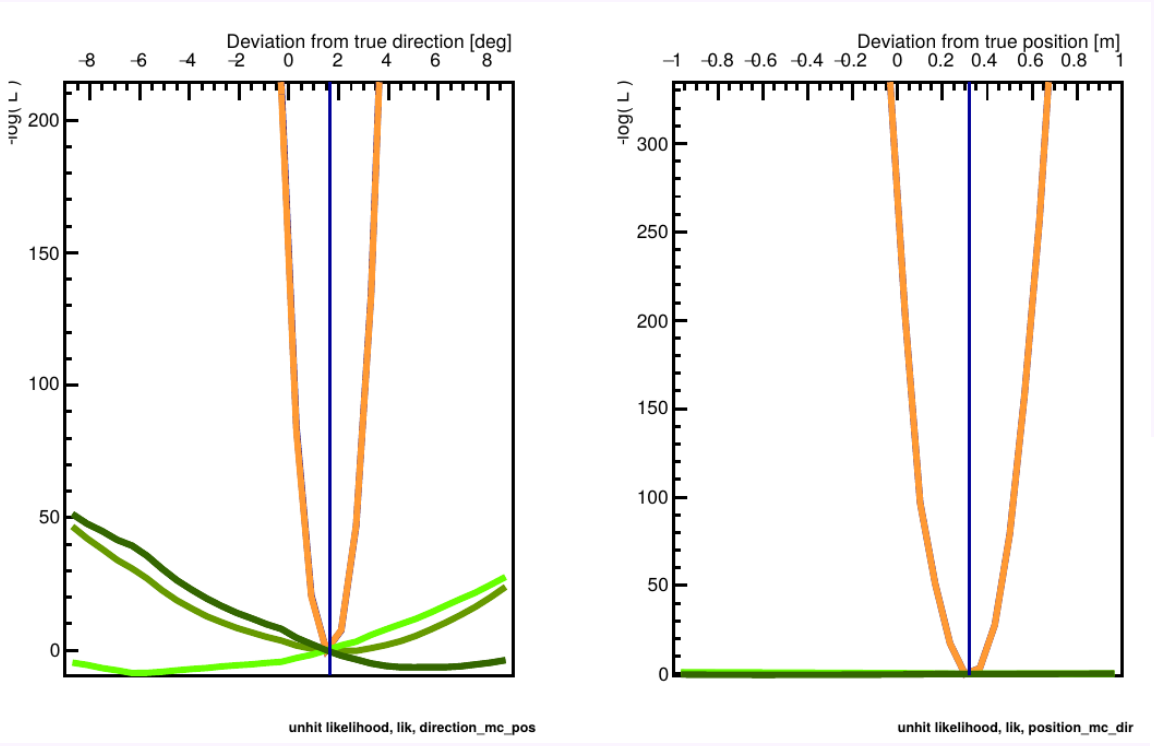
Likelihood performance on MCv5

And simpler likelihood definition

Jordan Seneca

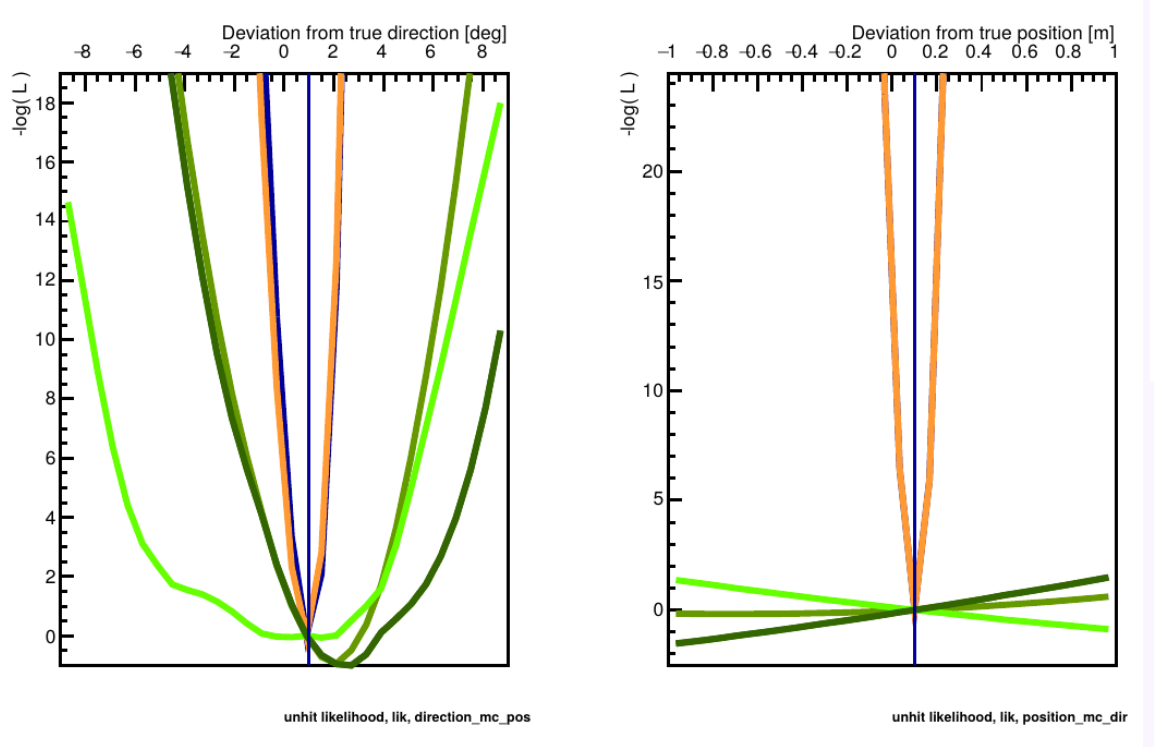
June 3rd 2020, OCCASION

Toy MC (single track)



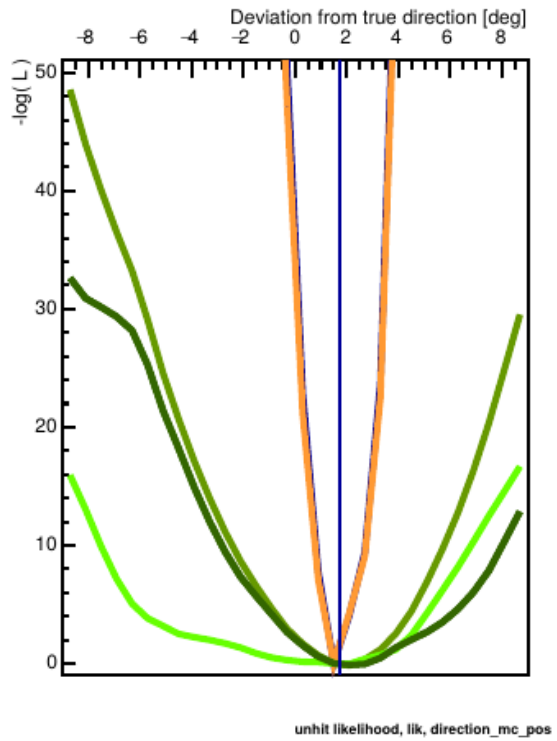
Shower max sampling

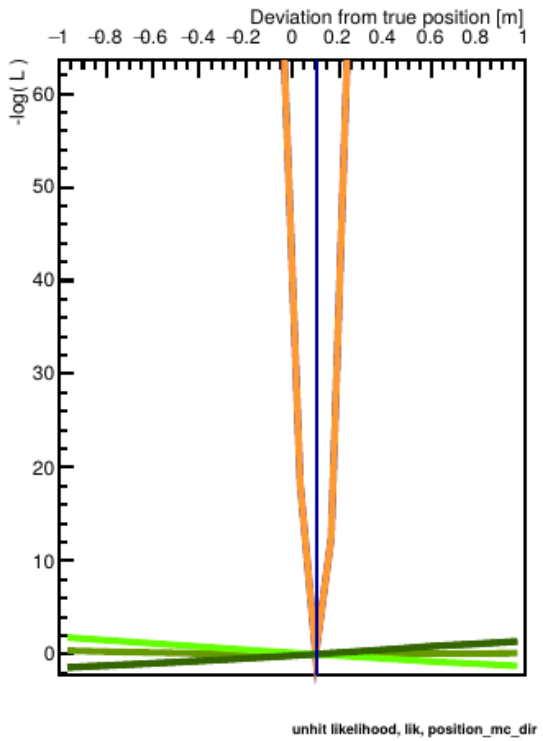
Improvement!



20 elongation steps sampling

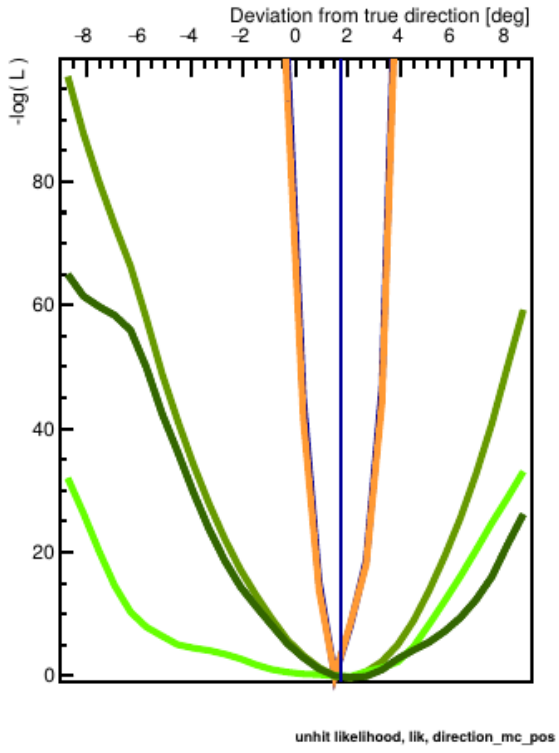
Toy MC (single track)

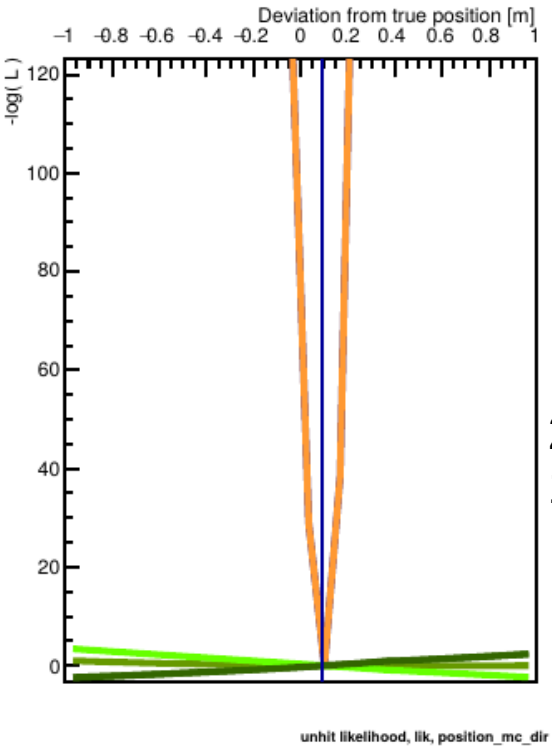




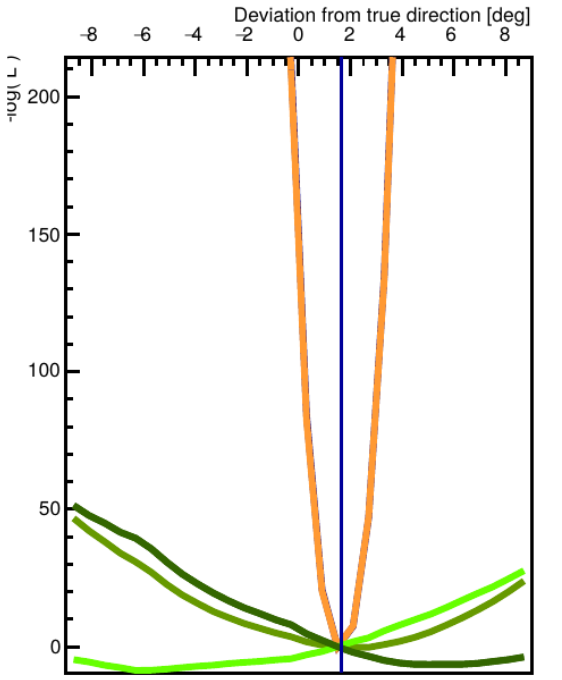
20 elongation steps sampling

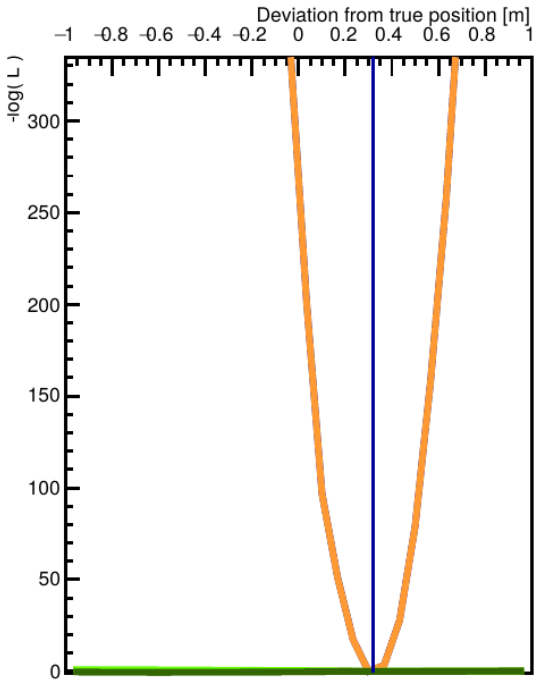
Negligible improvement in position...





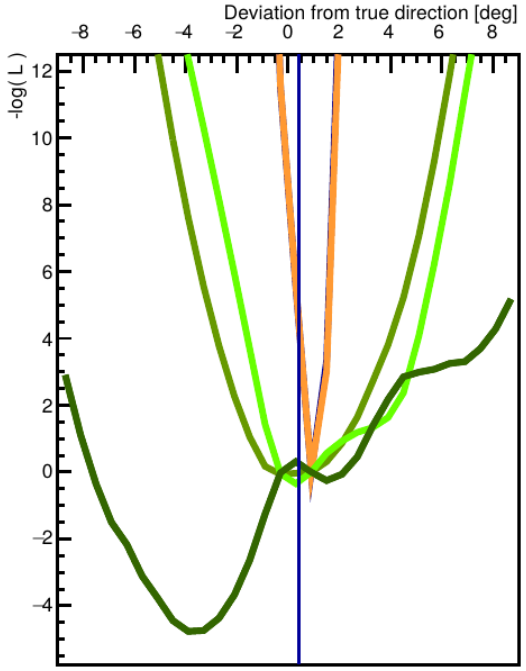
20 elongation steps sampling + 1% contribution at vertex

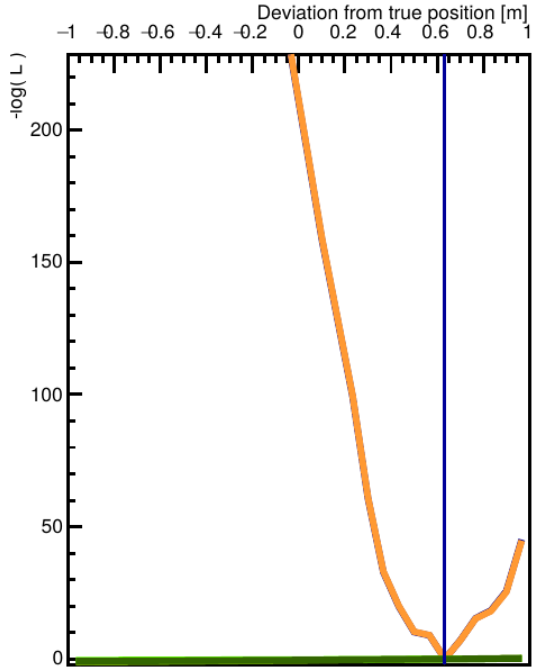




Toy MC (single track)

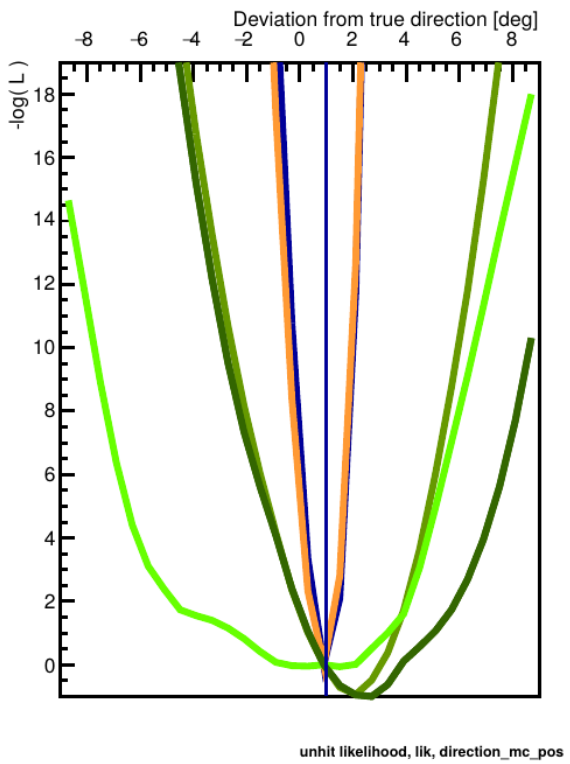
Shower max sampling

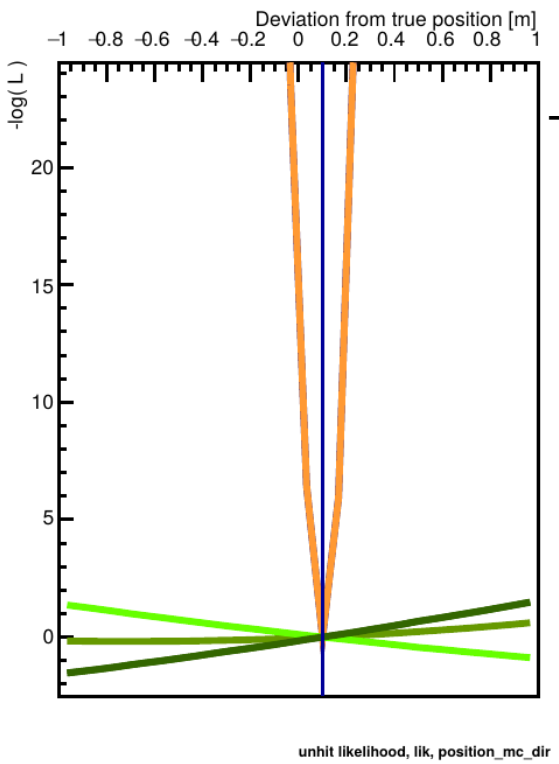




MCv5

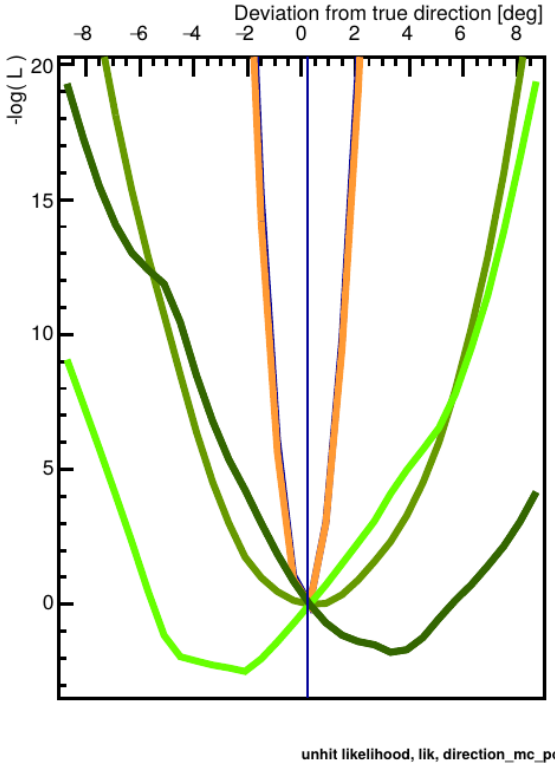
Toy MC seems more stable. What is the performance for higher elongation steps?

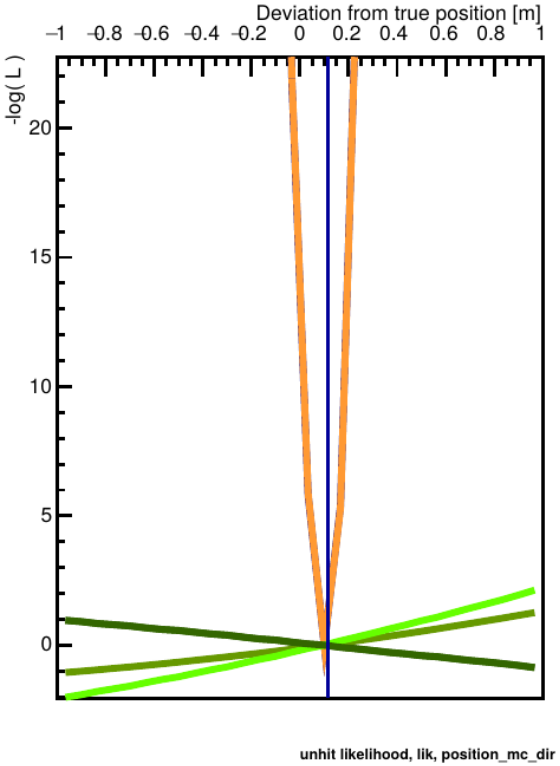




Toy MC (single track)

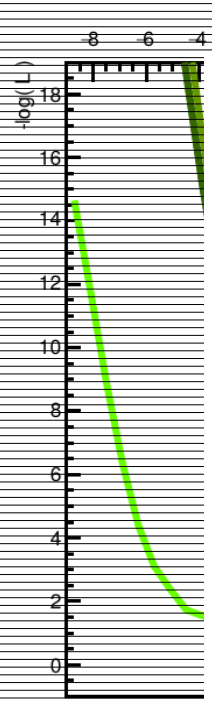
20 elongation steps sampling

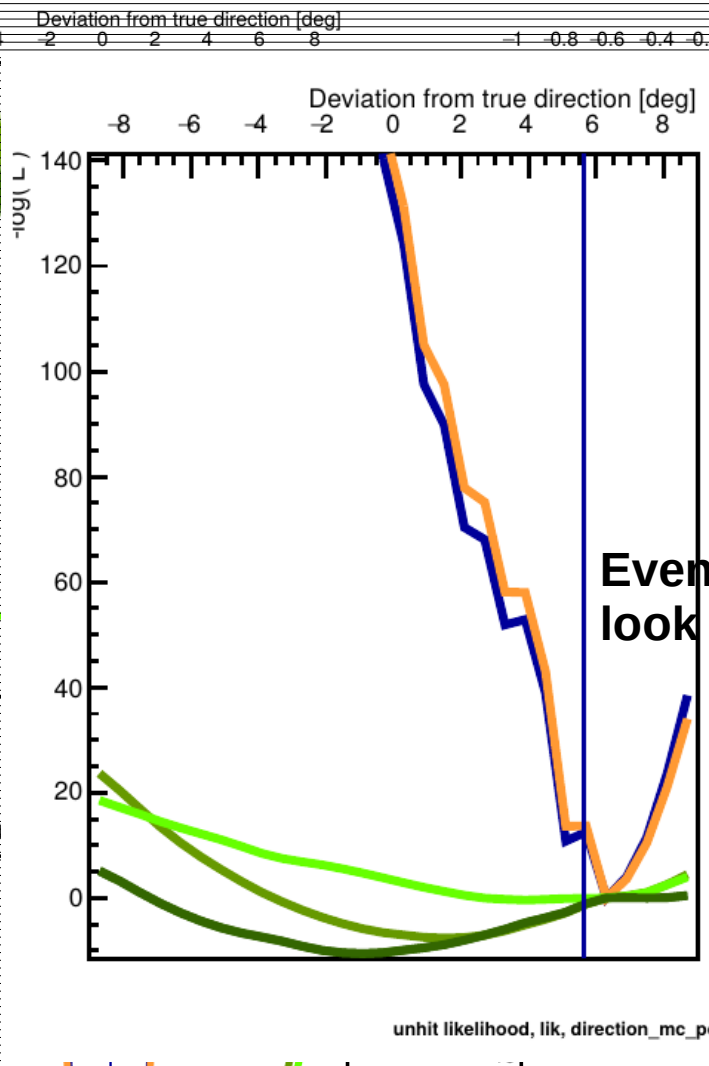


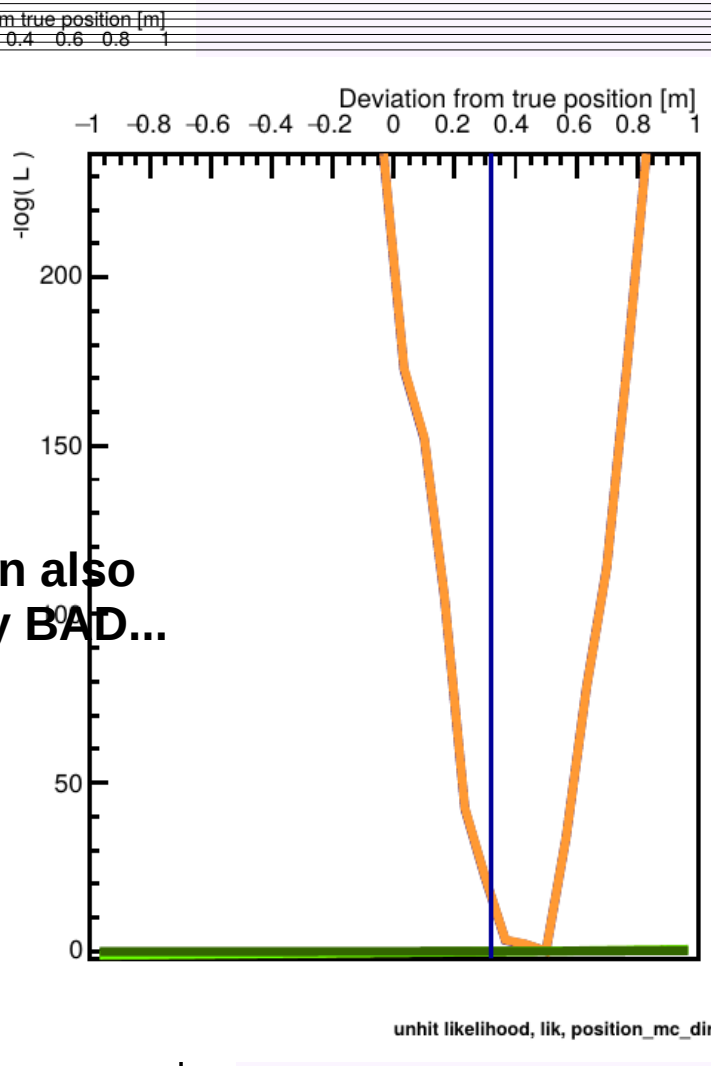


MCv5

Seems to work!
This seems to be a lucky event → Reconstruct sample







Events can also look really BAD...

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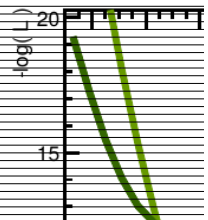

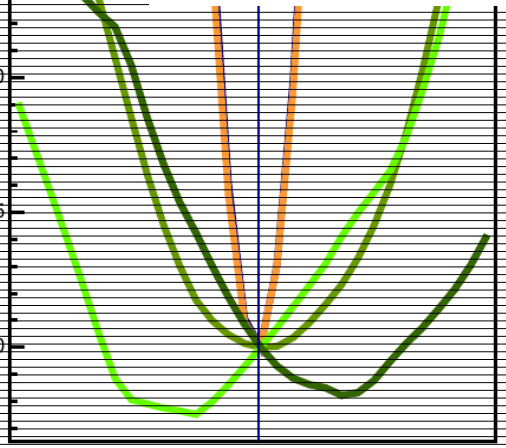

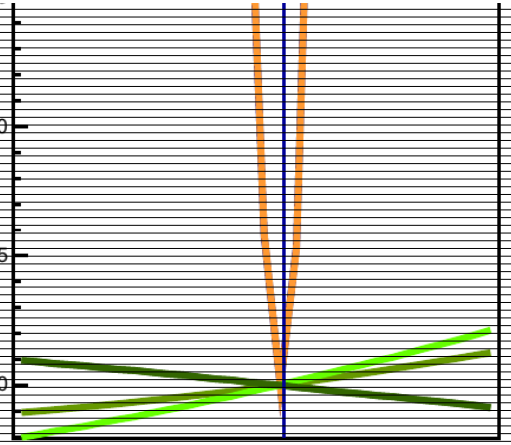

Seems to work!
This seems to be a lucky event → Reconstruct sample

Hit probability + first hit probability encapsulated as:

$$\sum_{i}^{\text{PMT}} \log(n(\Delta t)) + \sum_{i}^{\text{PMT}} -N(\Delta t)$$

2 N_{total} calls are taken out → ~3% speed improvement

```
-----------------------------------------
 timer   ncalls    total   time/call
-----------------------------------------
 eval1   162       1441.15 8.89596
 eval2   162       1393.54 8.60209
 evalpdf 6773520   25.3002 3.73516e-06
 evalpne 417385560 700.292 1.67781e-06
 none    1         51.694  51.694
-----------------------------------------
```

Short derivation in document on Indico