The Giant Radio Array for Neutrino Detection

Absolutely Preliminar Estimation of GP300 effective area below 100 PeV

GRAND Collaboration Workshop
Dunhuang, April 24th-27th 2019

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Absolutely preliminar demolition
(shown for comparison)

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GRANDproto300 science case

- Requires to achieve self-triggering radio detection at 3 PeV of inclined showers

  not an easy task:
  - Inclined showers develop far away!

Simulation Ingredients

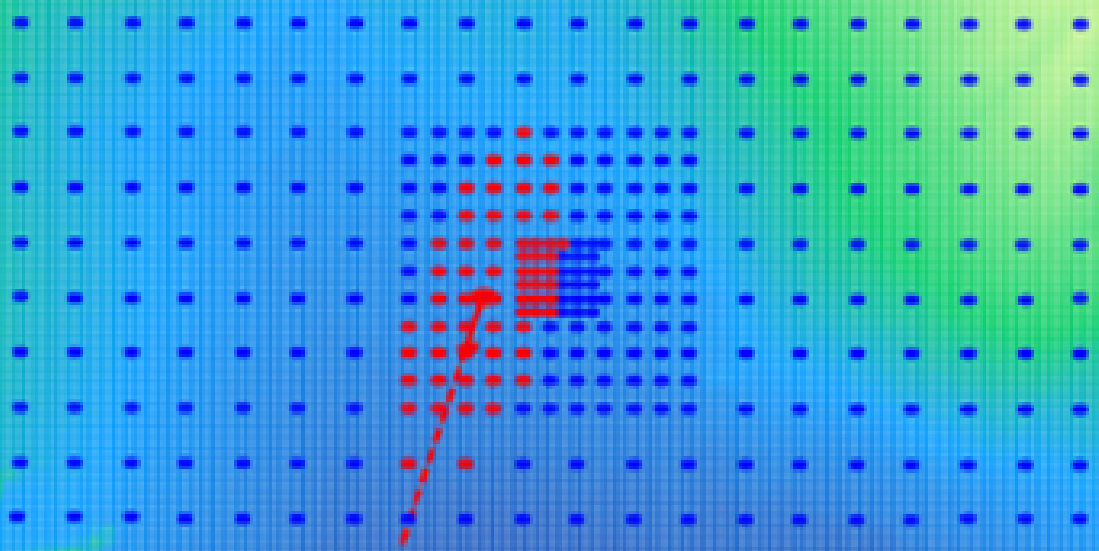
- Candidate event sampler
  hacked on RETRO (V. Niess) to include the topography
  95-130º incoming angle, 10 PeV to 100 PeV
  Conservative Iron Xmax estimation
  3º cone selection + distance cut

- 10k ZHAireS sims (V. Decoene)

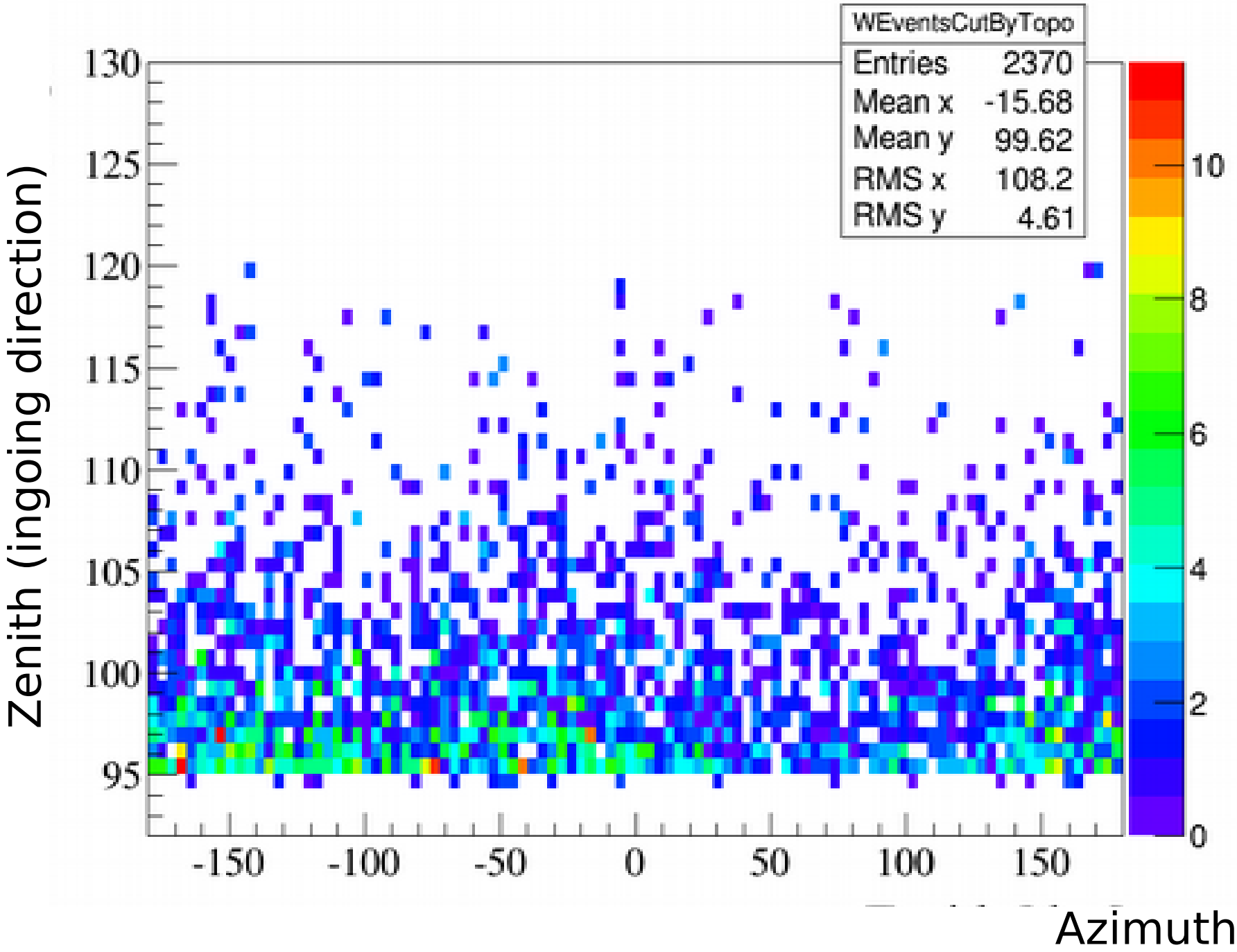
- Antenna response (O. Martineau)
  Actual response without noise, but filtered
  Peak to peak trigger treshold: 30/50/75 uV

GRANDproto300 layout (C.Timmermans)

- 312 Antenas in staggered array
  - 10 x 20 Ant. in 1km grid – 200 km^2
  - 11 x 11 Ant. in 500m infill - 30 km^2
  - 6 x 6 Ant- in 250m dense infill – 2,25 km^2



Event Candidates



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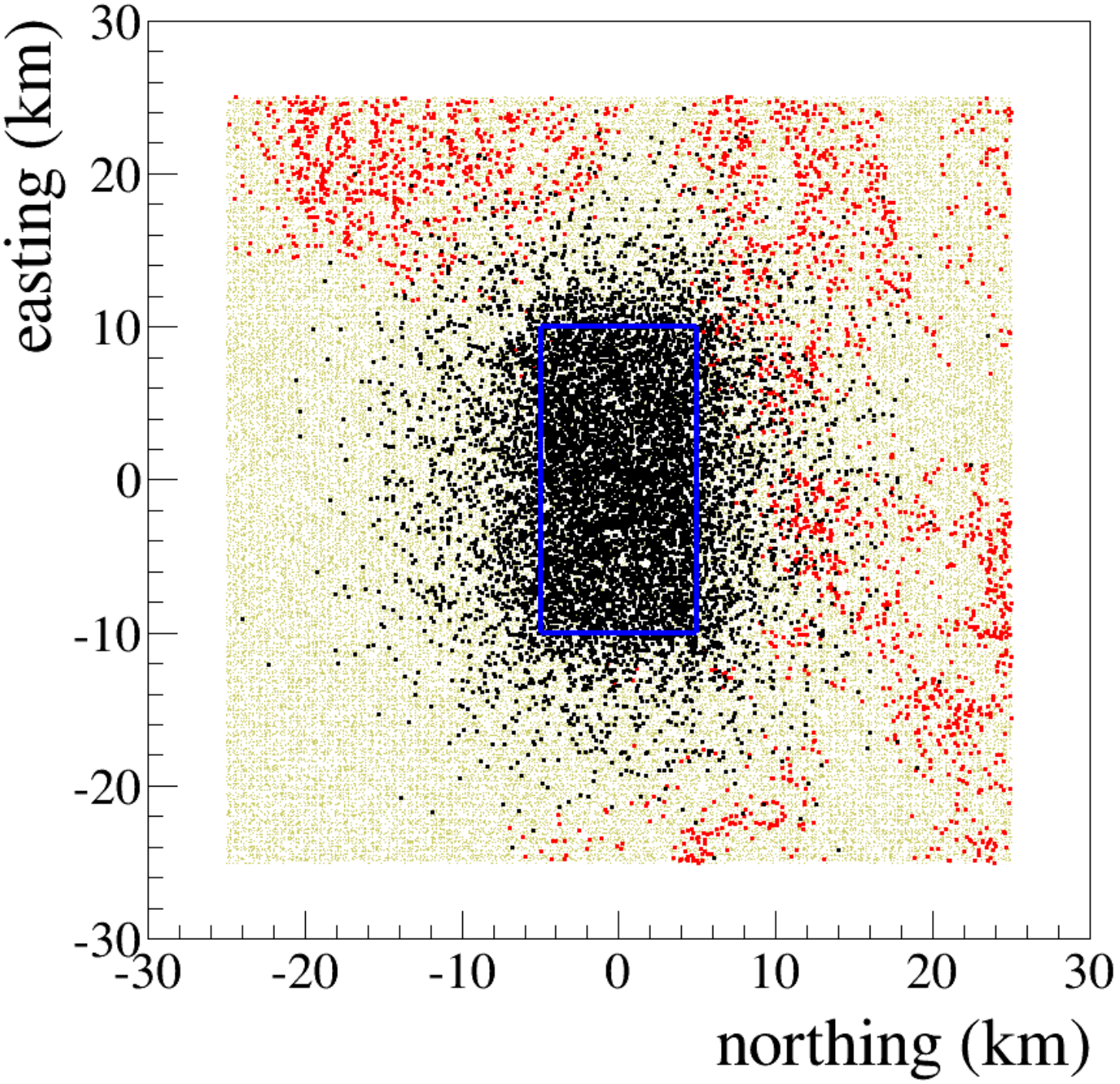

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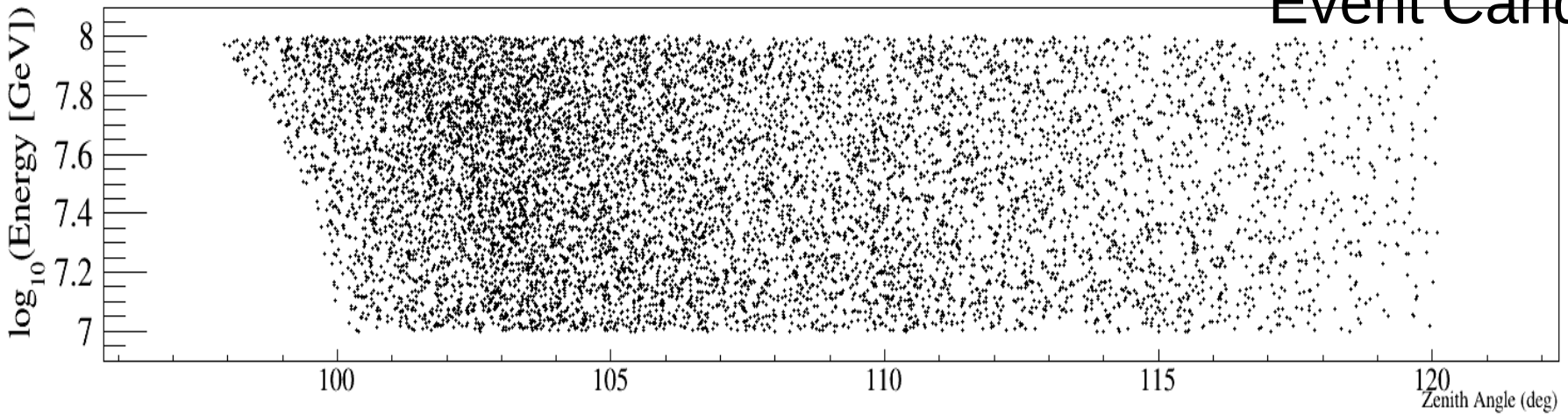

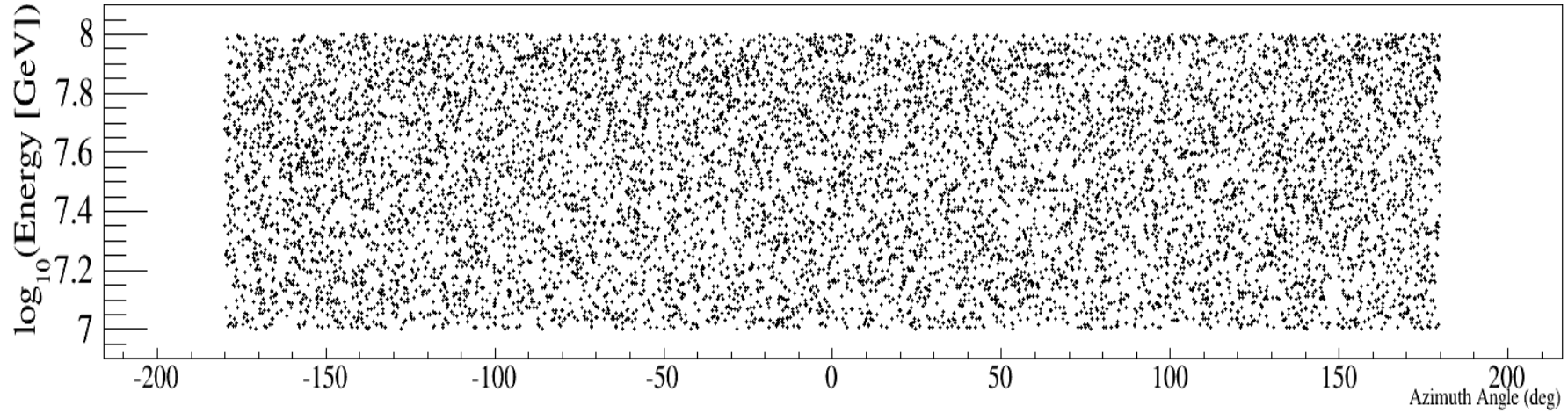

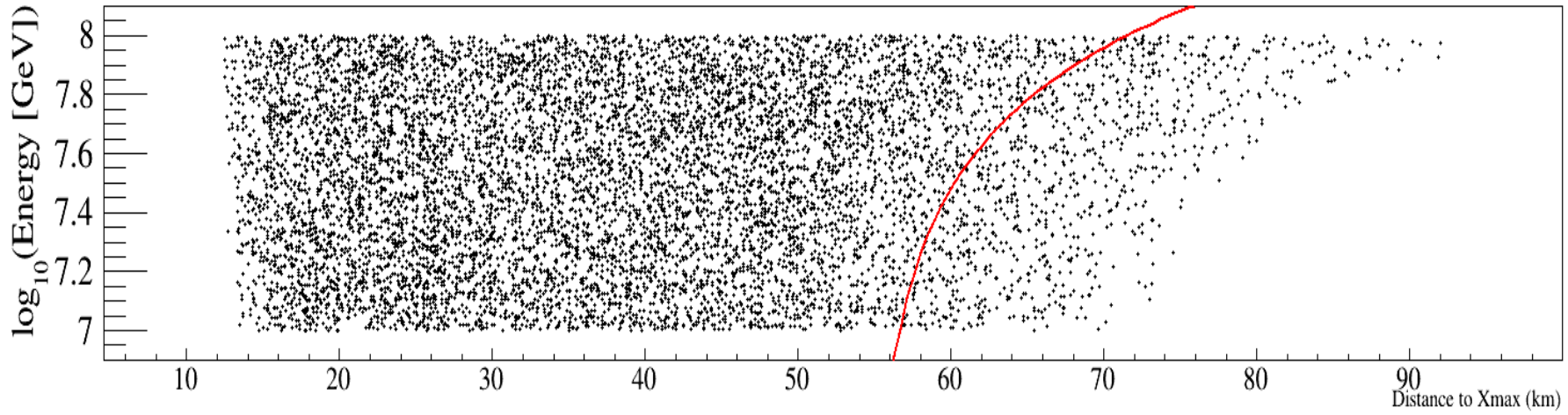

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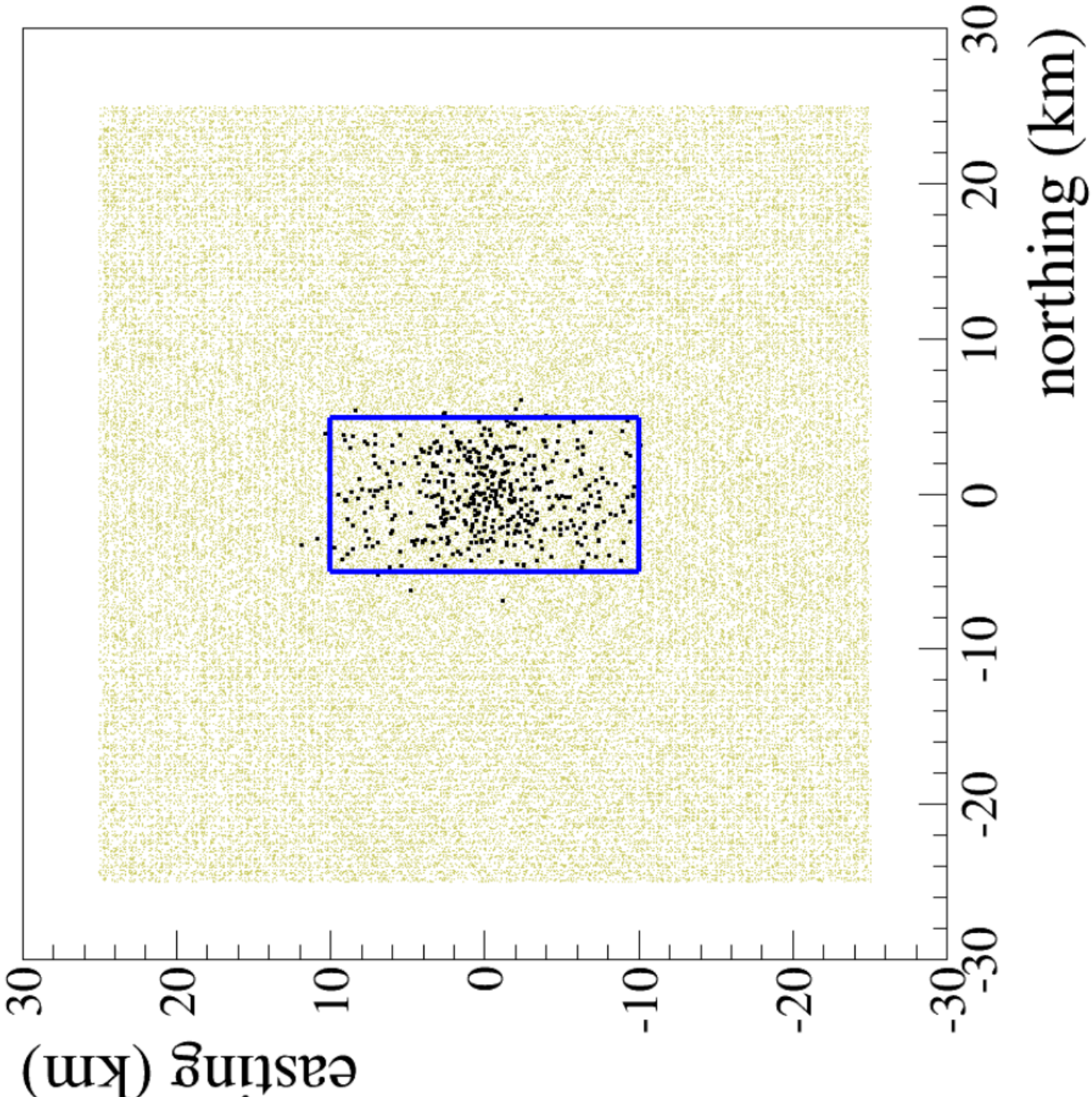
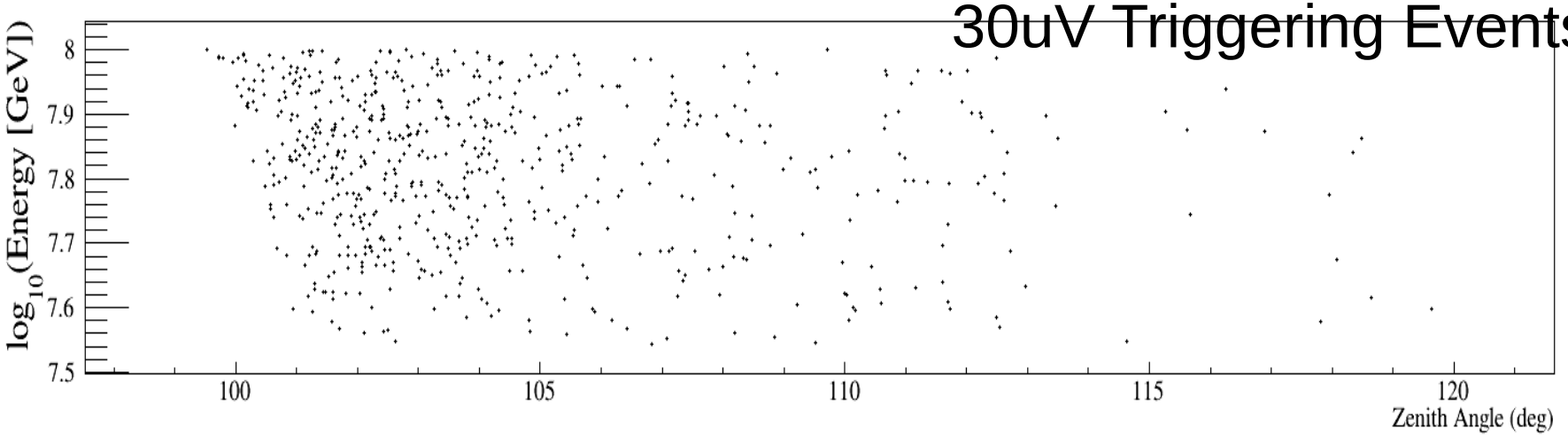
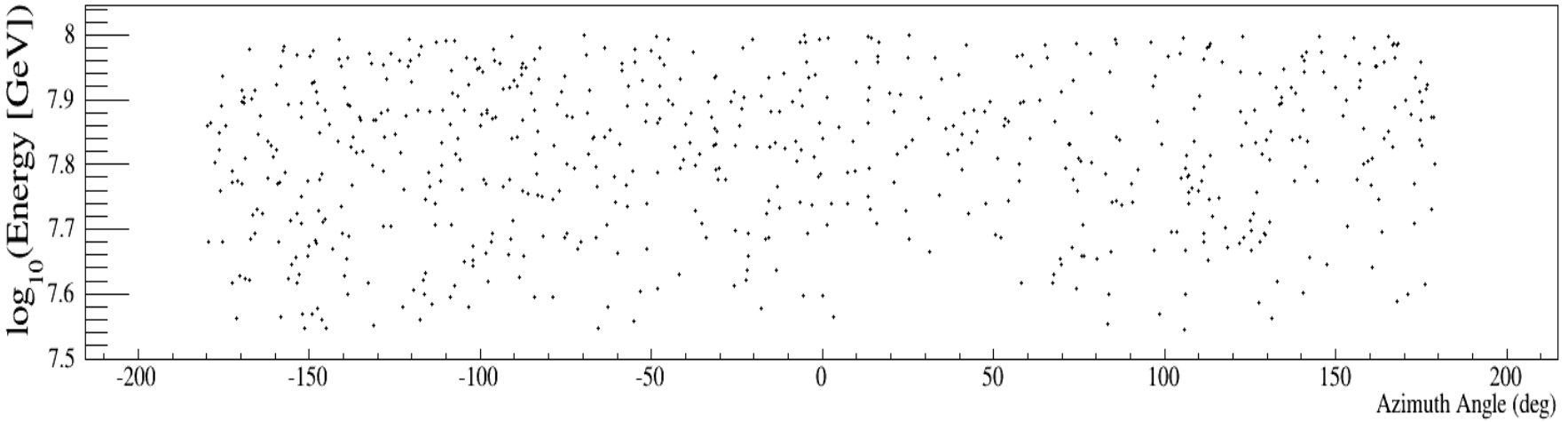
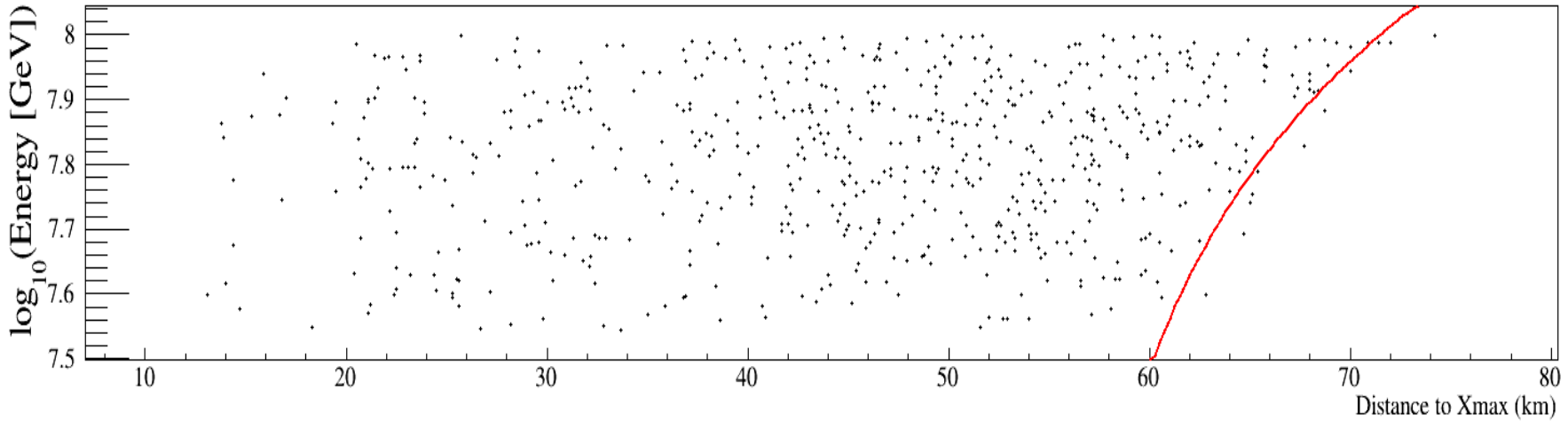
30uV Triggering Events



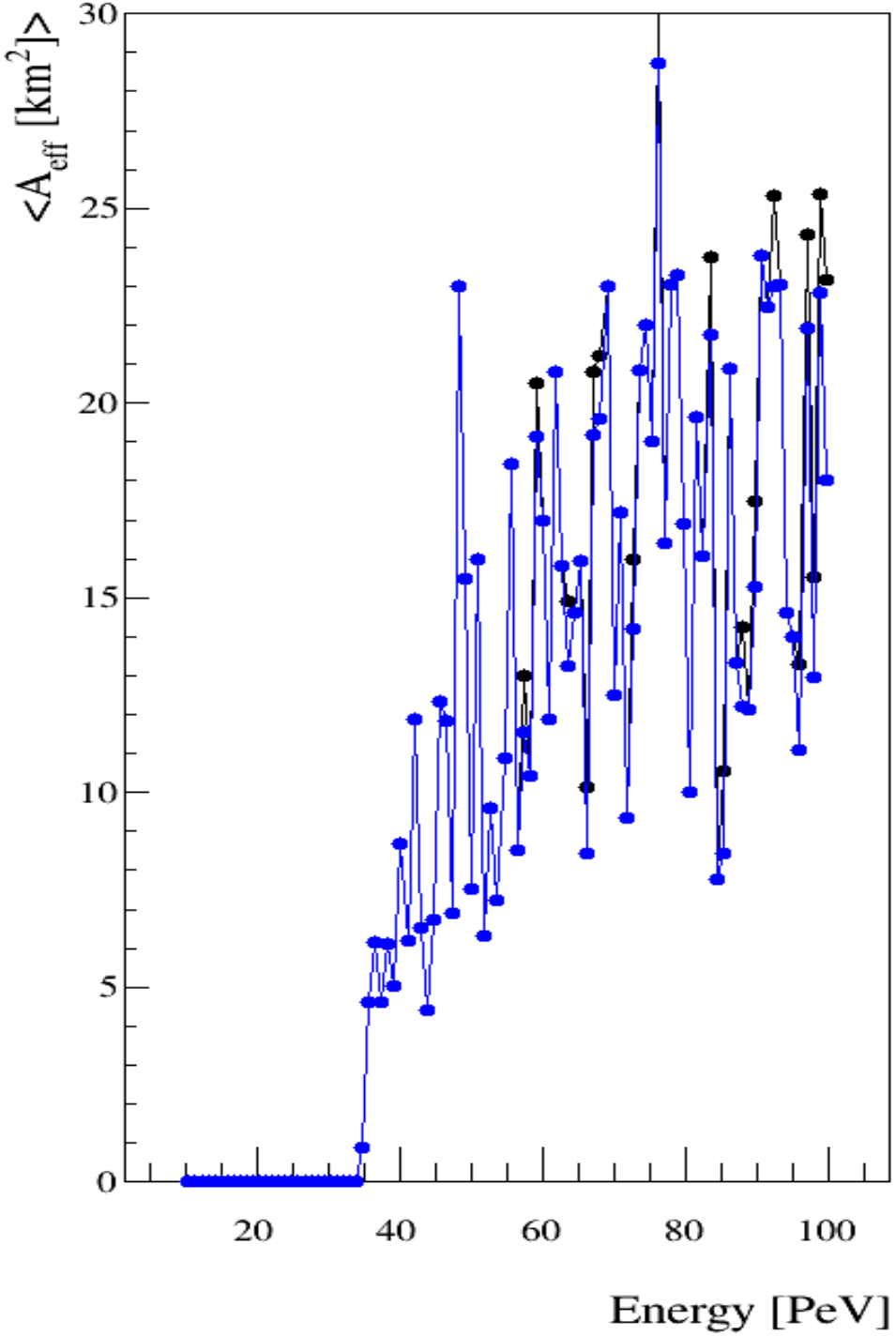
30uV Triggering Events

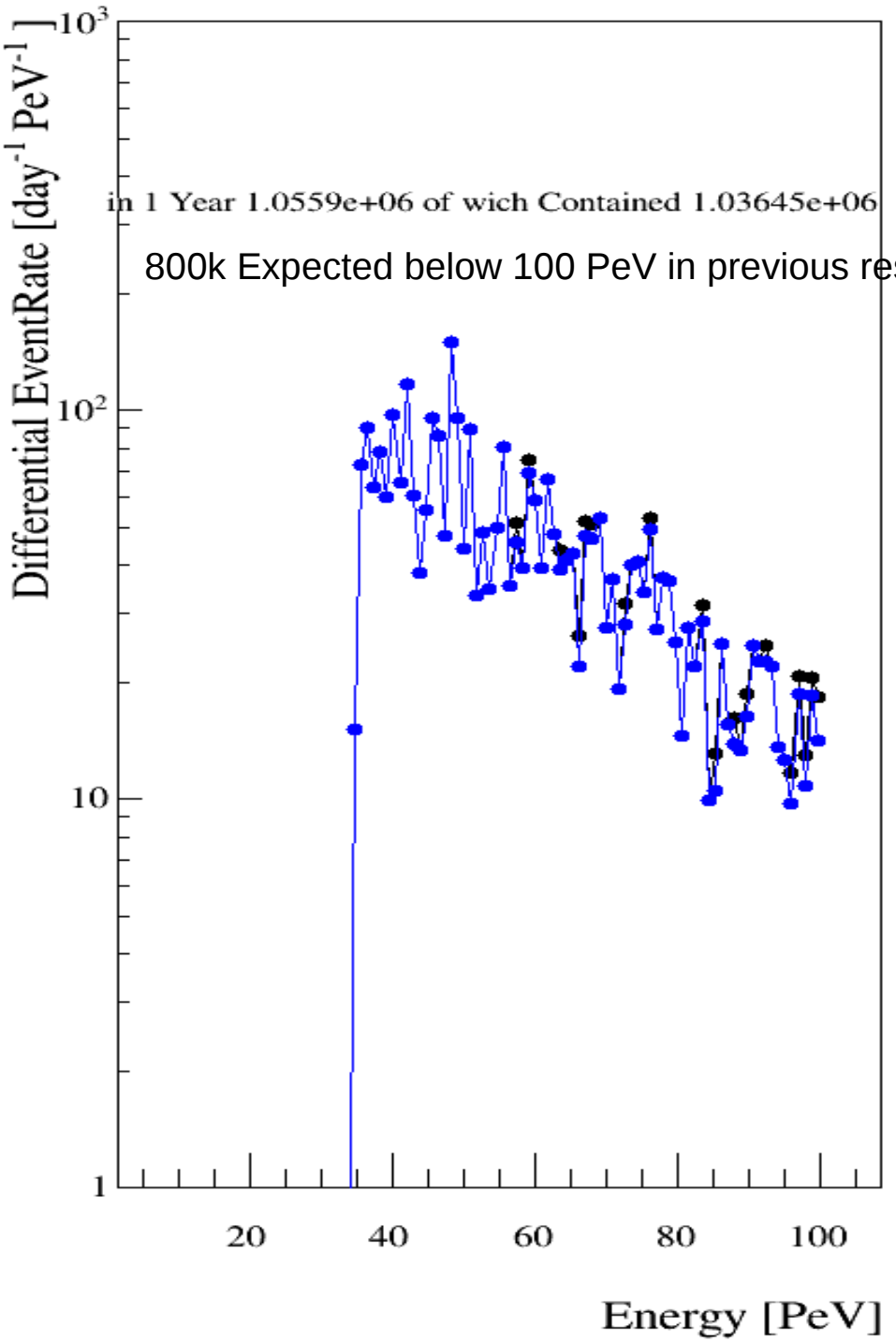






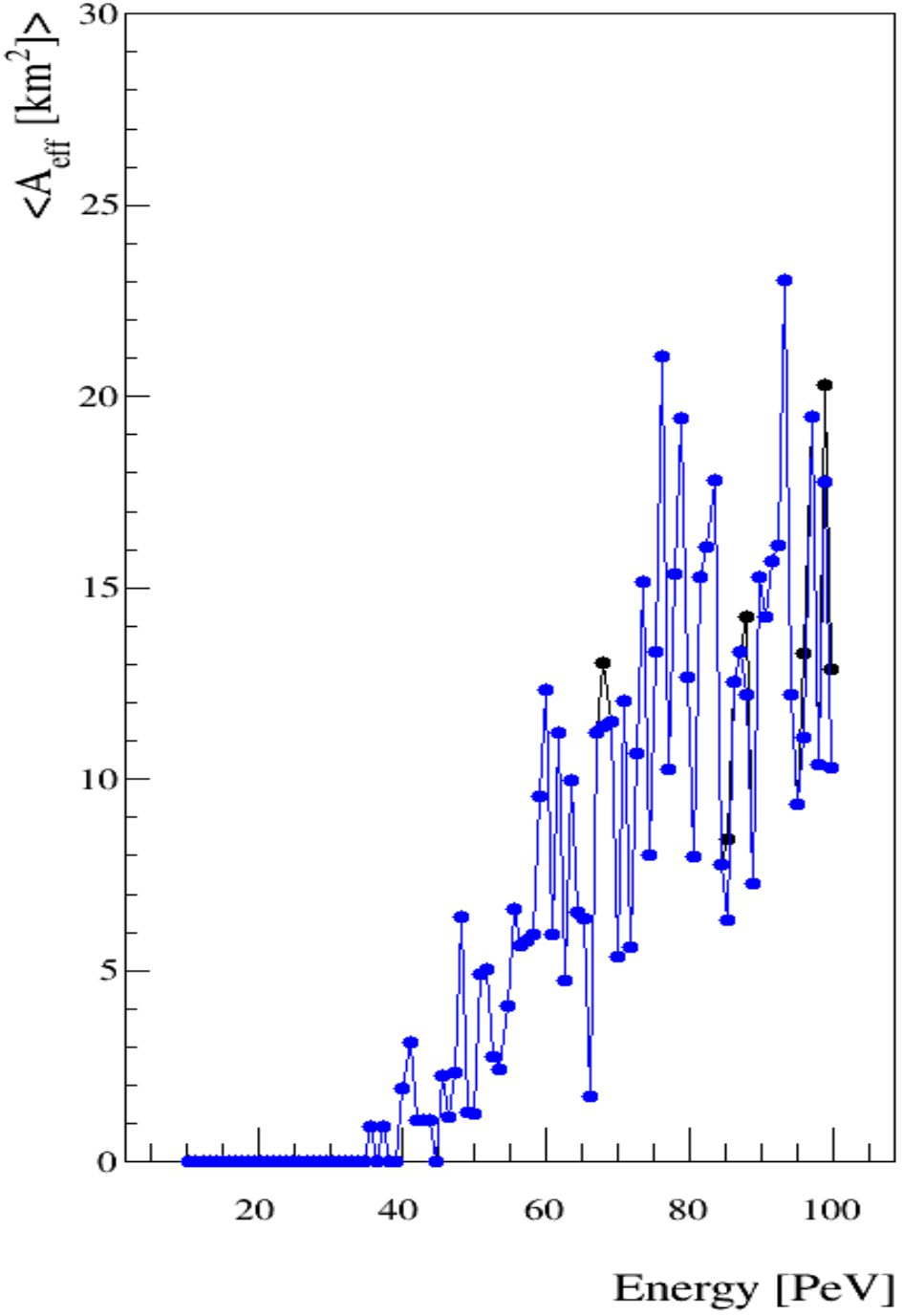
30uV Triggering Events

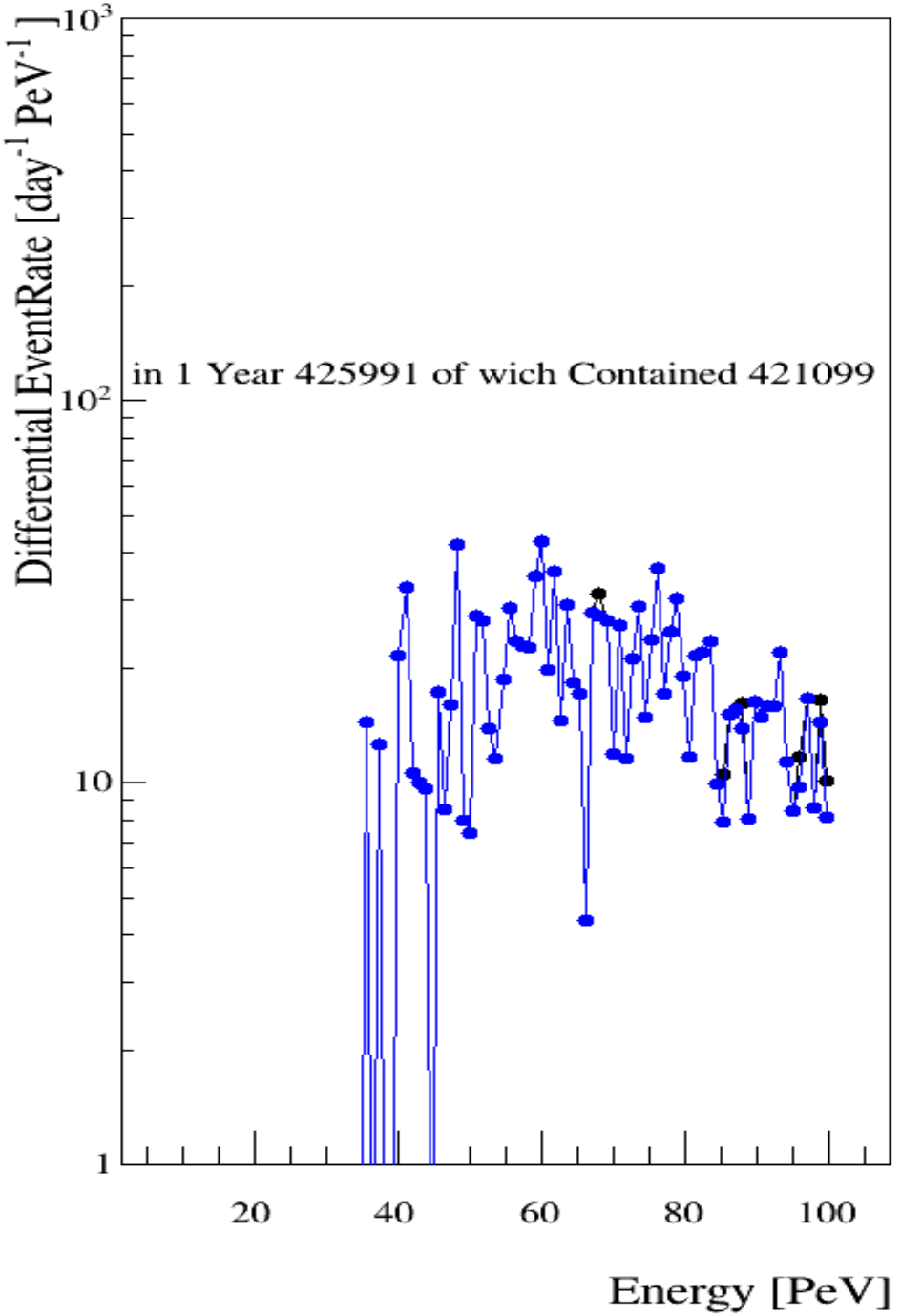




Using TALE spectrum, https://arxiv.org/pdf/1803.01288.pdf

50uV Triggering Events





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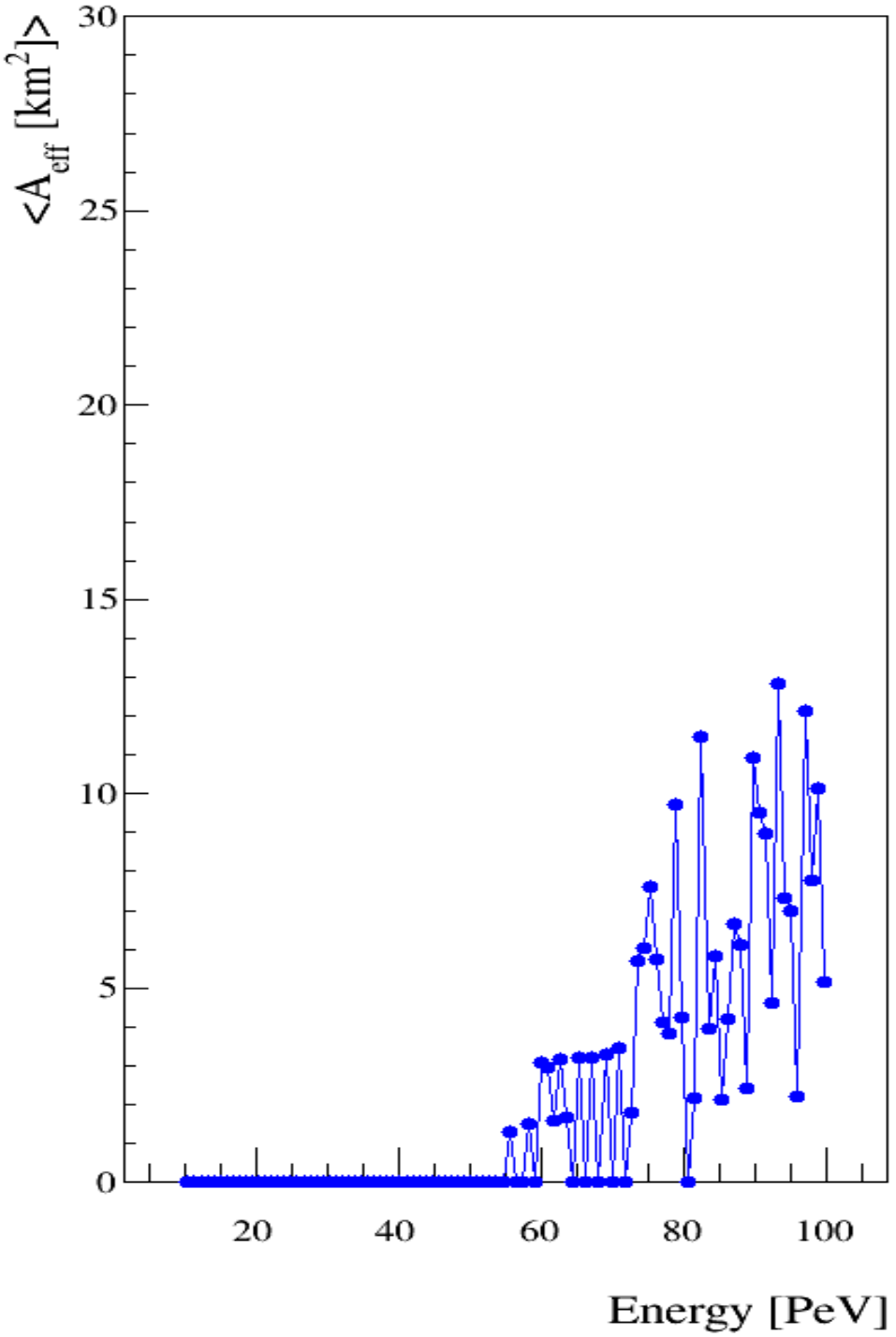
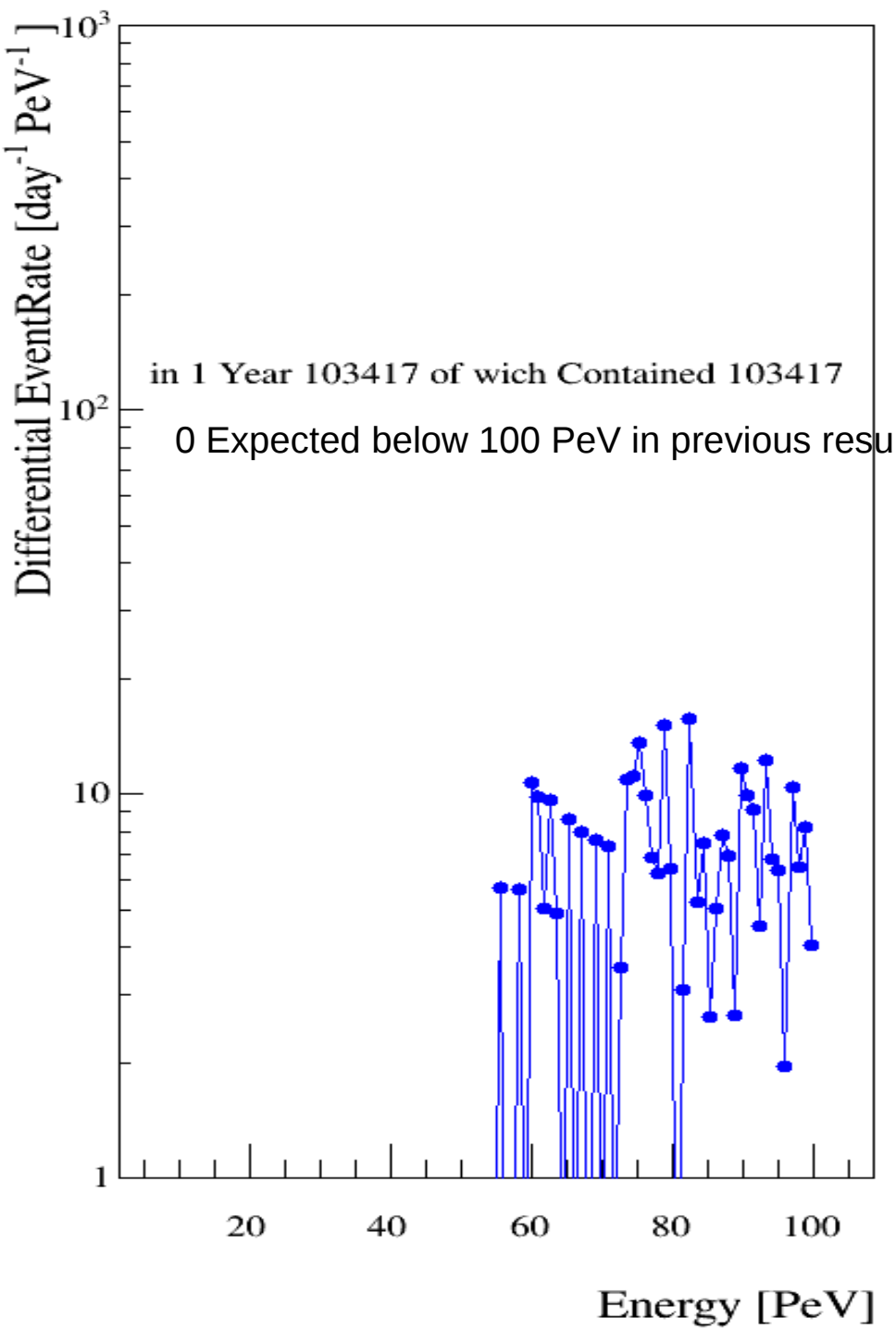
75uV Triggering Events





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Conclusions

- Preliminar results. More statistics, better cuts
- Go down to 92º (2 deg above the horizontal)
- Compatible or better than previous results
- Room for improvement/tunning the layout
- Possible to trigger, but making physics at 3 PeV will be very difficult.