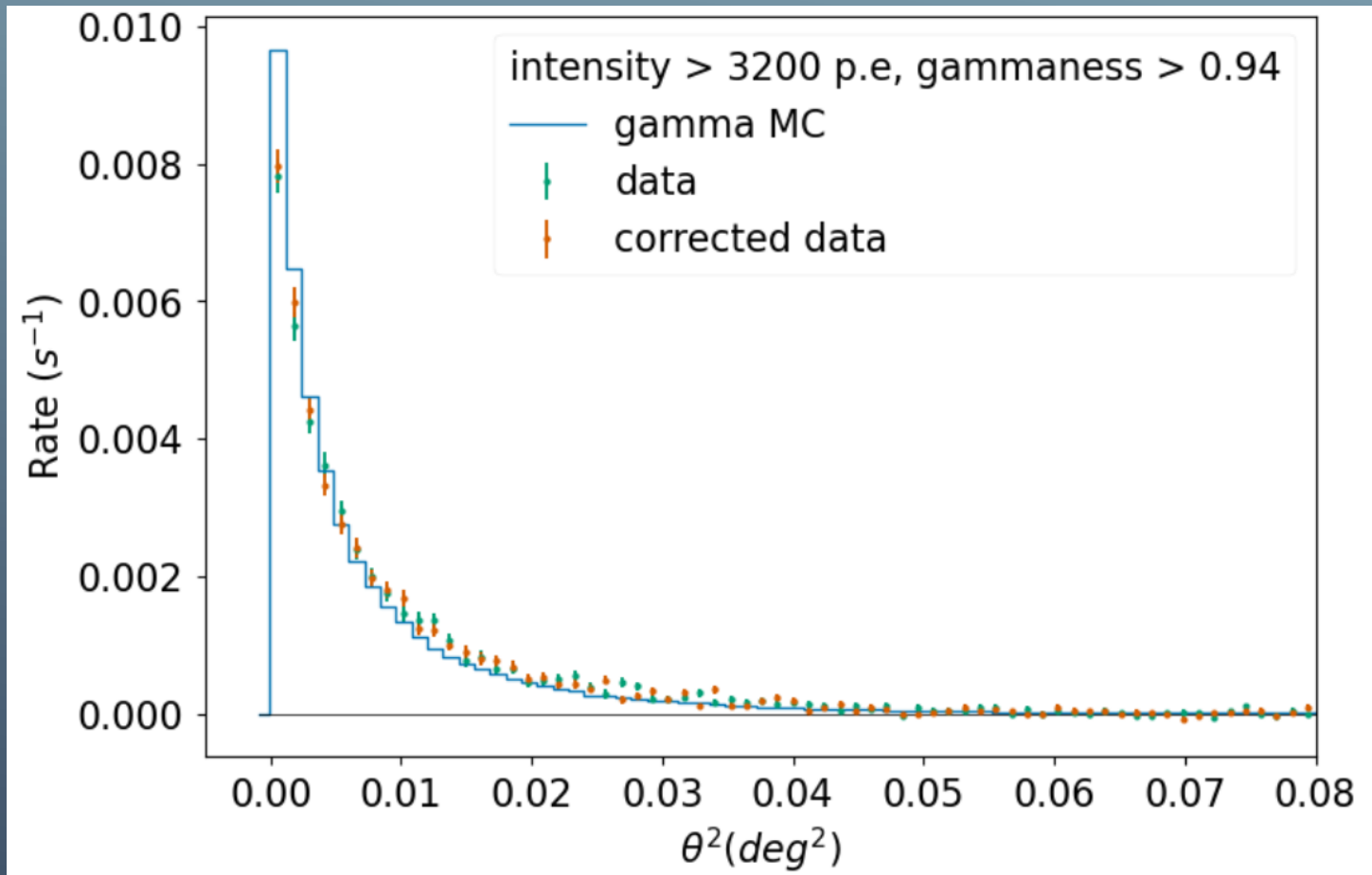
Correlation between events



MISPOINTING CORRECTION



CORRECTED PLOT Θ^2



CONCLUSIONS

- ▶ Confirmed that part of the PSF mismatch is due to a mispointing
- ▶ Improves the data-MC match marginally
- ▶ Remaining discrepancy: shorter-timescale pointing, MC oversimplified...

SOLUTIONS

- ▶ Star guider

BACKUP

- ▶ Cosmic Rays (alpha, protons, ...)

