

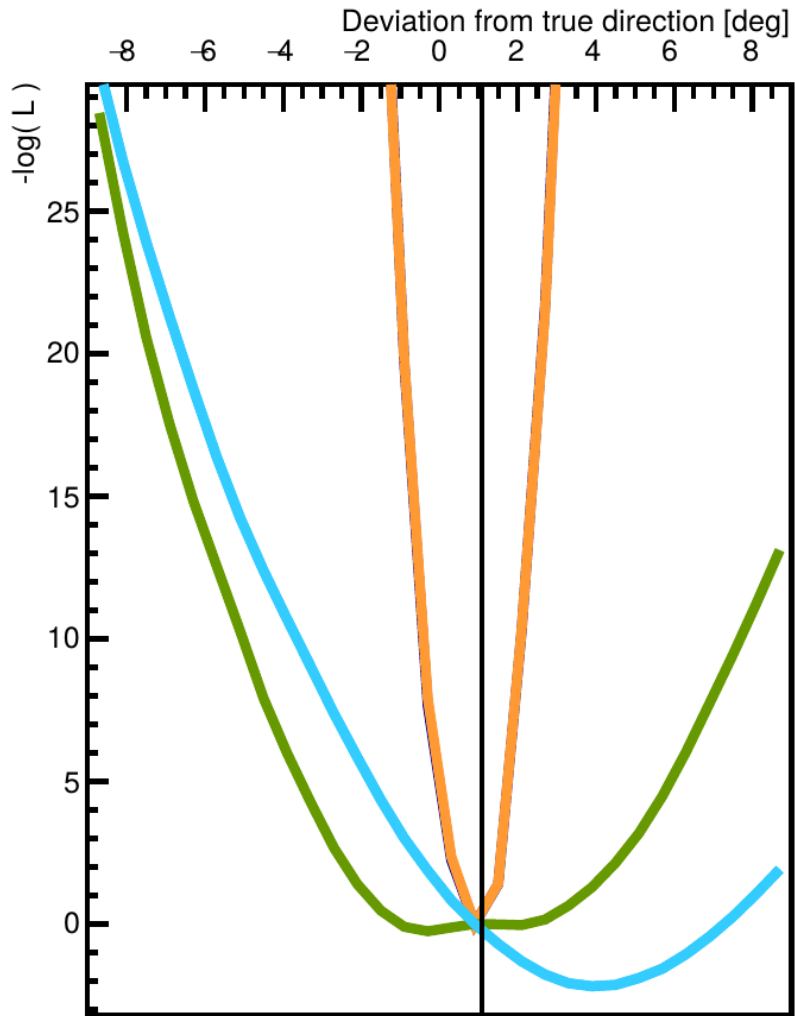
# Shower max centered likelihoods

## And elongation studies

Jordan Seneca  
January 7<sup>th</sup> 2021, Group Meeting

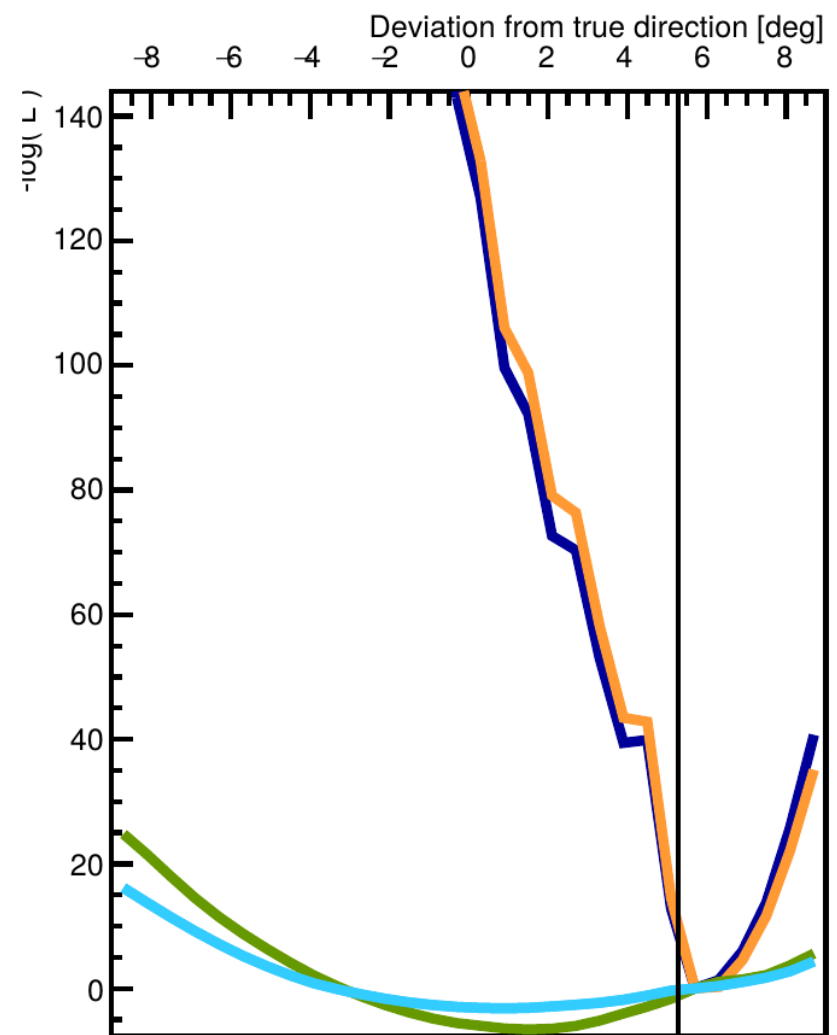


**Problem #1:**  
**Some locations in detector give worse performance**  
**(both well-contained)**



**“Good” event 1855**

Jordan Seneca

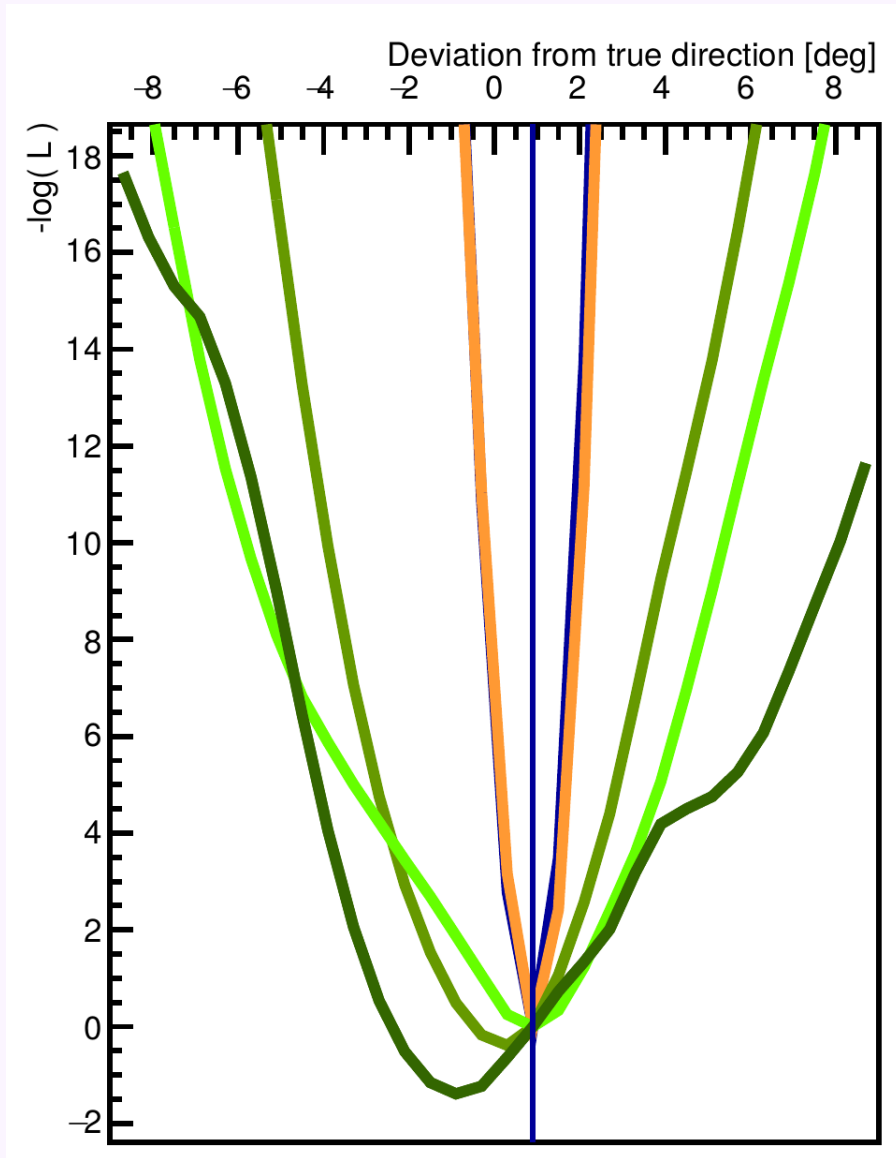


**“Bad” event 1904**

# Problem #1:

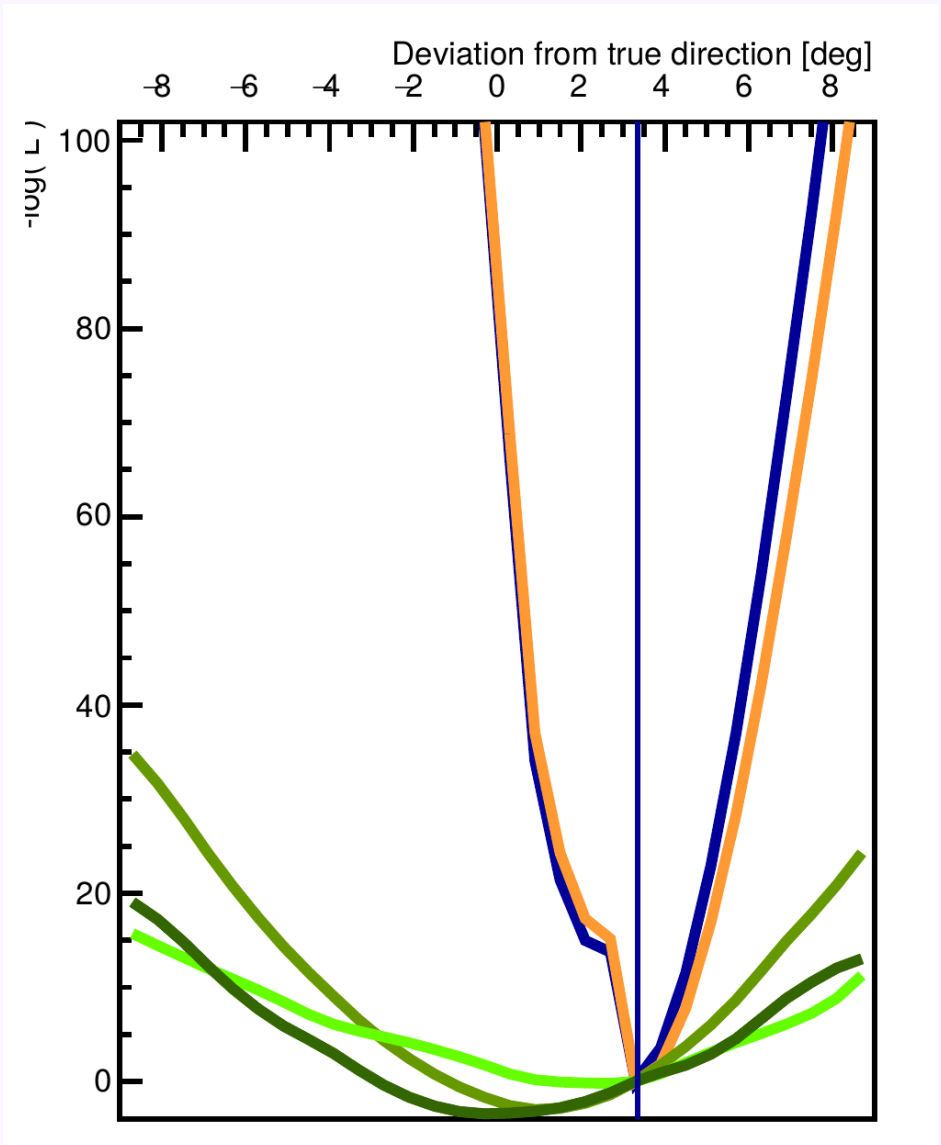
Some locations in detector give worse performance

I re-simulate the events with toy mc and get a very similar performance:



“Good” event 1855 re-generated

Jordan Seneca

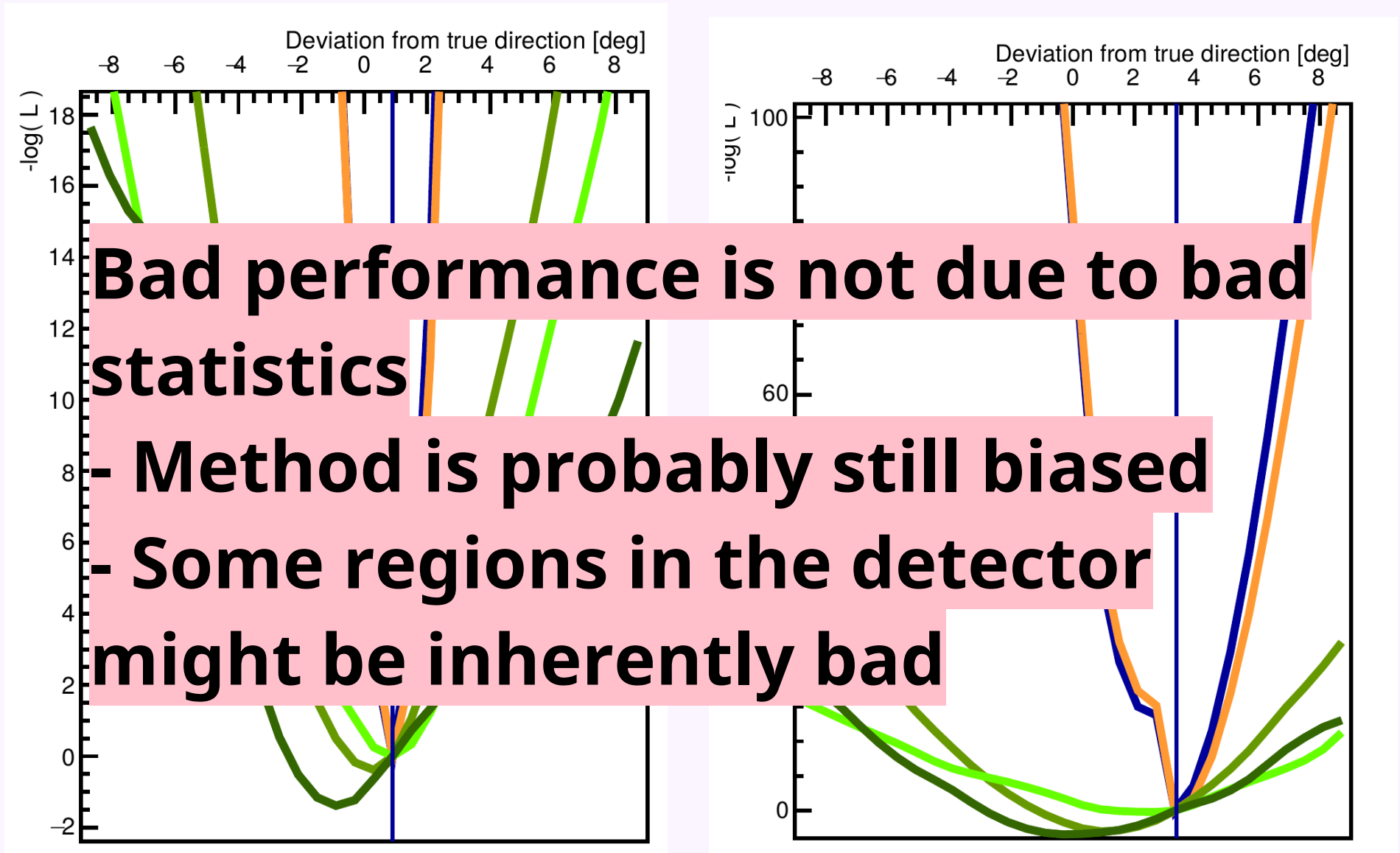


“Bad” event 1904 re-generated

## Problem #1:

Some locations in detector give worse performance

I re-simulate the events with toy mc and get a very similar performance:



“Good” event 1855 re-generated

Jordan Seneca

“Bad” event 1904 re-generated

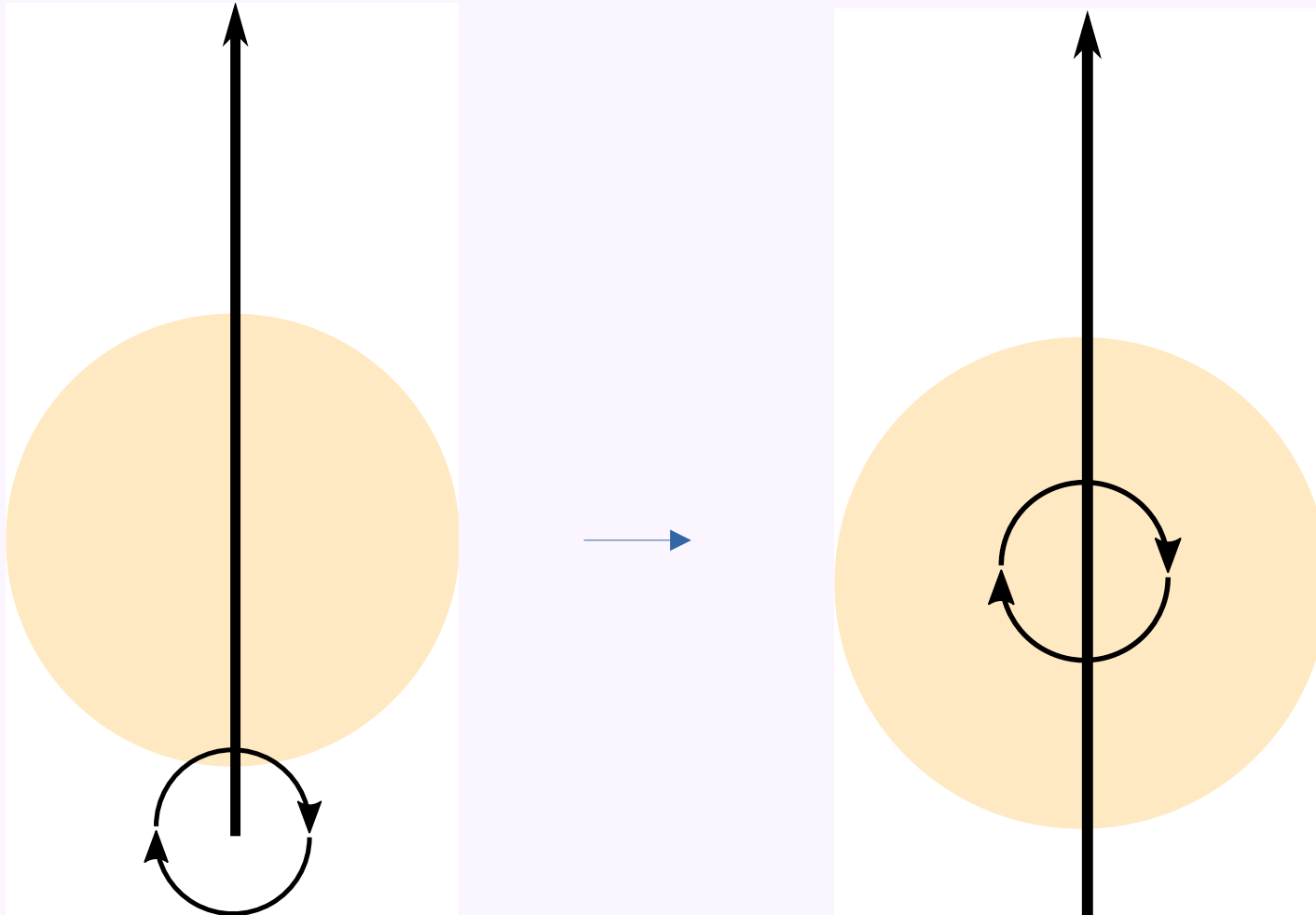
**Problem #2:**  
**Inaccurate nuisance parameters (position, energy)**  
**greatly affect the performance**

(Sorry no fancy plot for this)

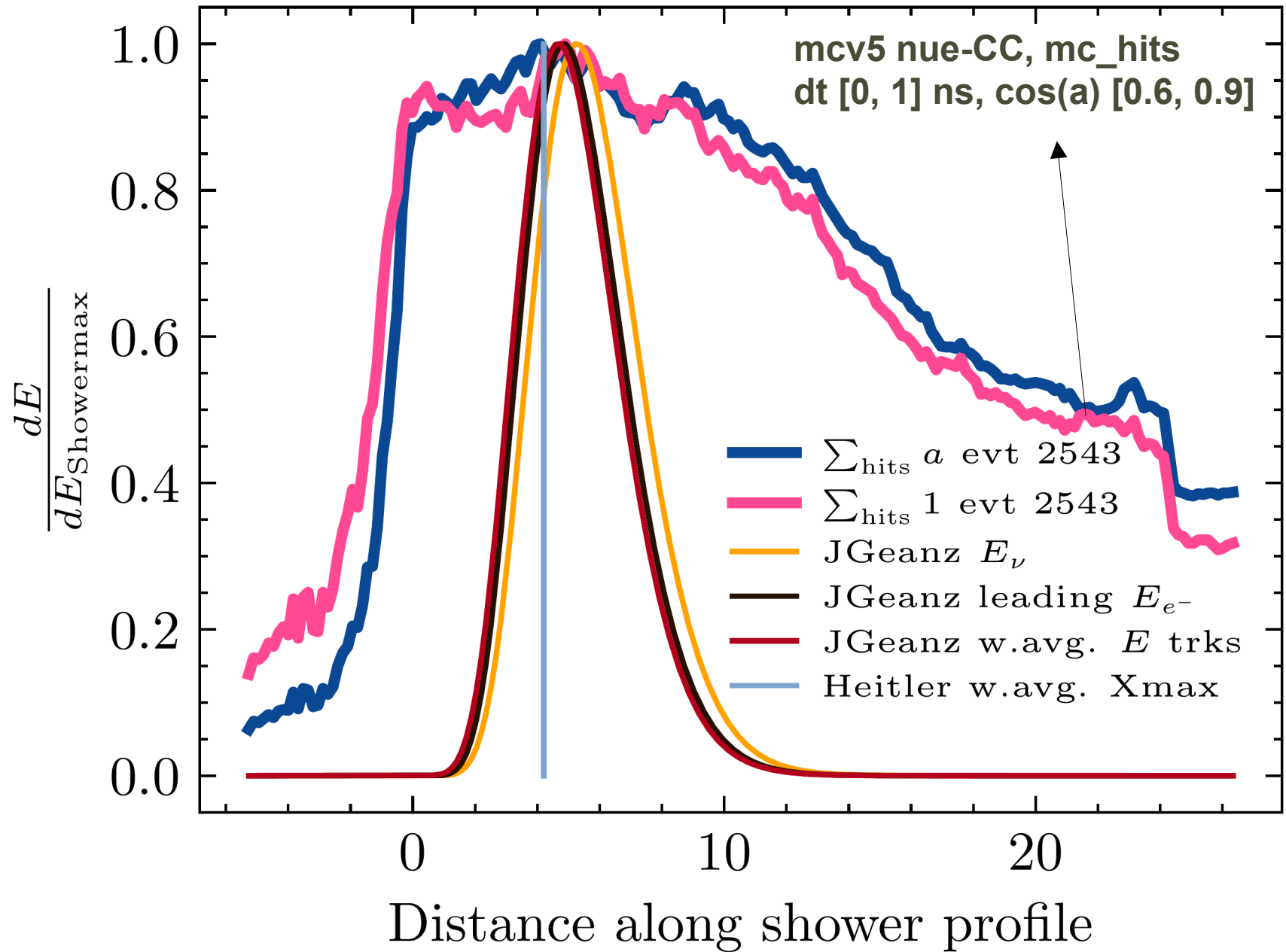
**Fitted information for position and energy**

→ **typically deteriorates best fit direction by several degrees.**

**Shower<sub>max</sub> treatment:**  
**Reconstruct from shower<sub>max</sub> instead of vertex.**



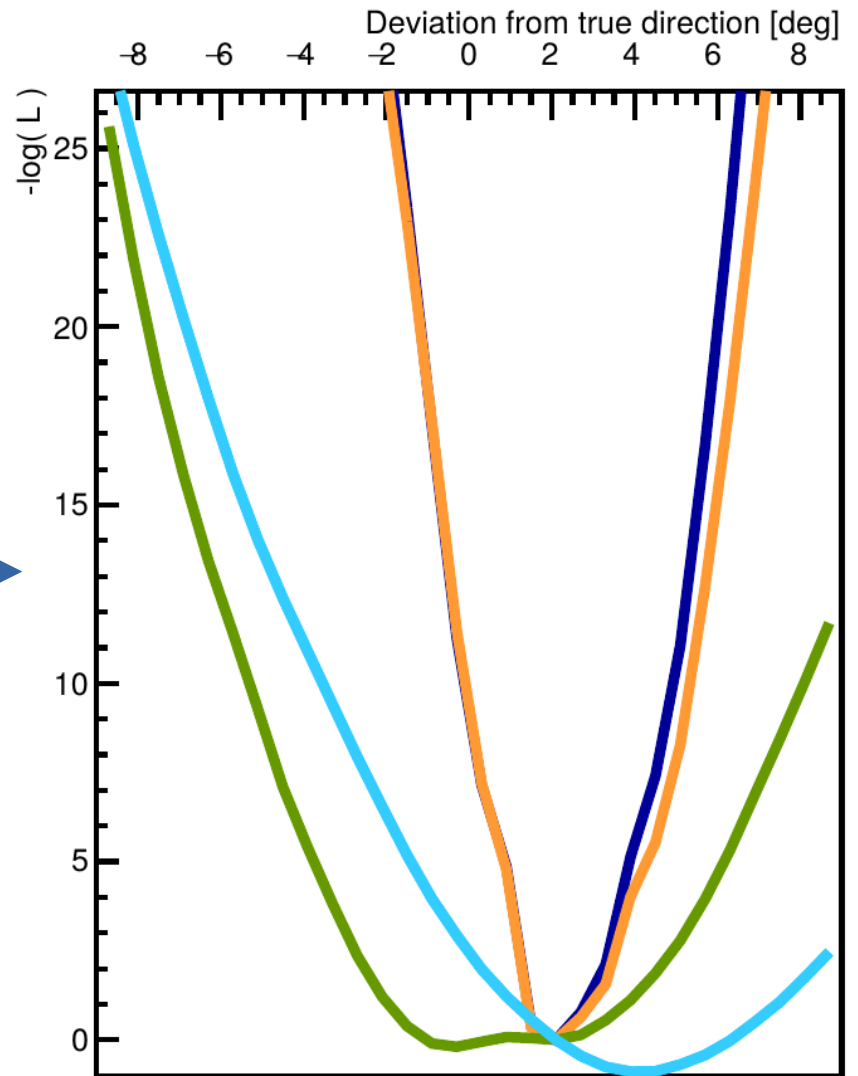
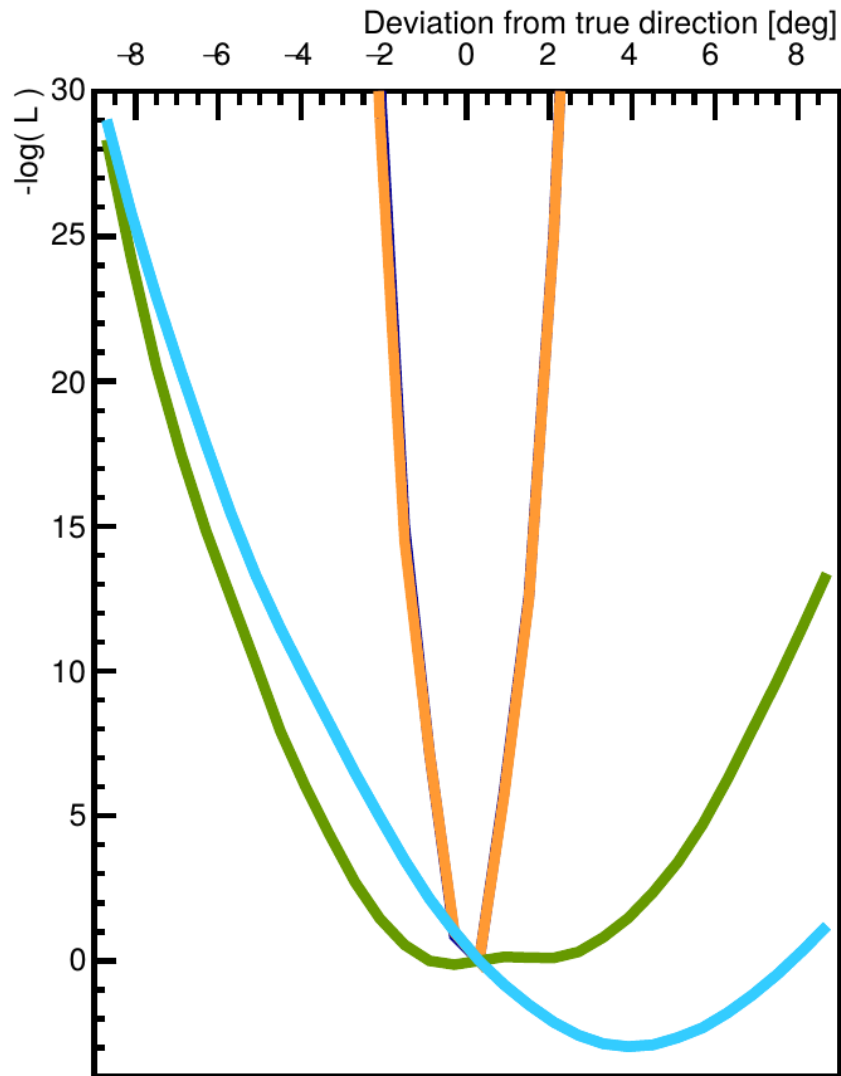
# Tangent: which energy for Shower<sub>max</sub> calculation?



Small inconsistencies → use nu E for now

# Shower<sub>max</sub> treatment:

## The good event seems to suffer from this



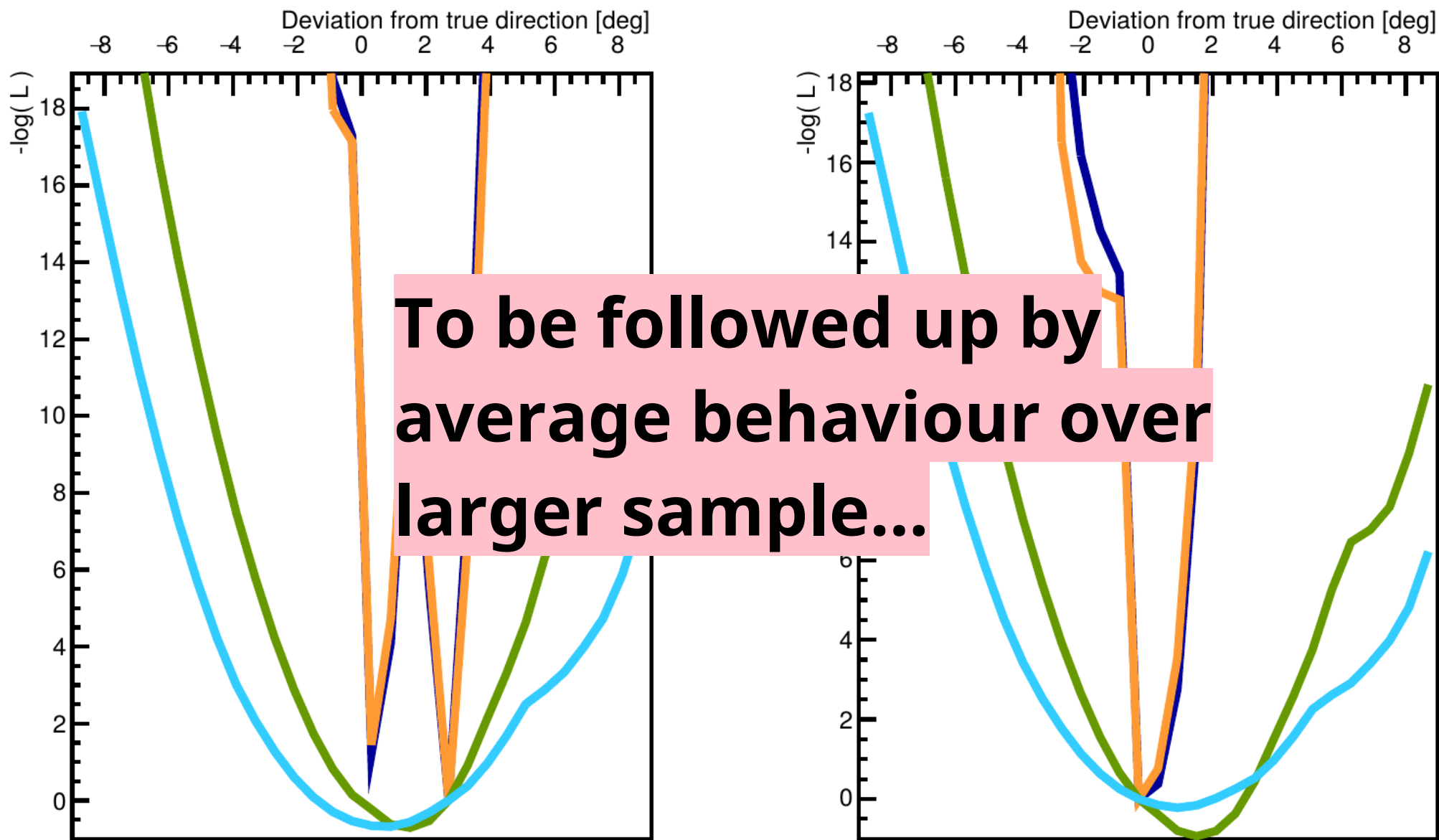
“Good” event 1855 with fixed fitted position

Jordan Seneca

- with fixed fitted shower<sub>max</sub>



Shower<sub>max</sub> treatment:  
The bad event seems to benefit from this



“Bad” event 1904 with fixed fitted position

- with fixed fitted shower<sub>max</sub>