Application of KCDC platform for non-collaboration analysis: reconstruction of moon and sun shadows seen by KASCADE

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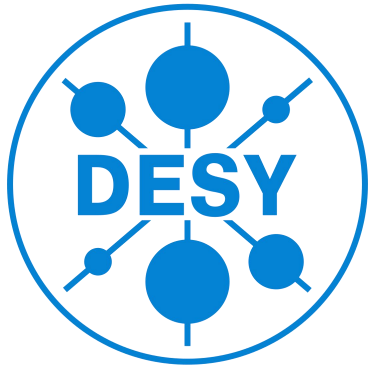
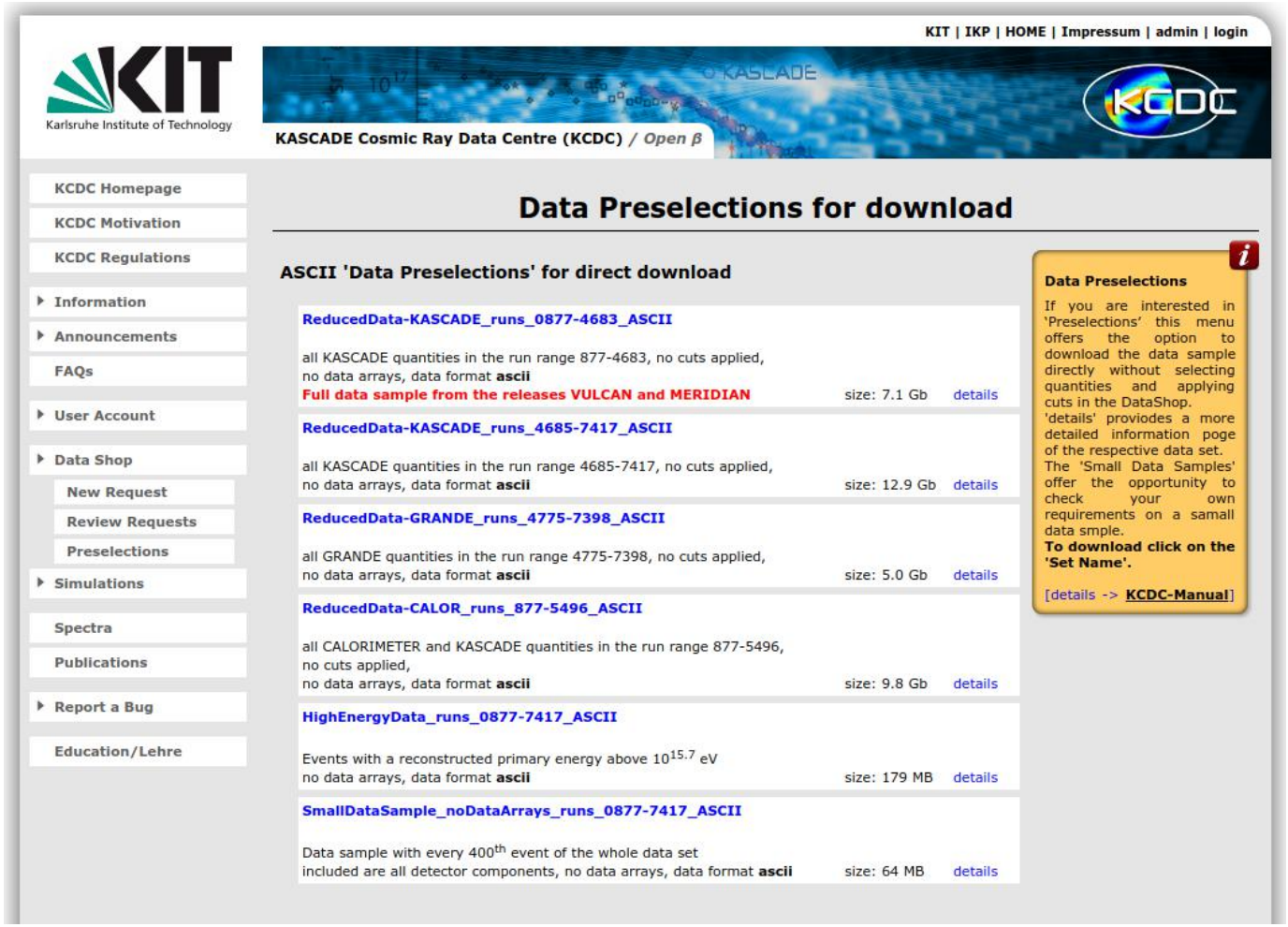
[1] API ISU, [2] DESY

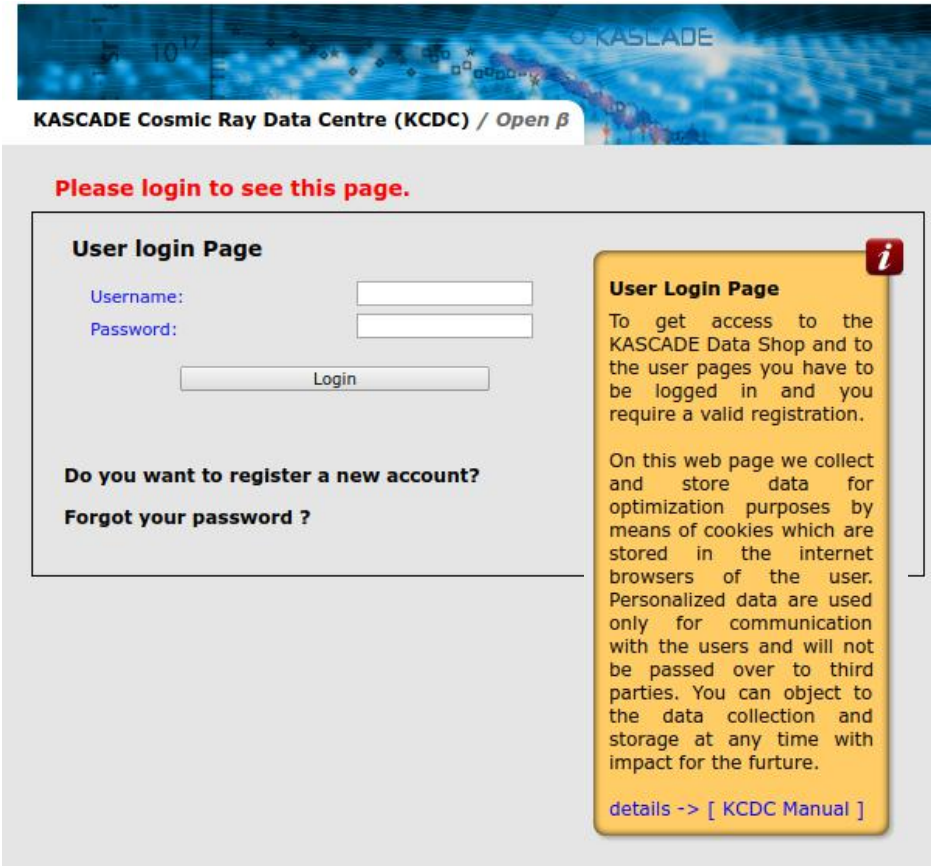


Motivation

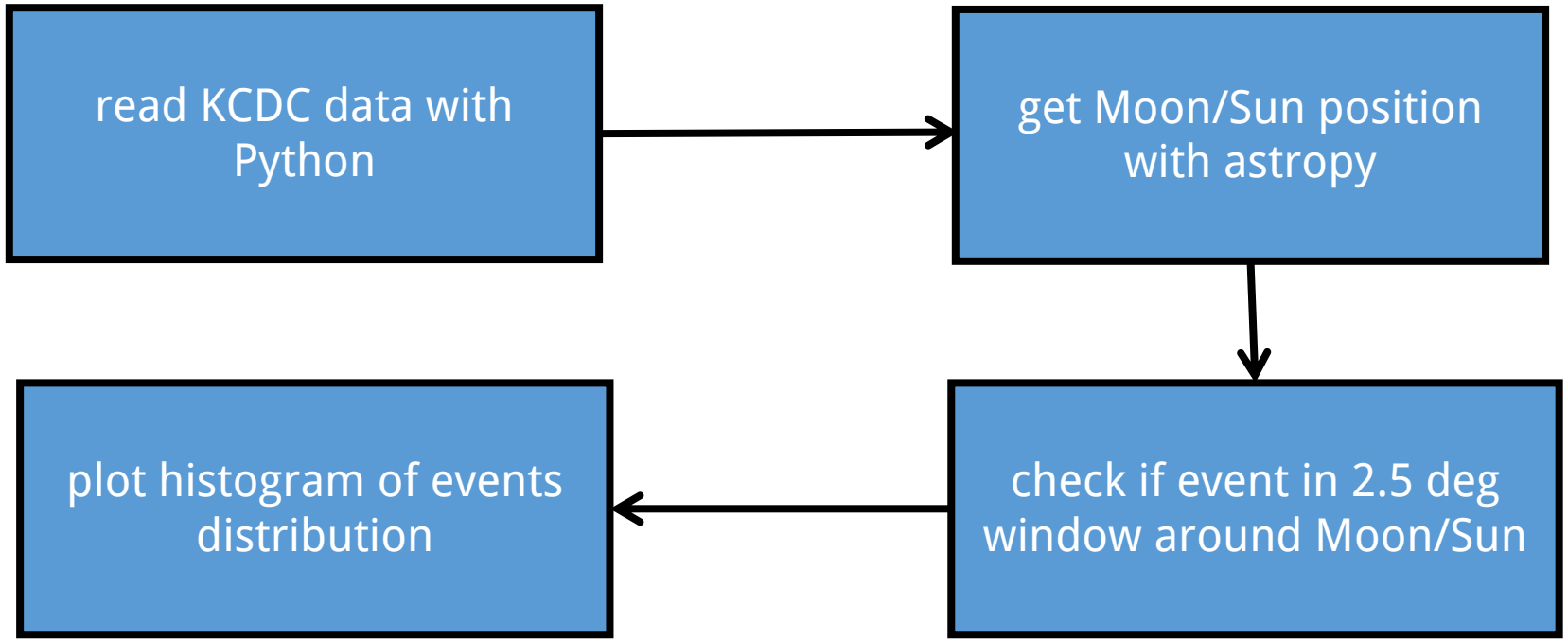
- KCDC provides an opportunity for data analysis by third parties
- Interest for looking for point sources, transients, etc
- Testing of KCDC platform itself

KASCADE Cosmic Ray Data Centre (KCDC)

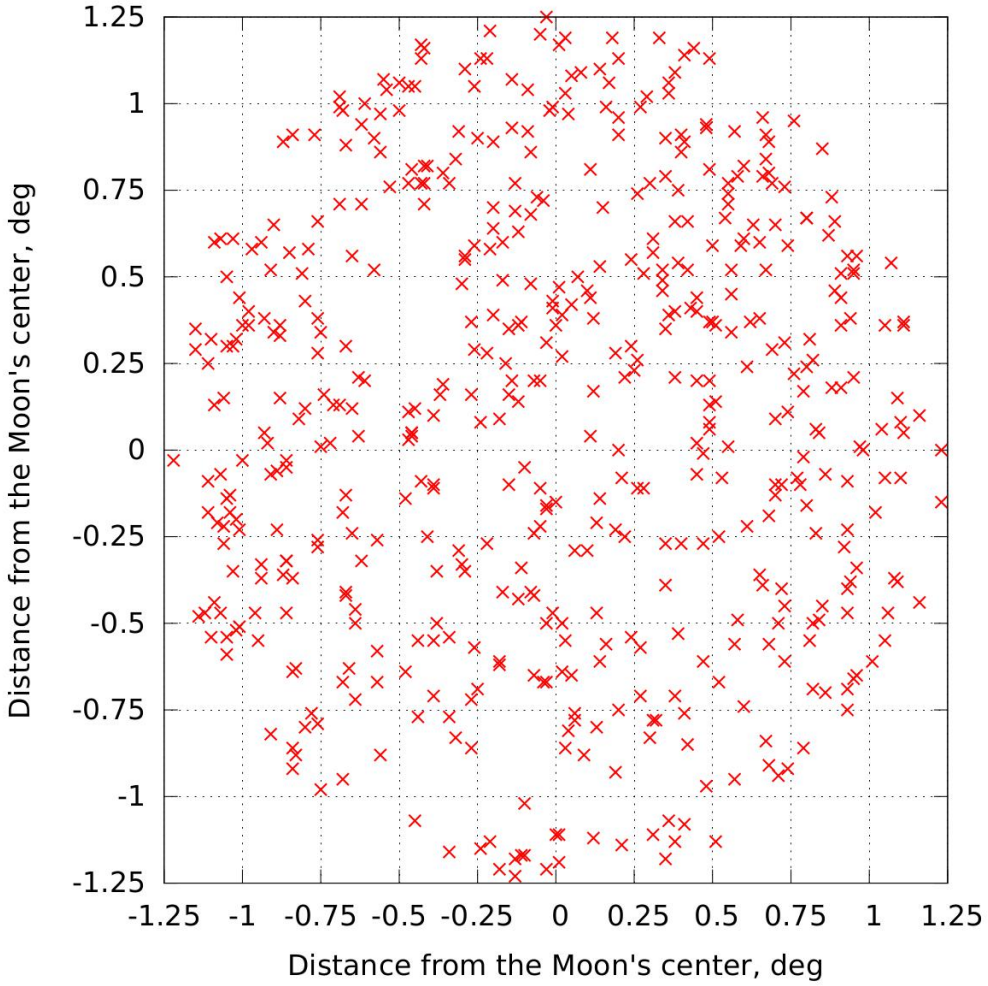


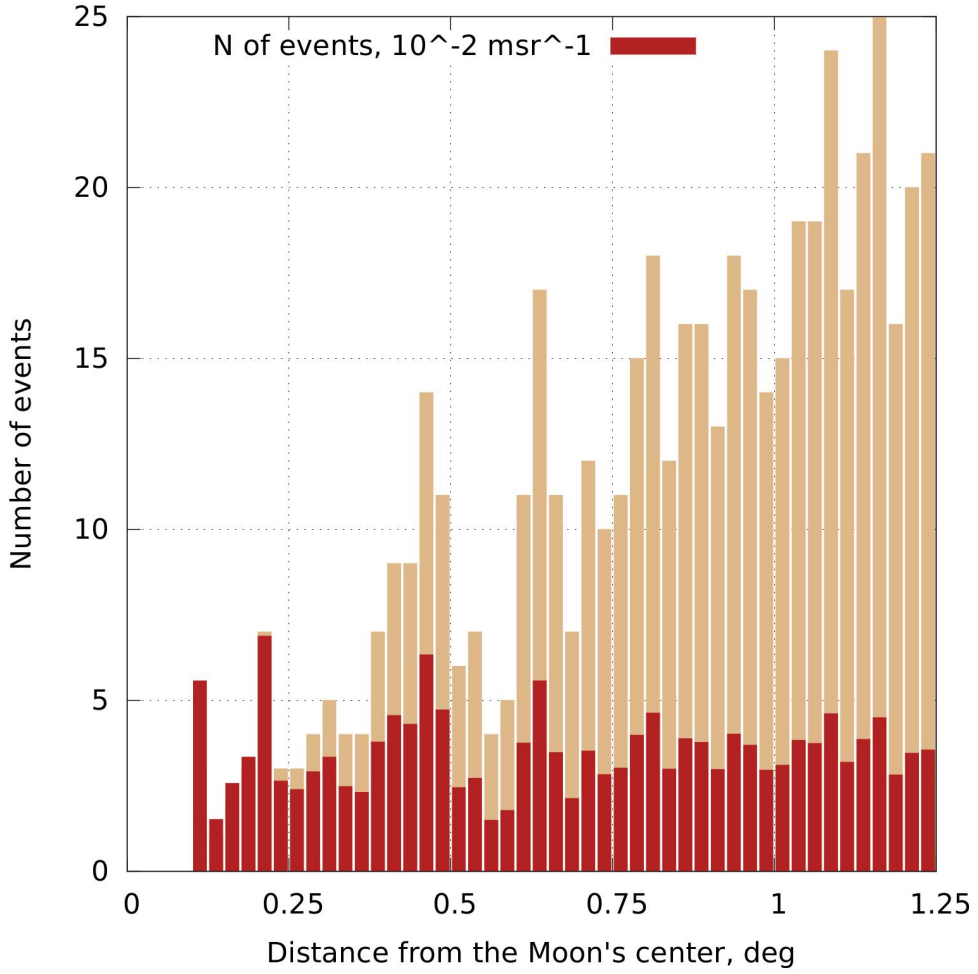


Data treatment



Statistics and Distribution

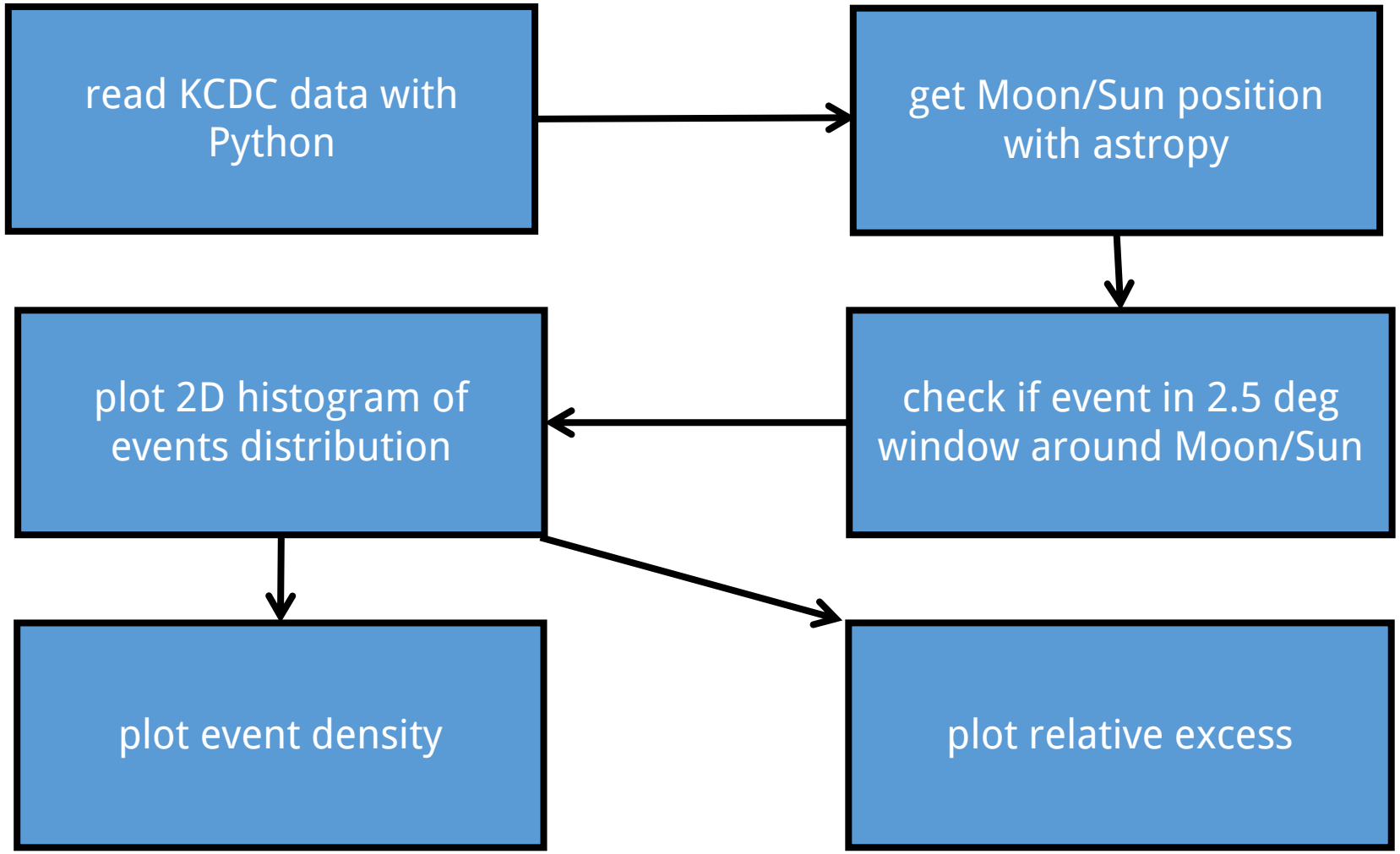




Statistics

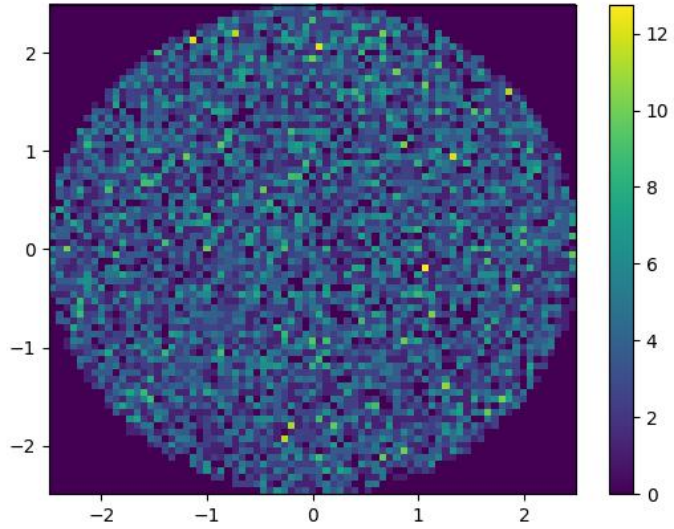
	Dataset 1	Dataset 2
Number of events	145,883,587	287,339,034
Operation period	8.5.1998–20.12.2003	20.12.2003-15.1.2013
Estimated primary energy	10^{13} -10^{19} eV	
Run number	877 – 4683	4685 - 7417
Runs with Moon	1601 of 4217	

Data treatment: method 2

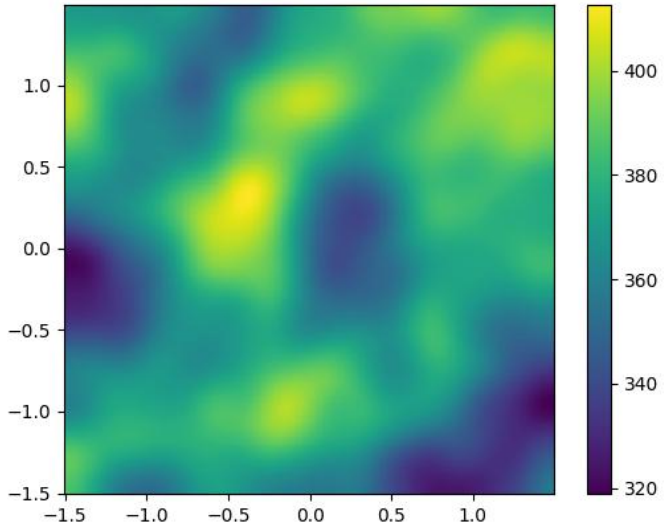


Plotting

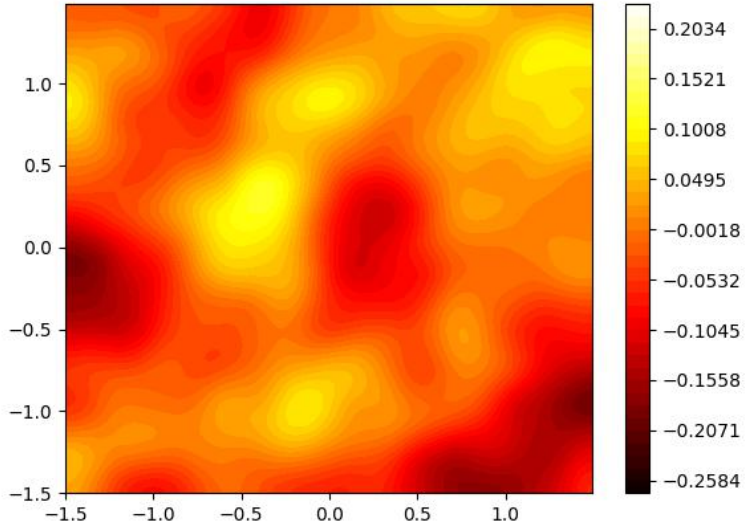
histogram



density



excess



correlation radius 0.5 deg, smoothed gaussian filter with σ = 0.5 deg

Comparison of datasets

1st dataset:
Event number: 11630
Moon relative excess:
0.171 +- 0.003
Sun relative excess:
0.122 +- 0.003

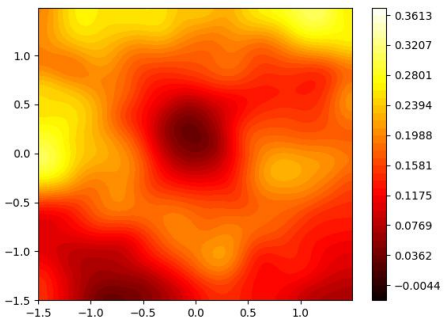
2nd dataset:
Event number: 21273
Moon relative excess:
0.058 +- 0.002
Sun relative excess:
0.176 +- 0.003

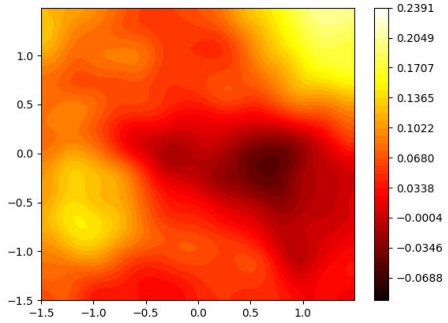
Merged dataset:
Event number: 32903
Moon relative excess:
0.096 +- 0.002
Sun relative excess:
0.163 +- 0.002

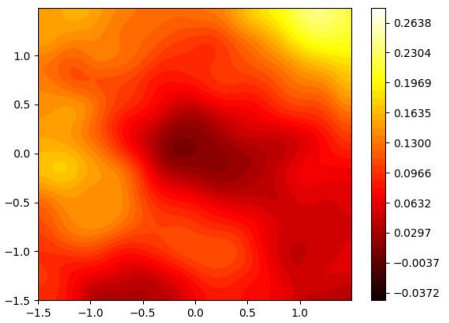
dataset 1

dataset 2

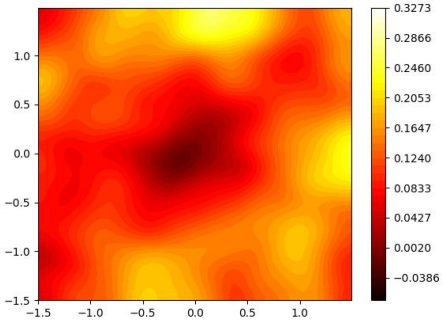
merged

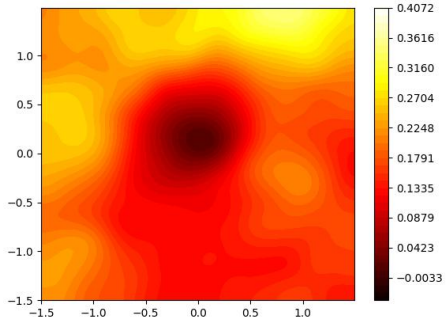


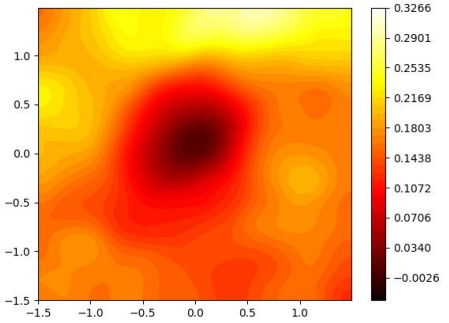




Moon shadow



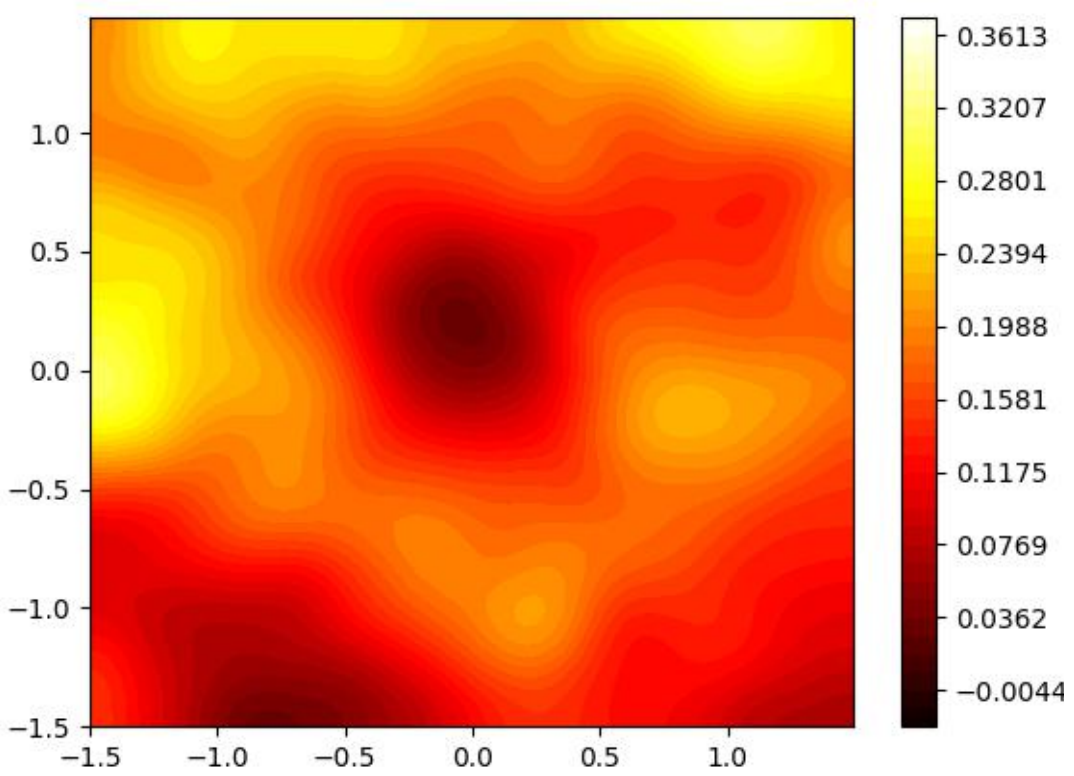




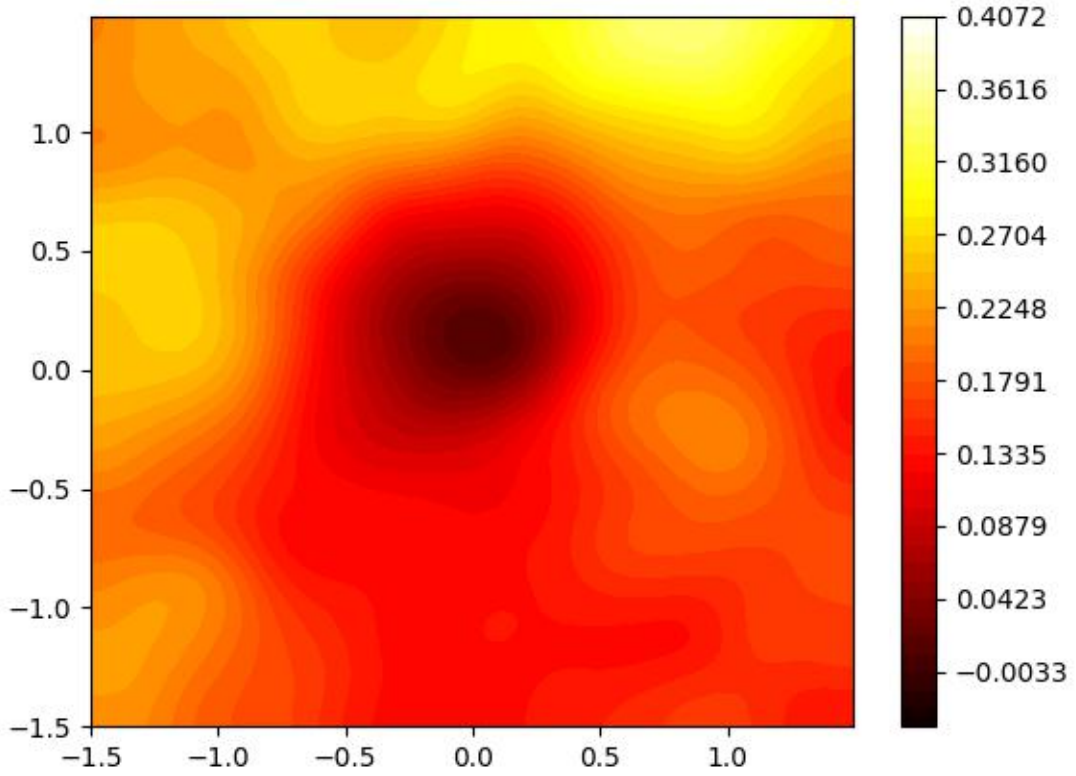
Sun shadow

Best results with 2nd method

Moon shadow (dataset 1)

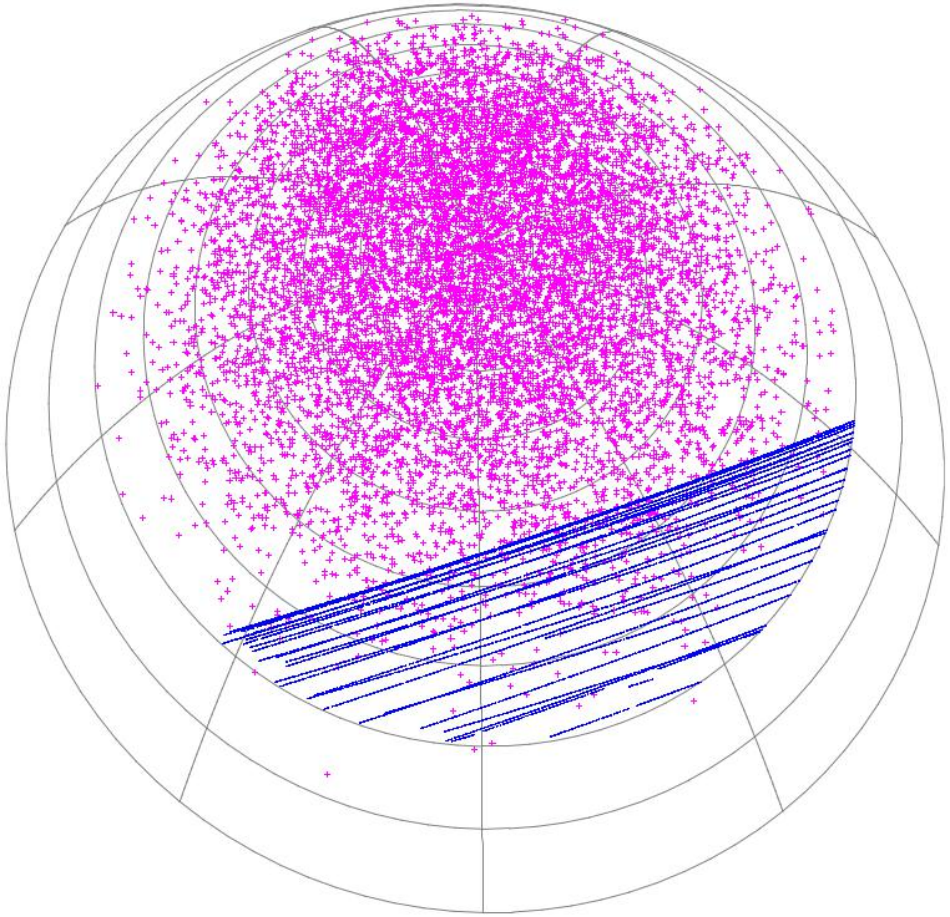


Sun shadow (dataset 2)

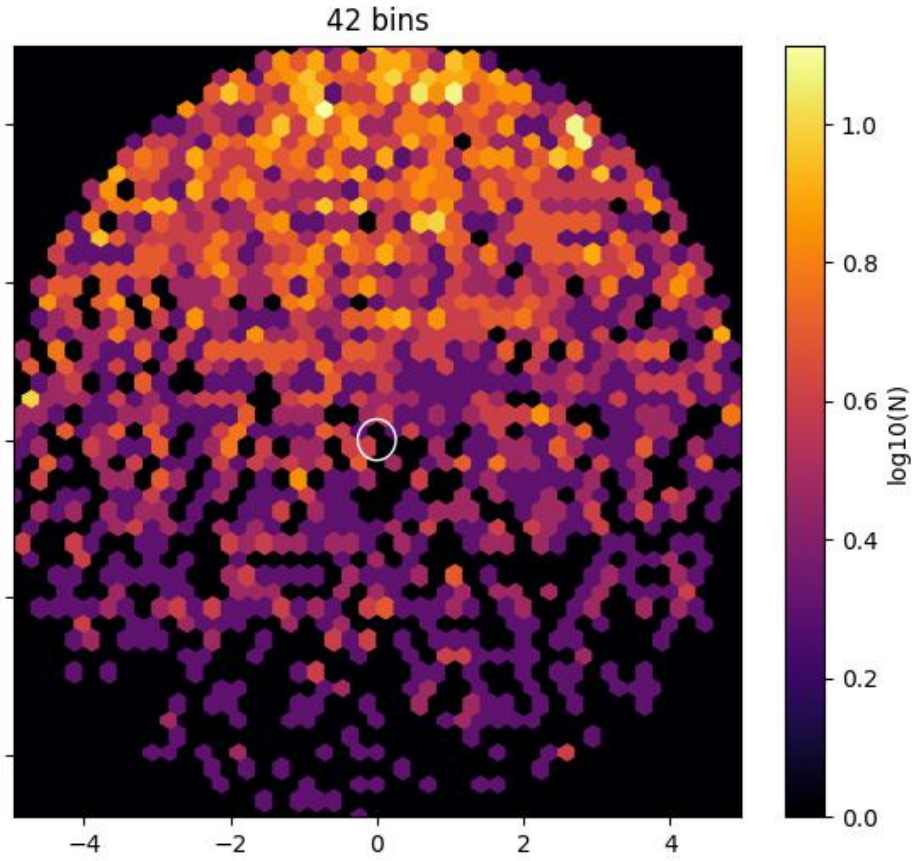


Acceptance correction (in progress ...)

Distribution of events and Moon tracks



5 degree window around Moon



Summary

The analysis of KASCADE data by non-members of collaboration is possible but there is a space for improvement:

1. Datashop is too slow, we have been forced to use preselected data
1. Detector acceptance and other useful quantities are required (the number of observables have to be extended)
2. There are no recommendation regarding suggested software for data analysis (like in H.E.S.S. case)