GAP 2021-XX

Measurement of the efficiency of the 1500-metre surface detector with the 750-metre detector

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September 3, 2021

1 Introduction

2 Efficiency of the 1500-metre array

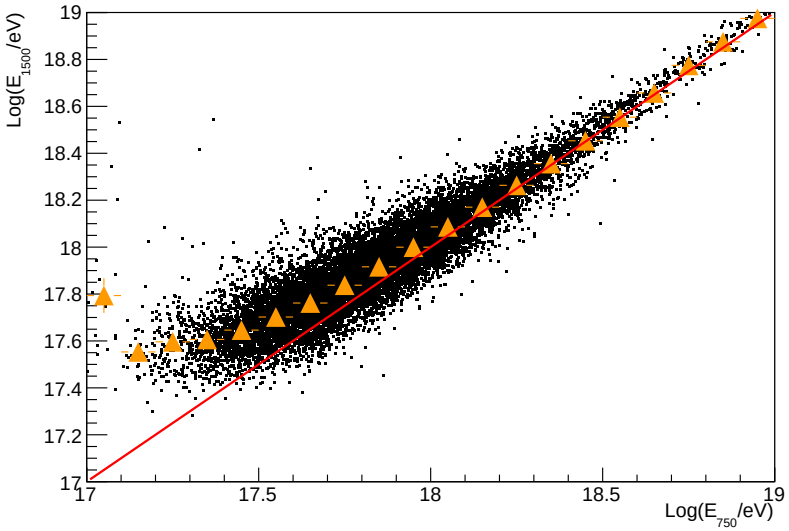

Figure 1: Energy measured by the SD1500 as a function of the energy measured by the SD750 toghether with it's average. In red it can be seen the identity function.

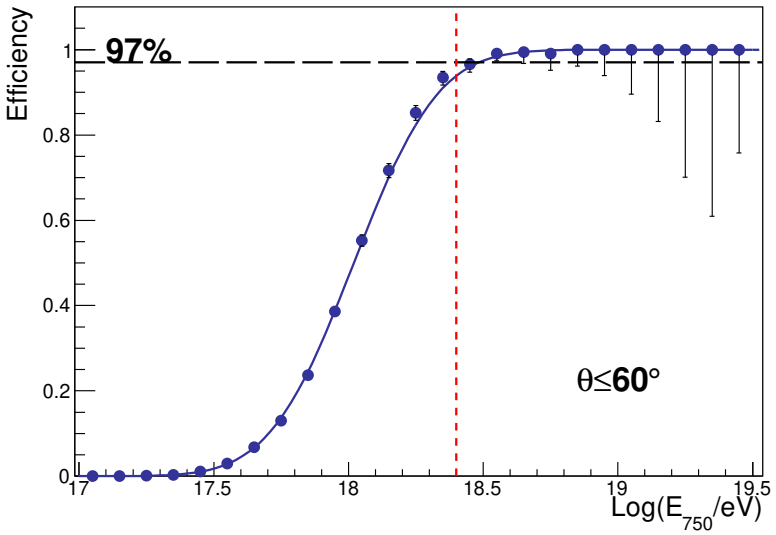

Figure 2: SD1500 efficiency measured with the SD750 event set. The 97% efficiency threshold to report the spectrum is reached in the $10^{18.4}$ eV bin.

3 Zenith angle dependence of the efficiency

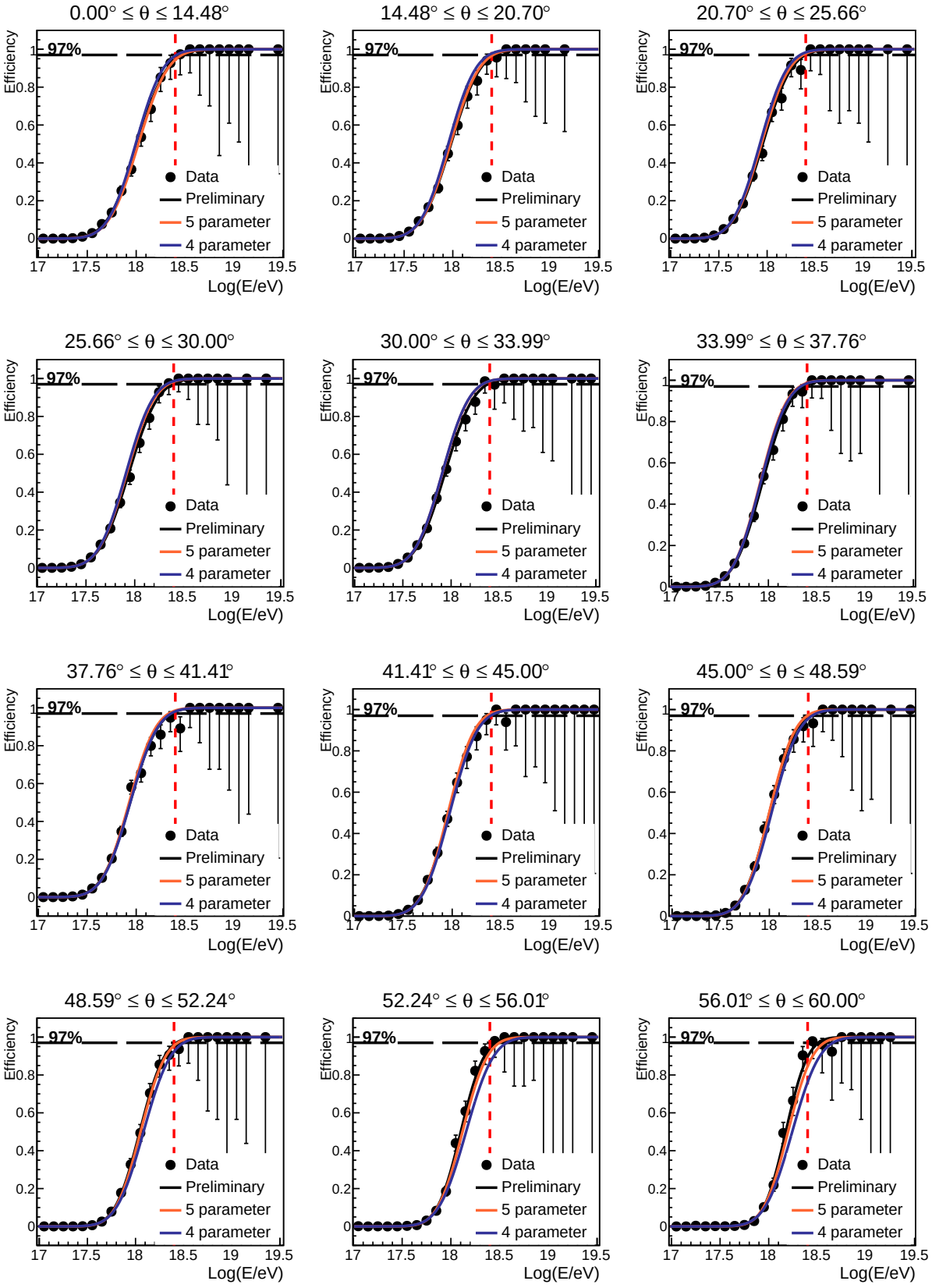

Figure 3: SD1500 efficiency for zenith angle bins and the 4 and 5 parameter fittings proposed together with the preliminary fit.

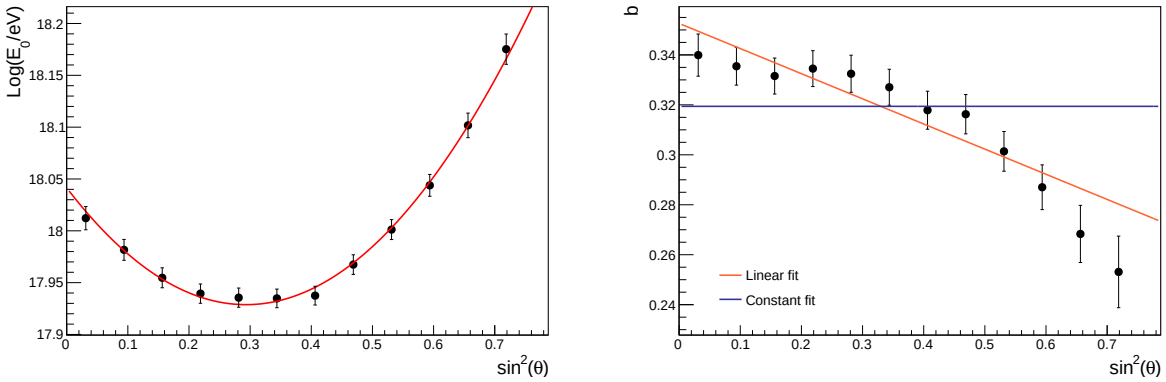

Figure 4: Parameter deppendency with $\sin^2(\theta)$ for the prelminiary fit. E_0 shows a quadratic dependance and b is modeled by a constant function and a linear function.

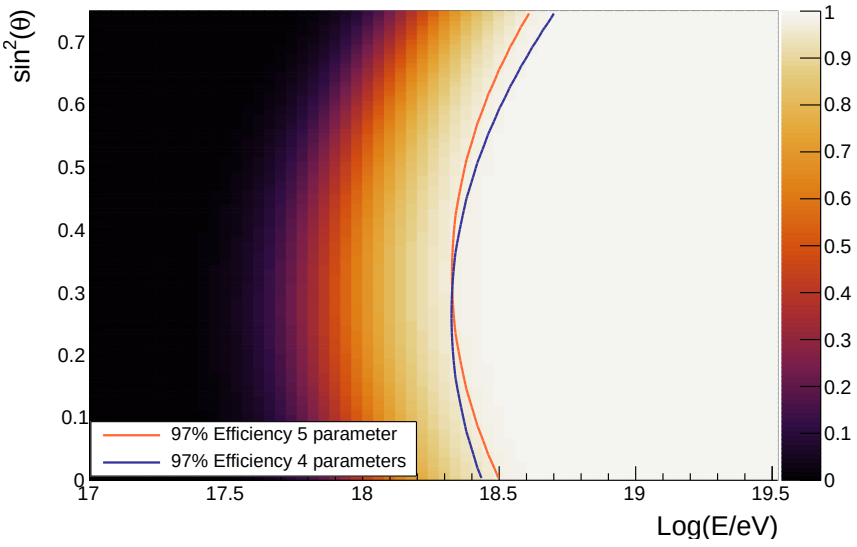

Figure 5: Surface plot of the efficiency 5 parameter fit as a function of the energy and zenith angle toghether with the 97% efficiency threshold for 4 and 5 parameter fit.

4 Efficiency of the 1500-metre array with the inclusion of the new triggers

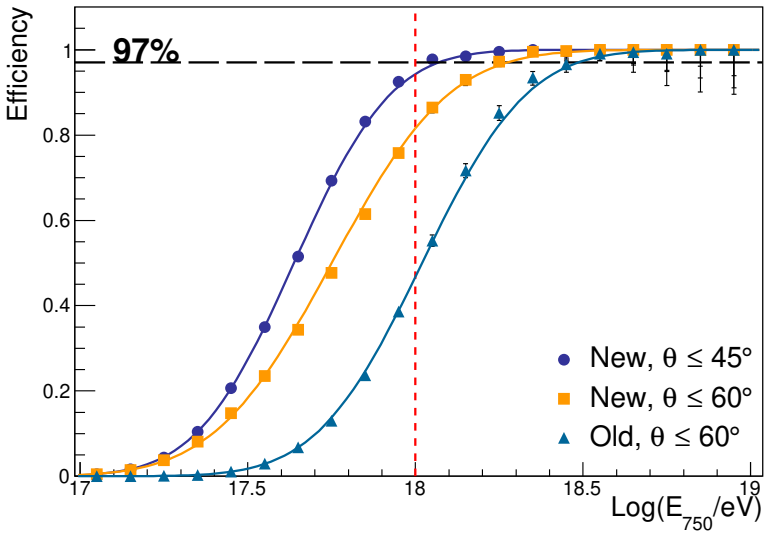

Figure 6: SD1500 efficiency for events reconstructed including the new triggers for $\theta \leq 60°$ and the new zenith angle cut proposed $\theta \leq 45°$. The efficiency threshold is reached at $10^{18.2}$ eV and 10^{18} eV respectively.

5 Efficiency correction of the SD-1500 Spectrum

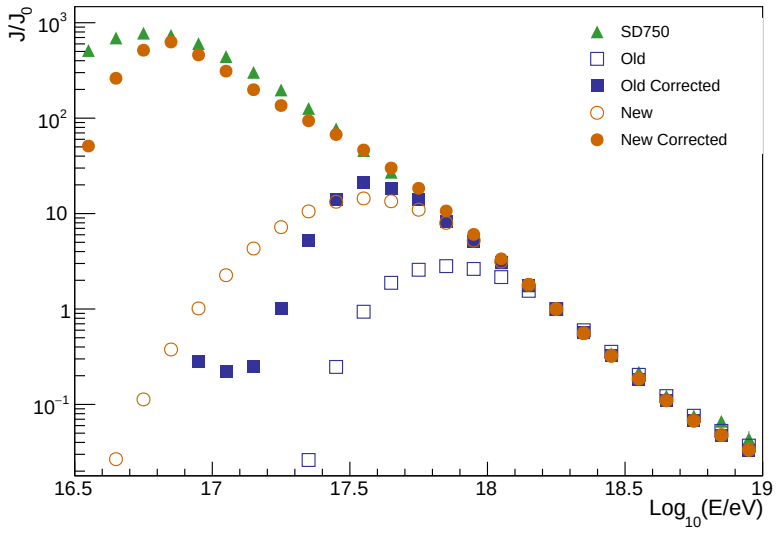

Figure 7:

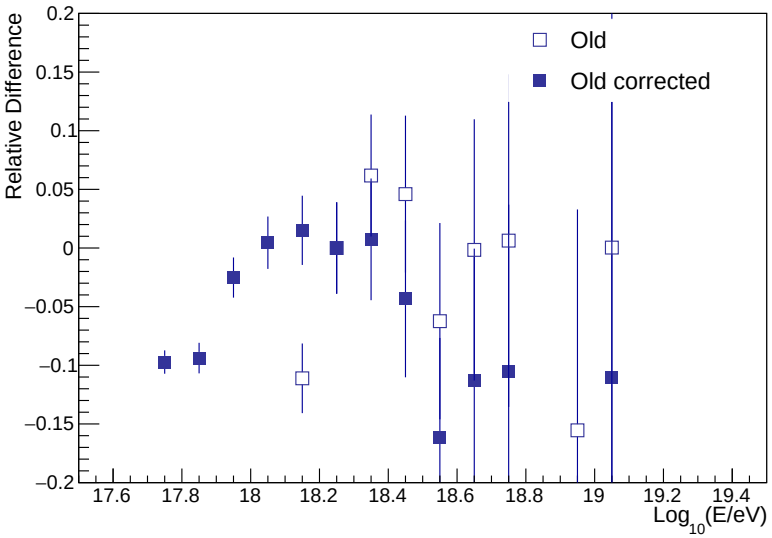

Figure 8:

Appendix: New Triggers

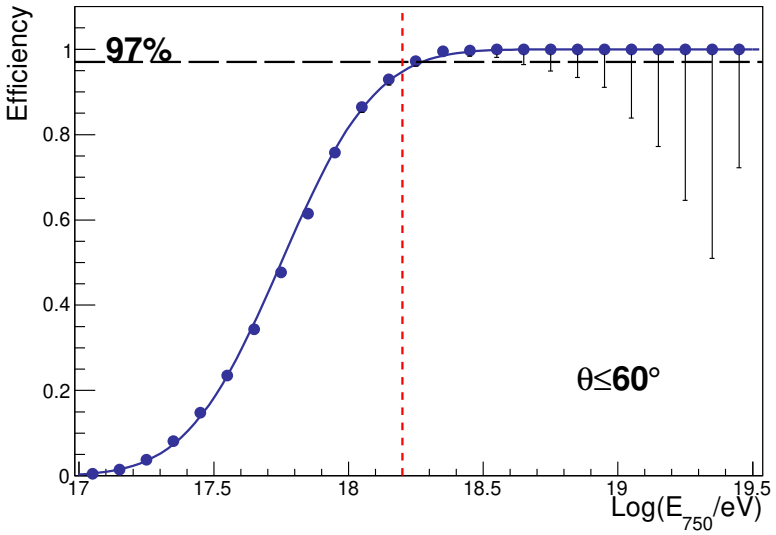

Figure 9:

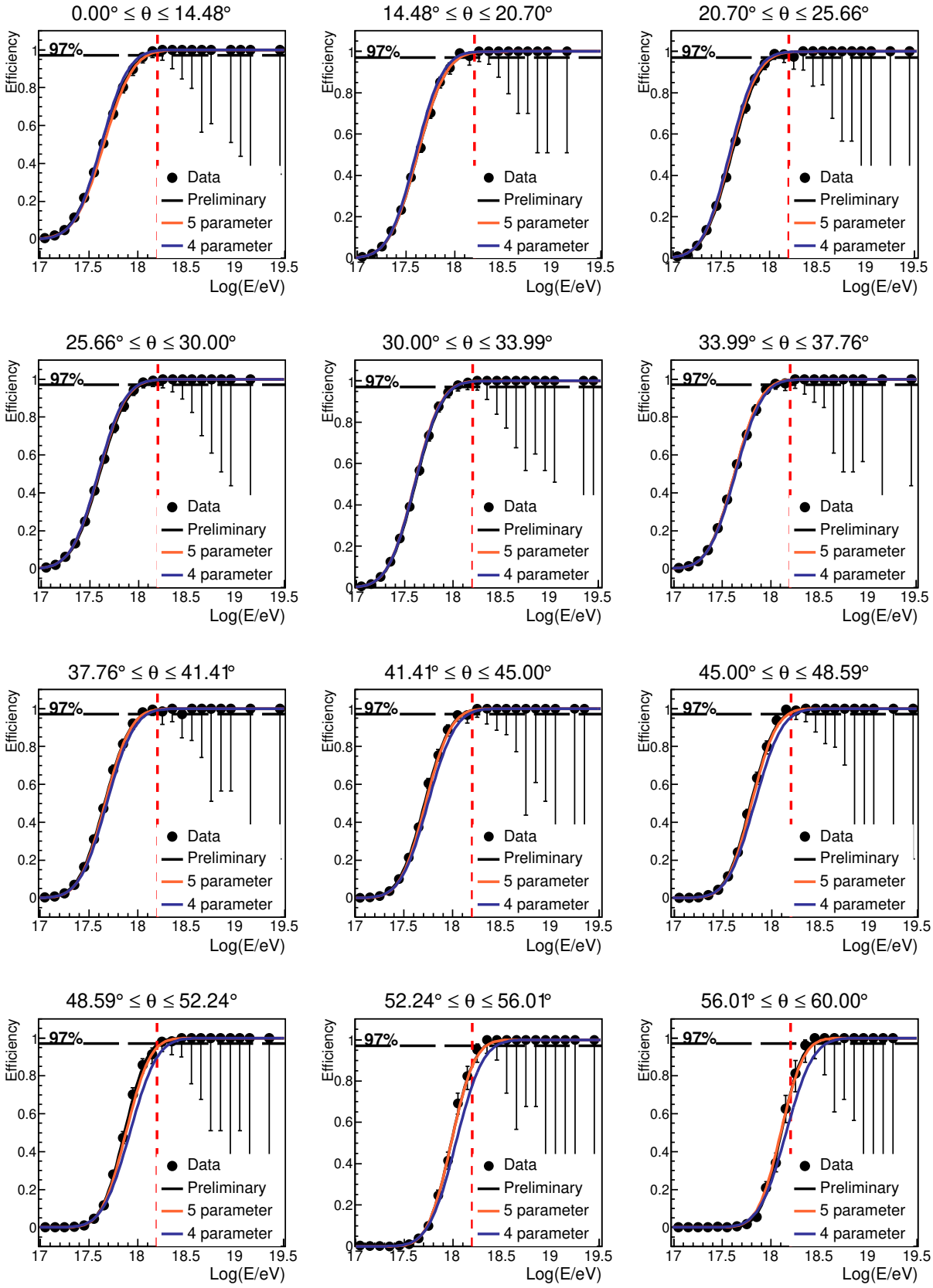
0.00° ≤ θ ≤ 14.48°
14.48° ≤ θ ≤ 20.70°
20.70° ≤ θ ≤ 25.66°
25.66° ≤ θ ≤ 30.00°
30.00° ≤ θ ≤ 33.99°
33.99° ≤ θ ≤ 37.76°
37.76° ≤ θ ≤ 41.41°
41.41° ≤ θ ≤ 45.00°
45.00° ≤ θ ≤ 48.59°
48.59° ≤ θ ≤ 52.24°
52.24° ≤ θ ≤ 56.01°
56.01° ≤ θ ≤ 60.00°
Efficiency
Log(E/eV)
97%
Data
Preliminary
5 parameter
4 parameter

Figure 10:

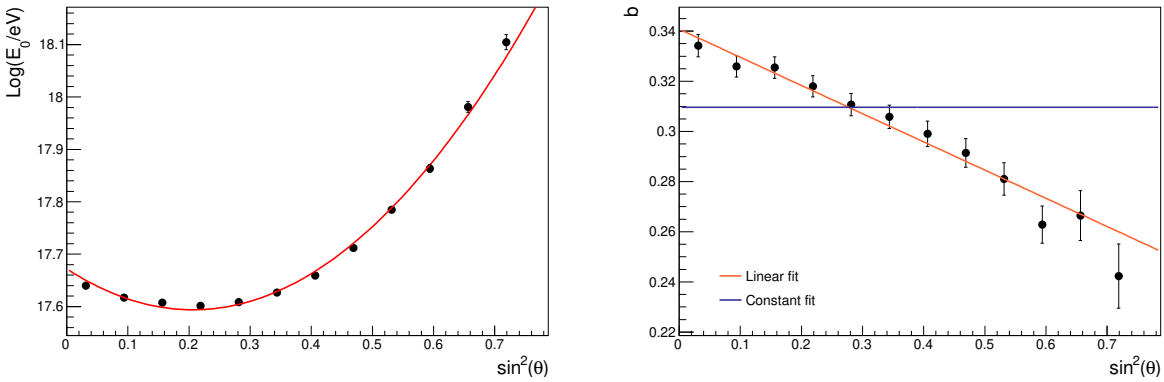

Figure 11:

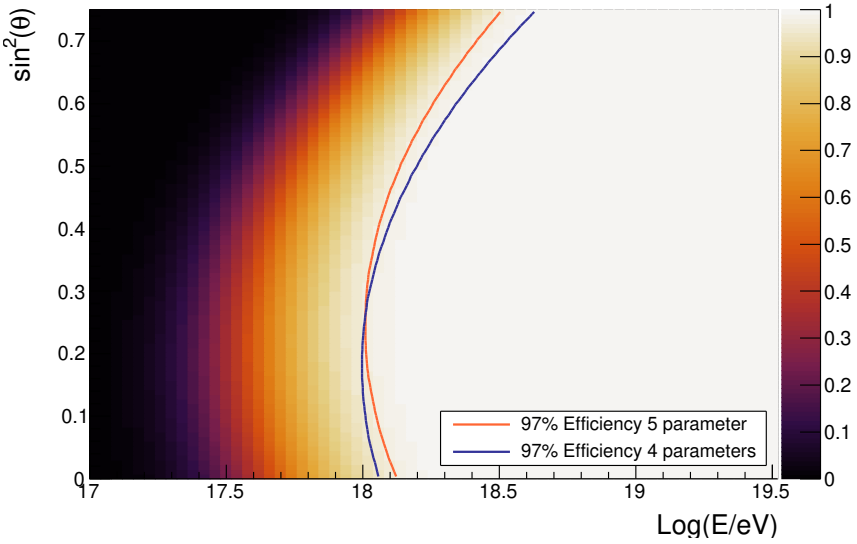

Figure 12:

References