

# Neutrino cuts : Data/MC exploration

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# Dataset

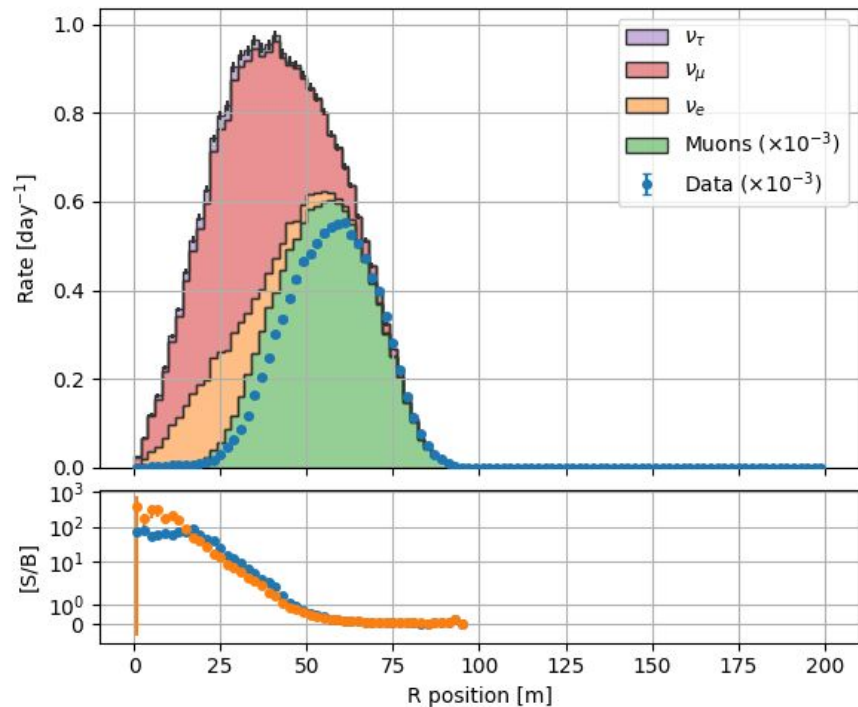
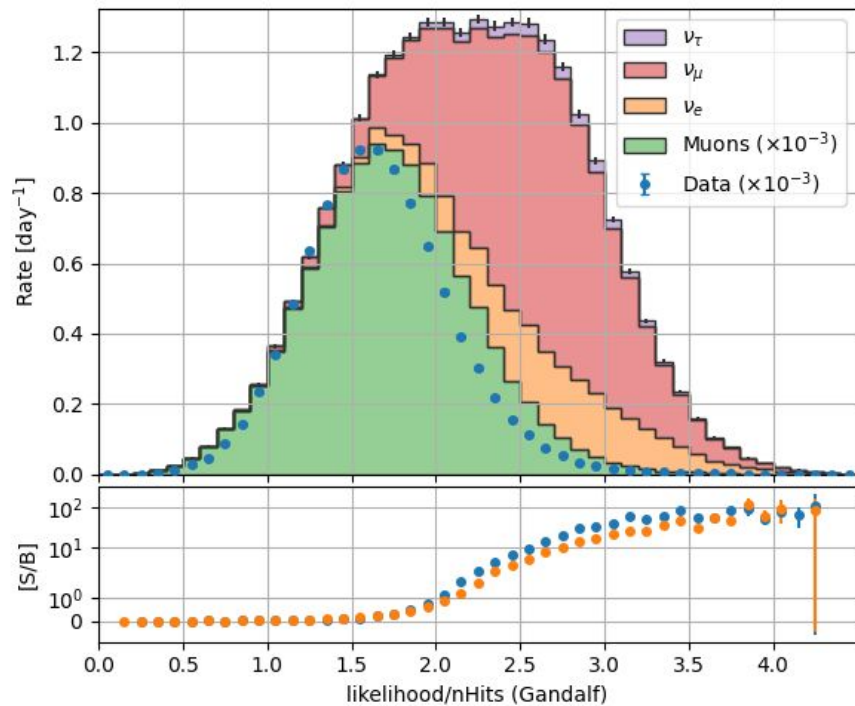
Use reco data produced by Lodewijk (JGandalf and Jshower(Jsh))

Simple cuts are applied :

- JGandalf energy [2:100]GeV -> Energy range where oscillation are
- JGandalf likelihood > 35 -> remove noise events from data
- JGandalf direction  $Z > 0$  -> Upgoing events

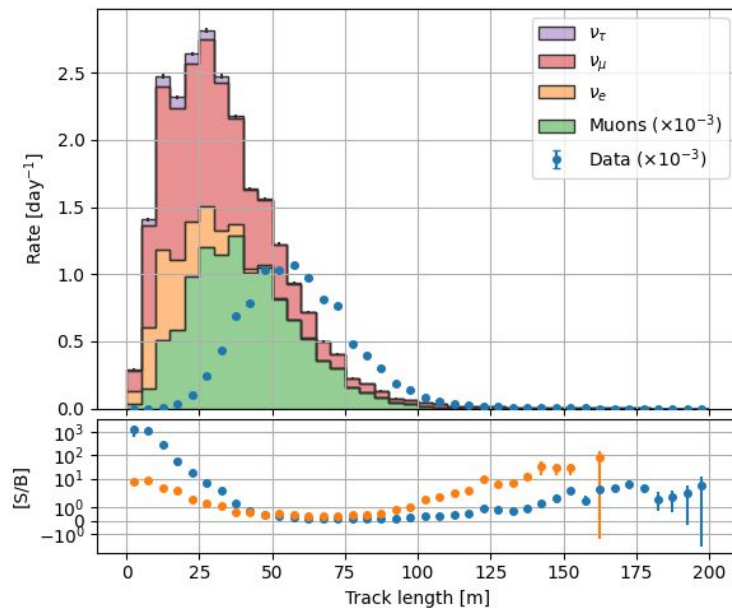
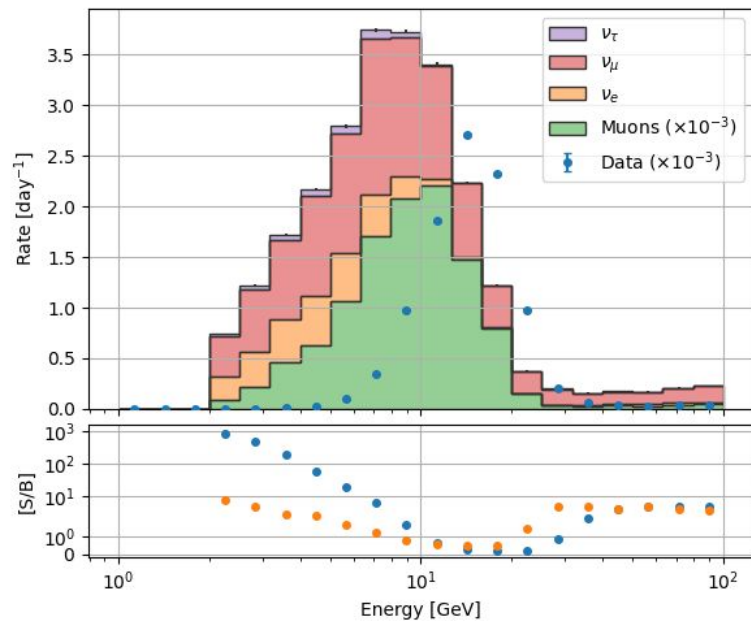
On all the plots : atm-muons MC and data are downscaled by a factor 1000 to be comparable with neutrinos

# Lot of variables agree nicely for JGandalf



$$R = \sqrt{\text{gandalf\_x}^2 + \text{gandalf\_y}^2}$$

# However ...



So far, energy/track length are the worst agreement between data and muons MC

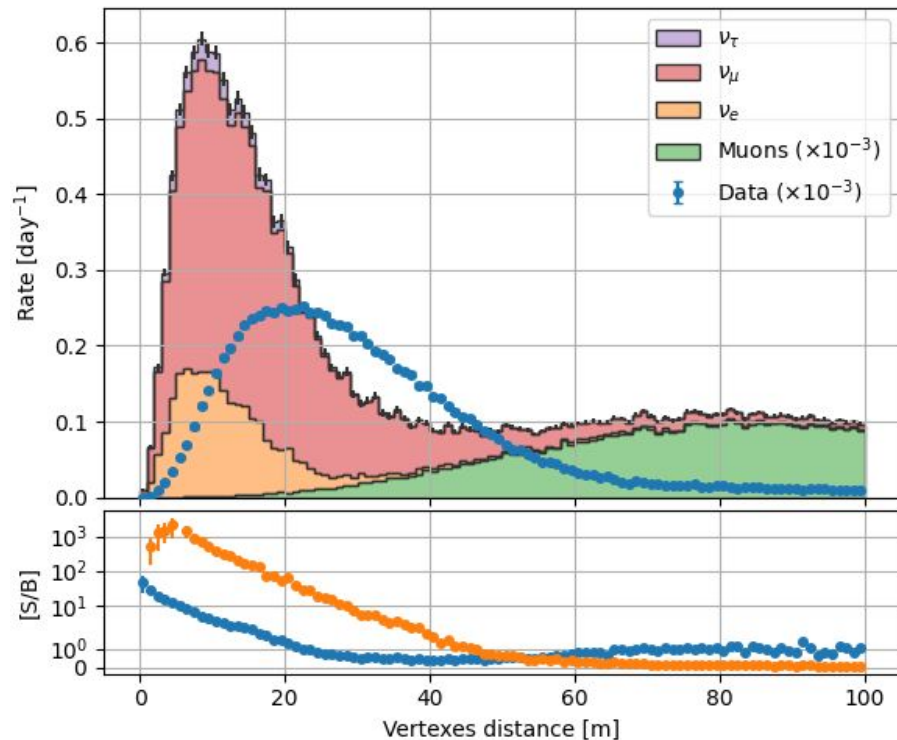
# JShower/JGandalf

There is a shower at the neutrino interaction point

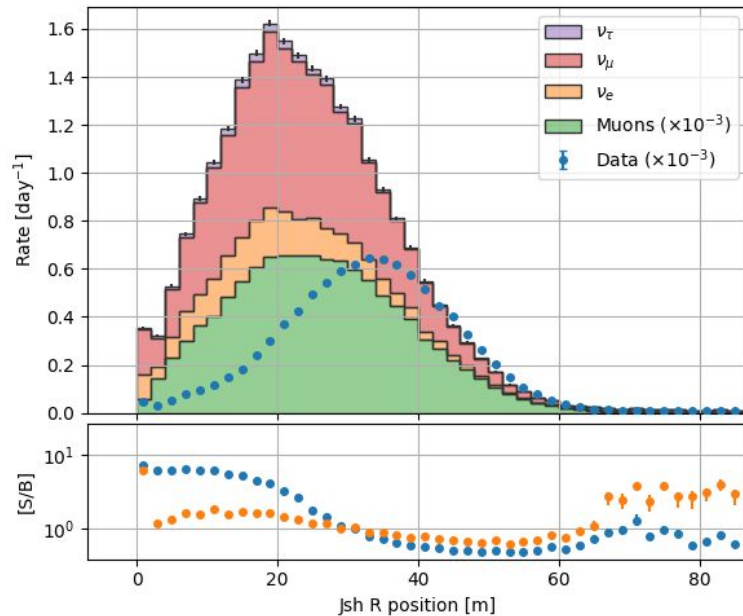
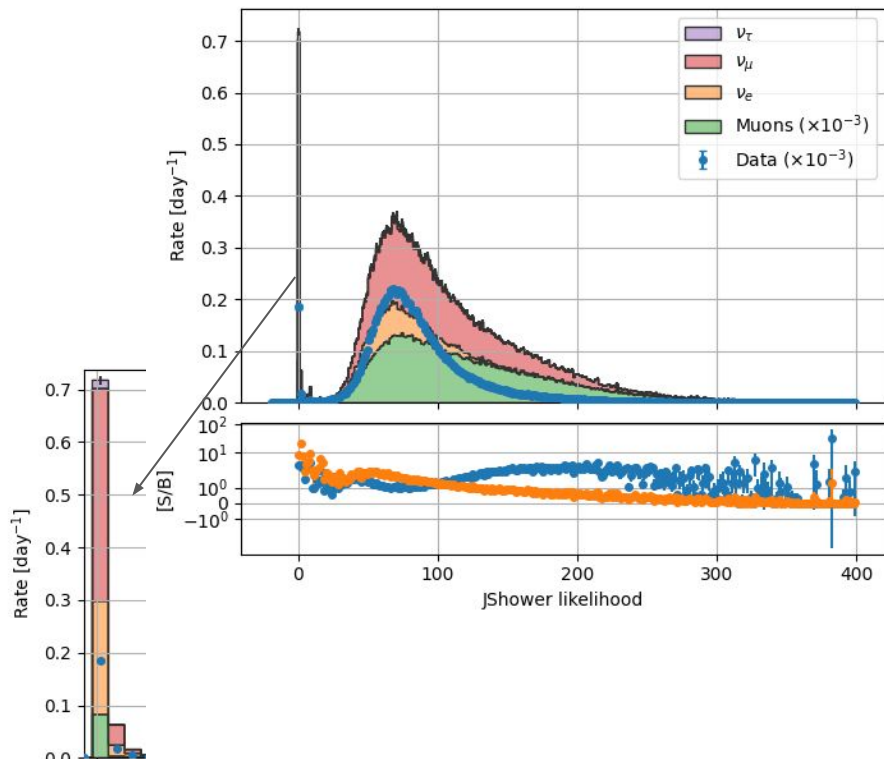
- Naive guess : JGandalf and JShower should give a initial vertex quite close for neutrinos
- Expect more differences for Atm-muons

Compute the distance between Jsh vertex and JGandalf vertex

**Great potential for discrimination, too bad data/MC doesn't agree ...**



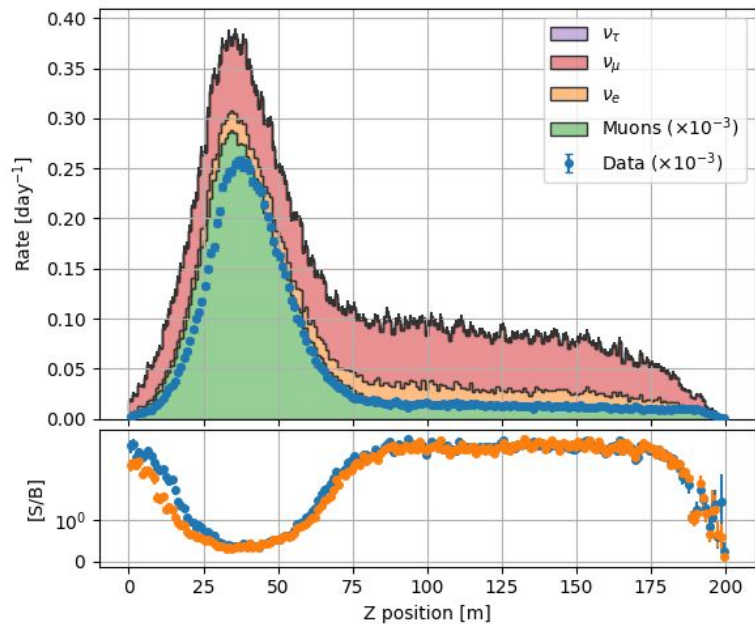
# JShower, more details ...



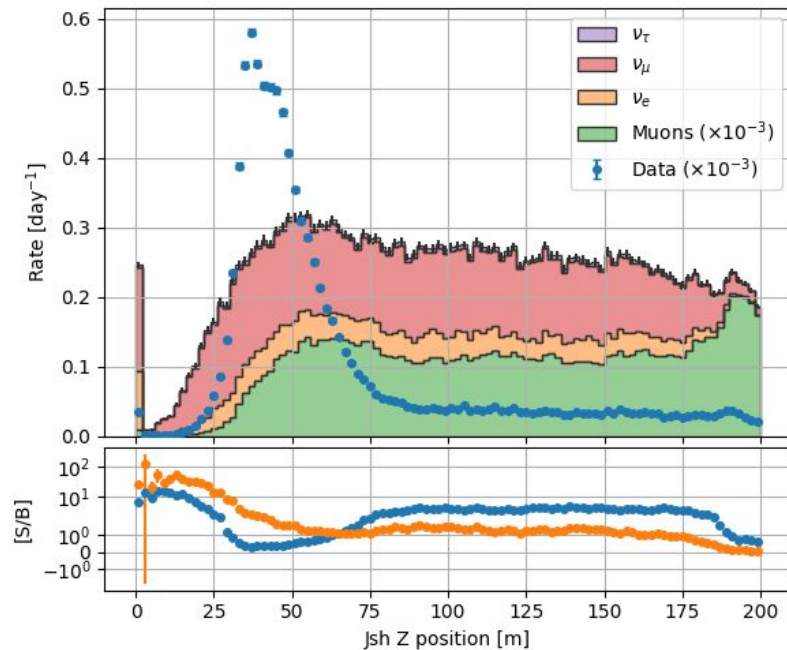
$$R = \sqrt{Jsh\_x^{**2} + Jsh\_y^{**2}}$$

# Z position

## Gandalf



## JShower



# Summary

## **JGandalf track length doesn't agree between data and MC**

- Problematic for :
  - containment cut -> you want the stopping point
  - Energy resolution for tracks
- Overall agreement is not too bad, but small discrepancies everywhere

## **JShower doesn't agree between MC and data**

- Quite large variation, due to the small detector size ?