



VHE energy estimation meeting  
24 July 2024



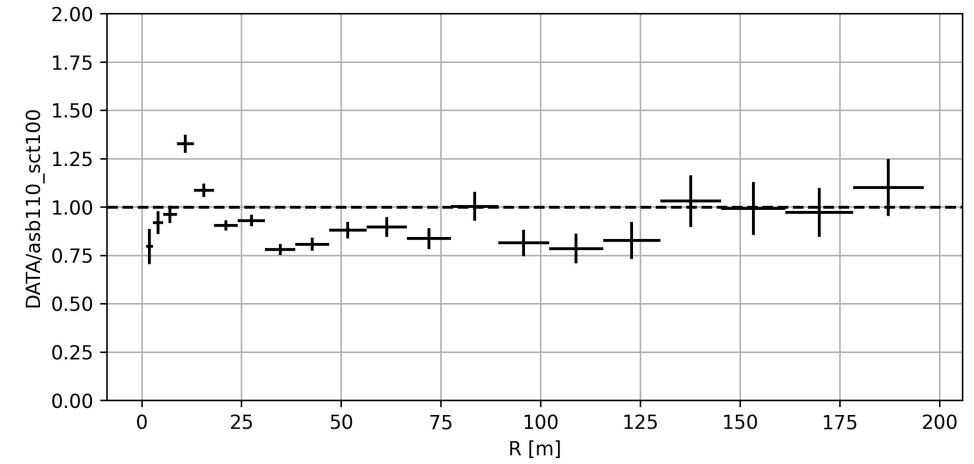
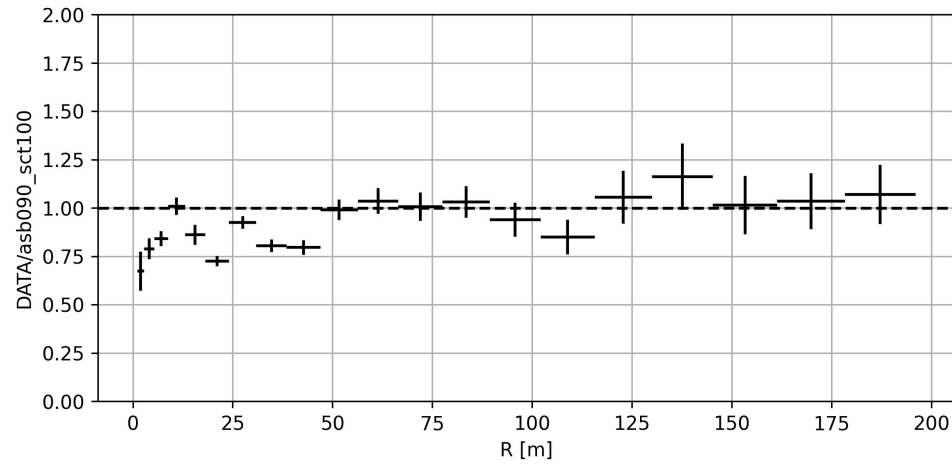
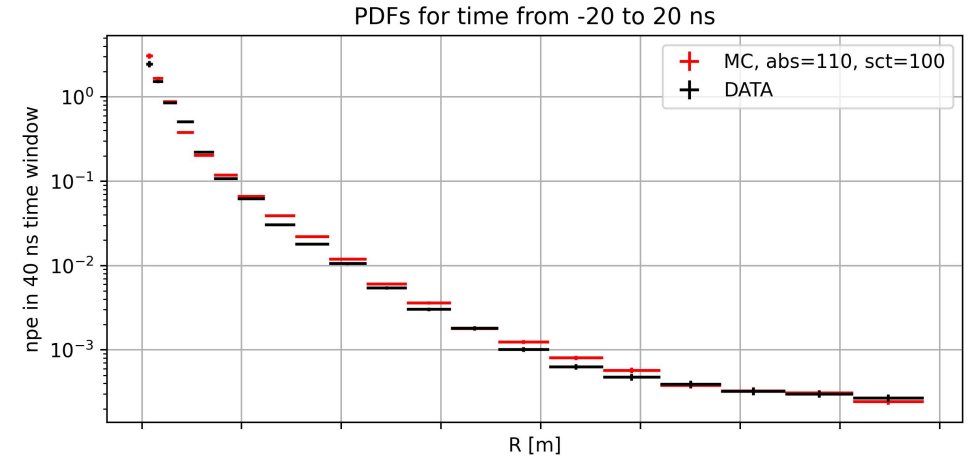
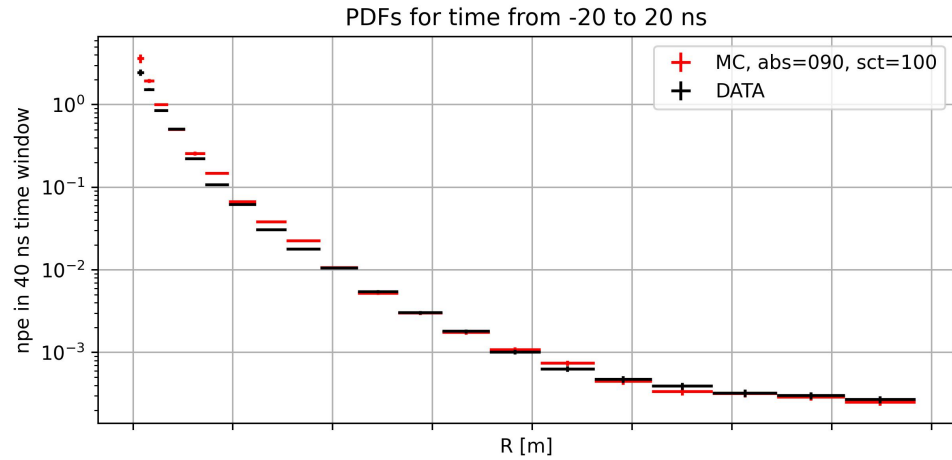
# Optical water properties

Andrey Romanov, Valentin Pestel, Maitha Alshamsi

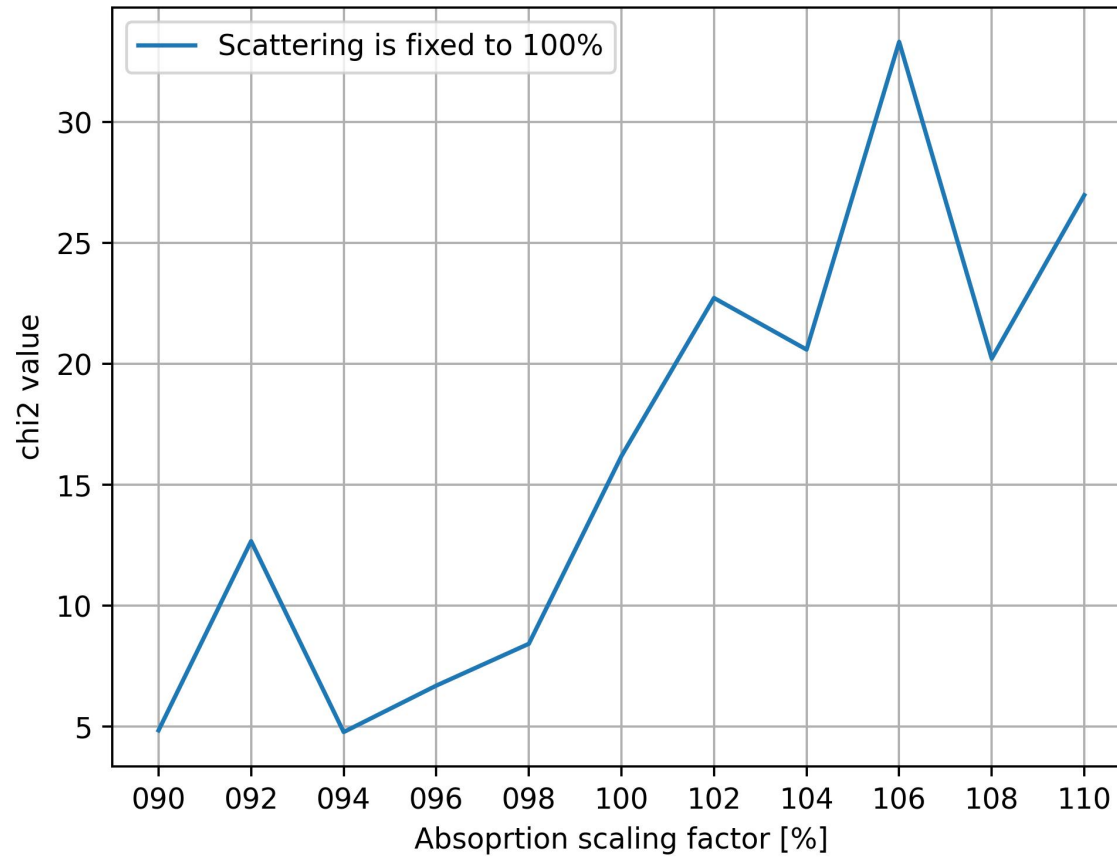
- Use selected muons in ARCA21 to create 4D PDFs
- [Git project, results](#)
- 11 MC samples produced with absorption length scaled from 90% to 110% with a step of 2%
- [Aart's approach with down-going muons](#)

Absorption is scaled by 90%

Absorption is scaled by 110%

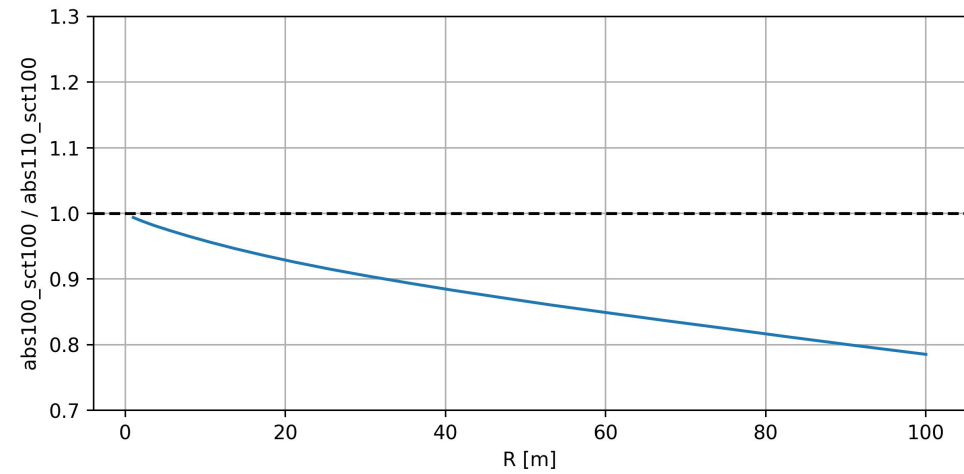
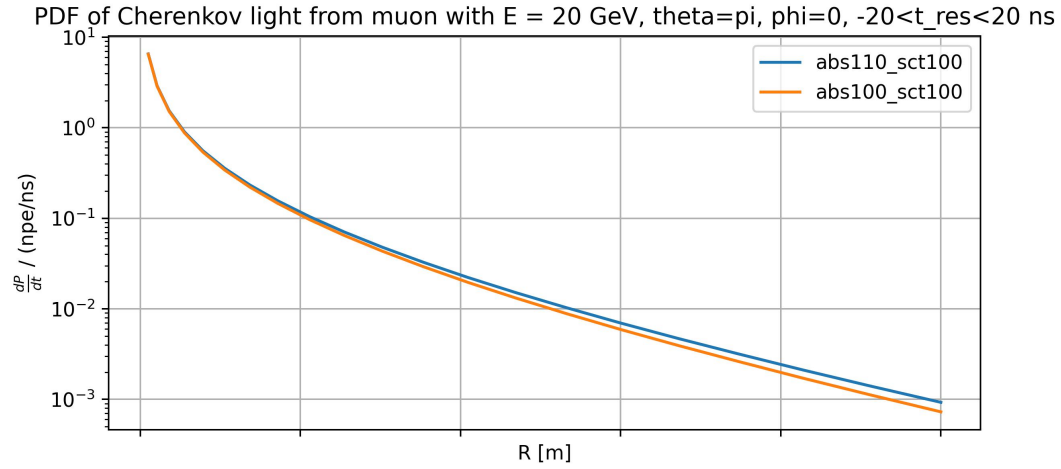


chi2 difference between data and MC

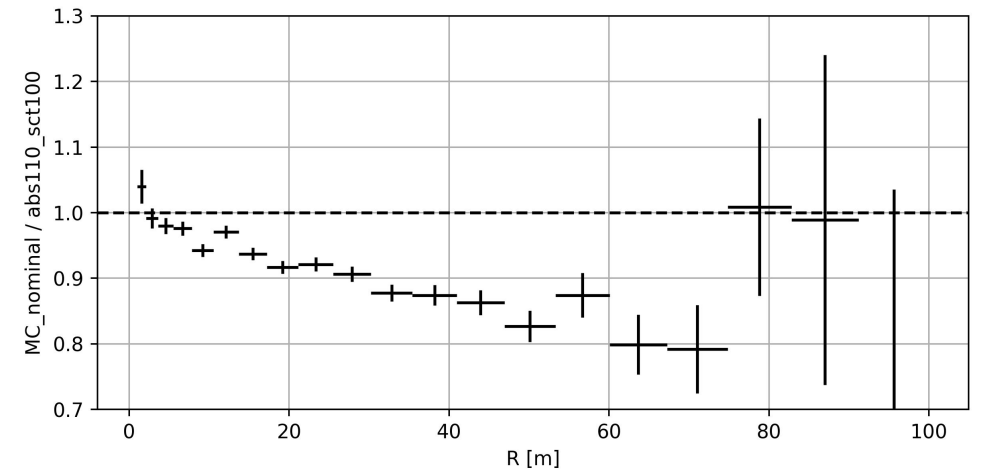
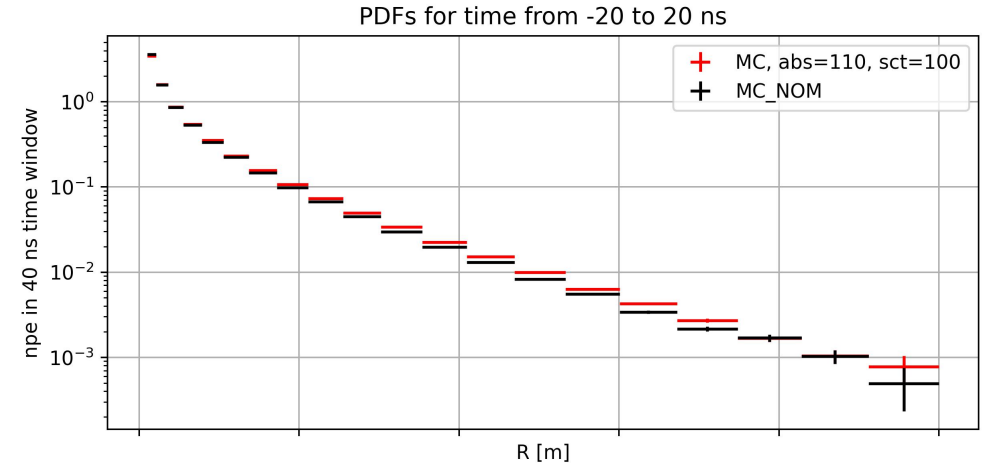


- Check if the problems are due to approach itself
- Use stopping muons in ORCA6 to create 5D PDFs
- [Git project](#), [results](#)
- 11 MC samples produced with absorption length scaled from 90% to 110% with a step of 2%

## Expectations from JPDFs with jppy

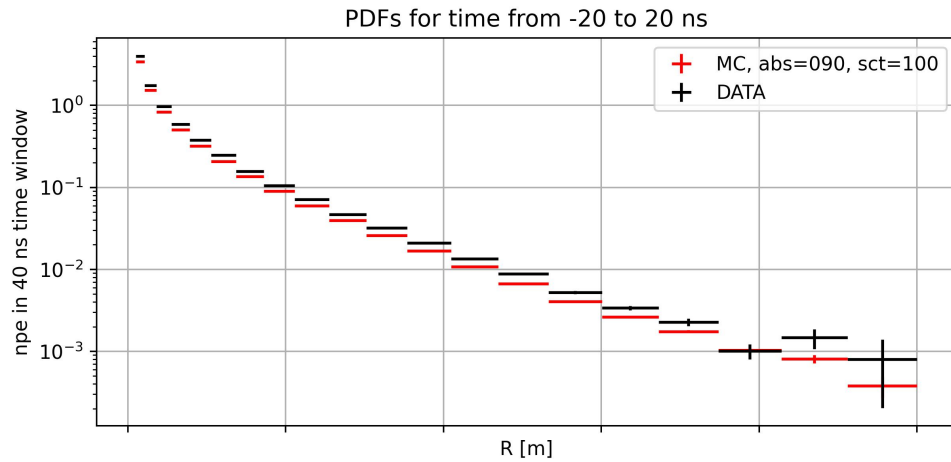


## Results with MC

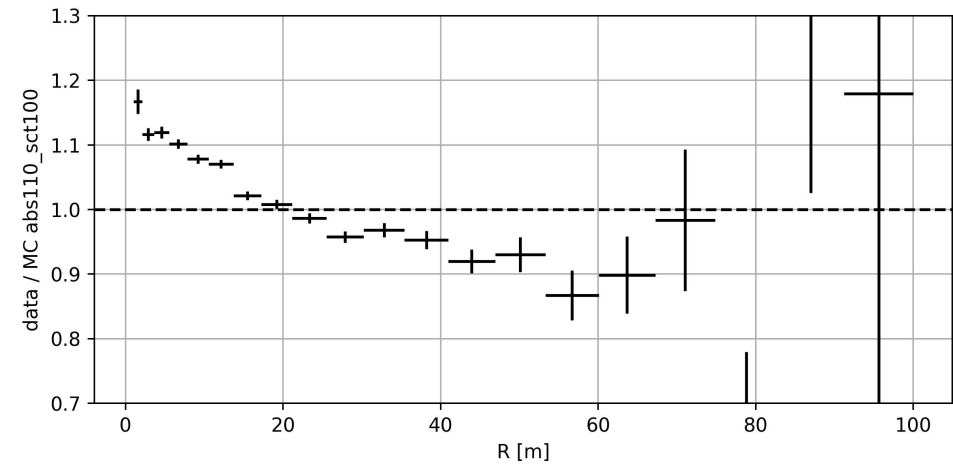
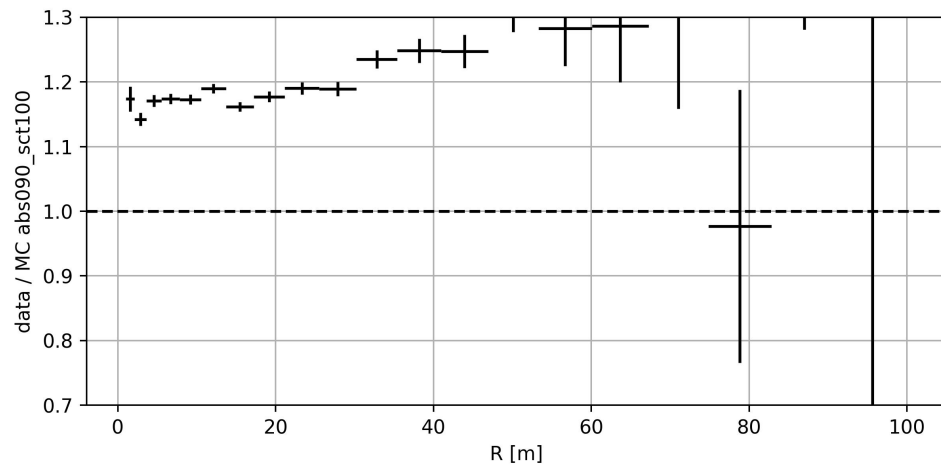
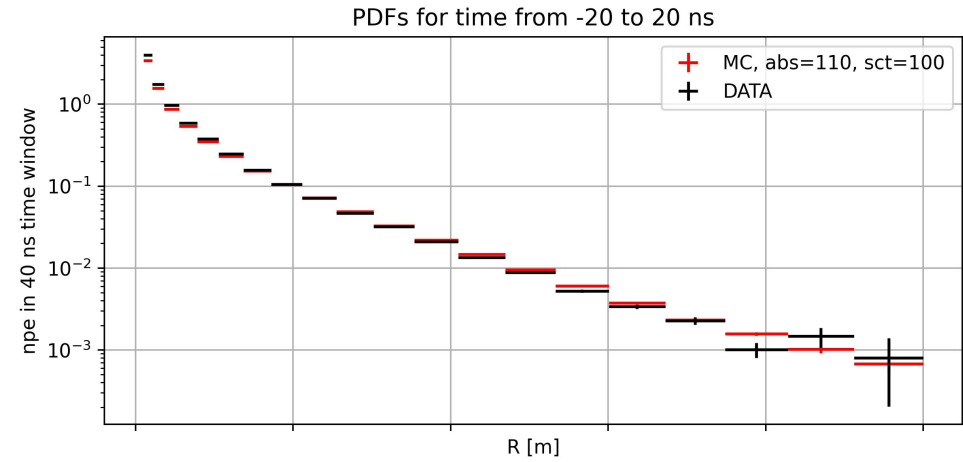


## All comparison plots

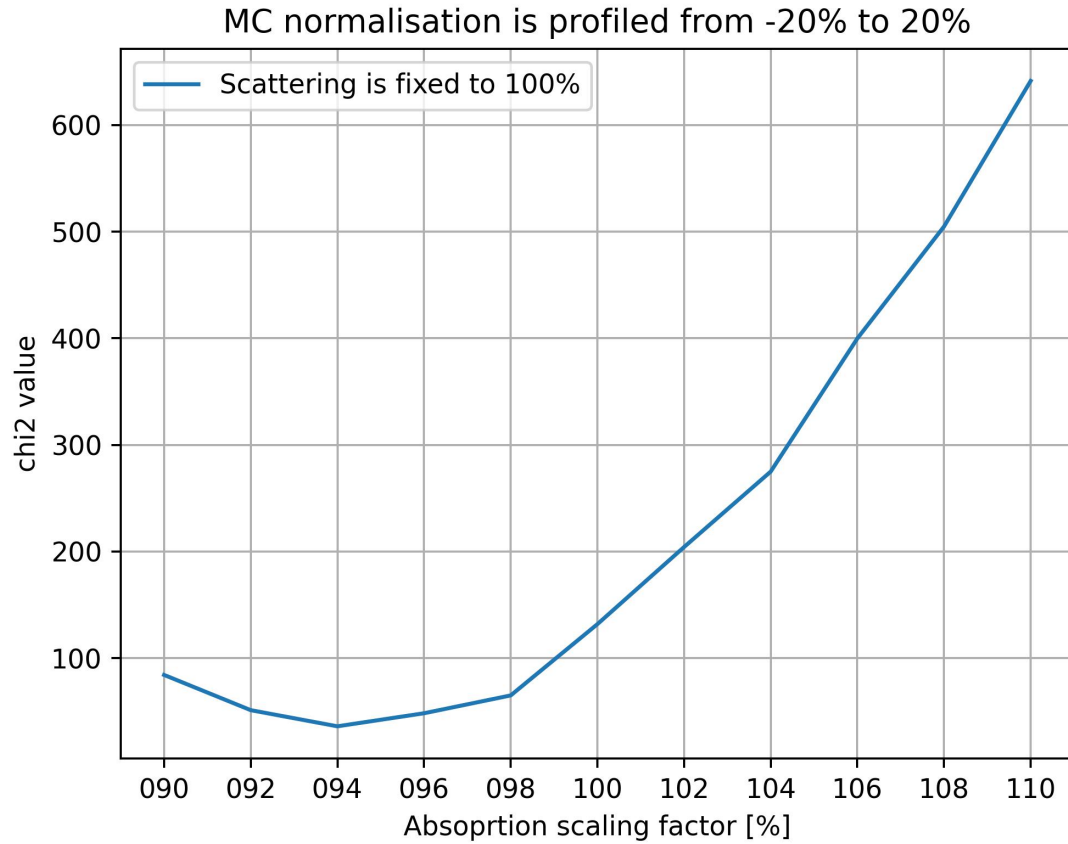
Absorption is scaled by 90%



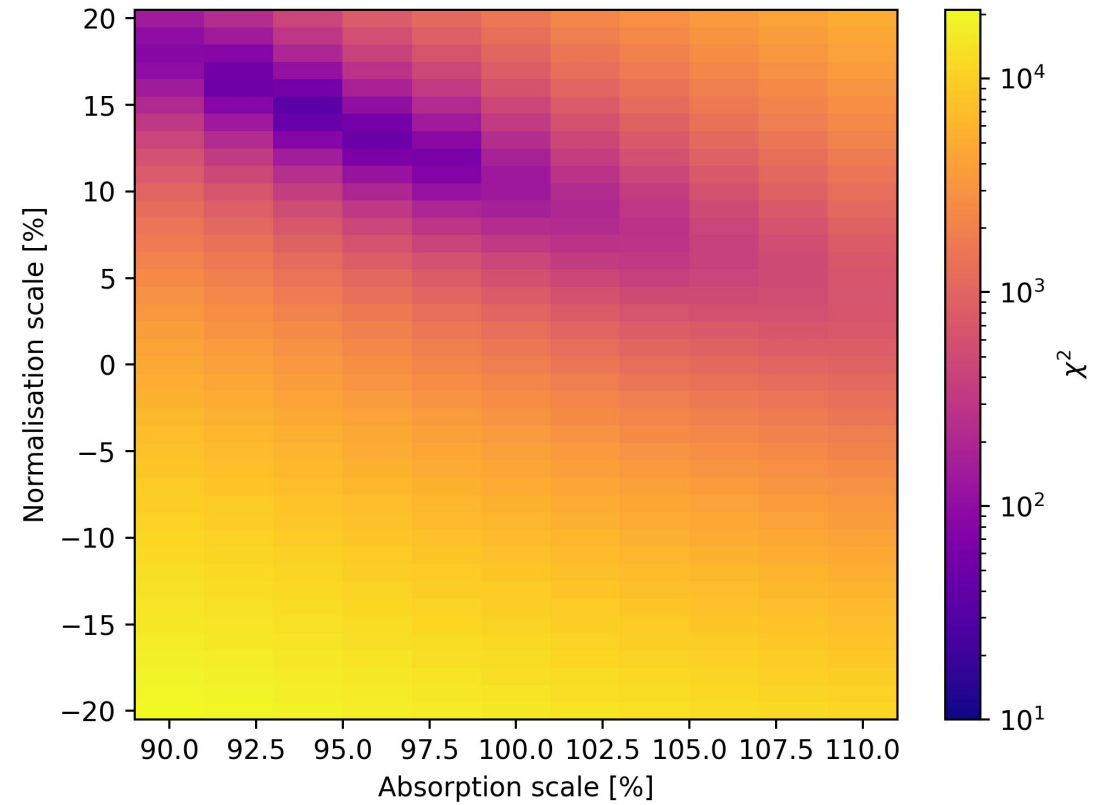
Absorption is scaled by 110%



chi2 difference between data and MC  
with MC normalisation profiled

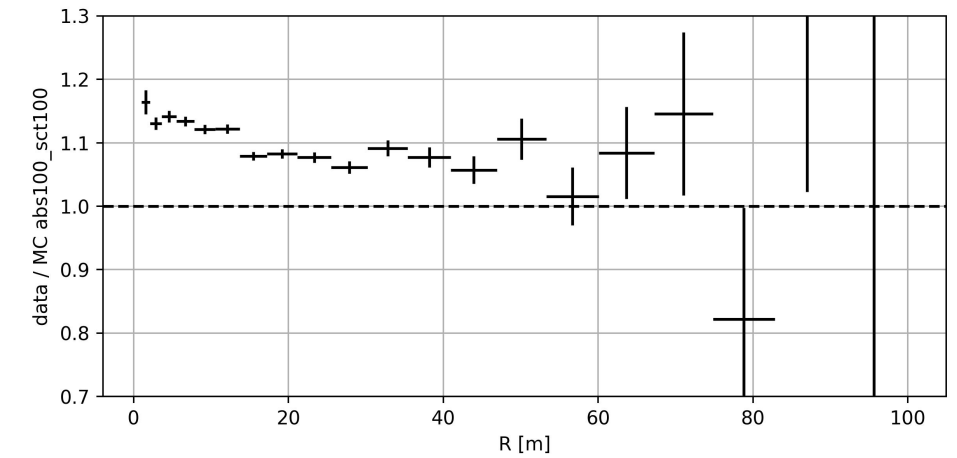
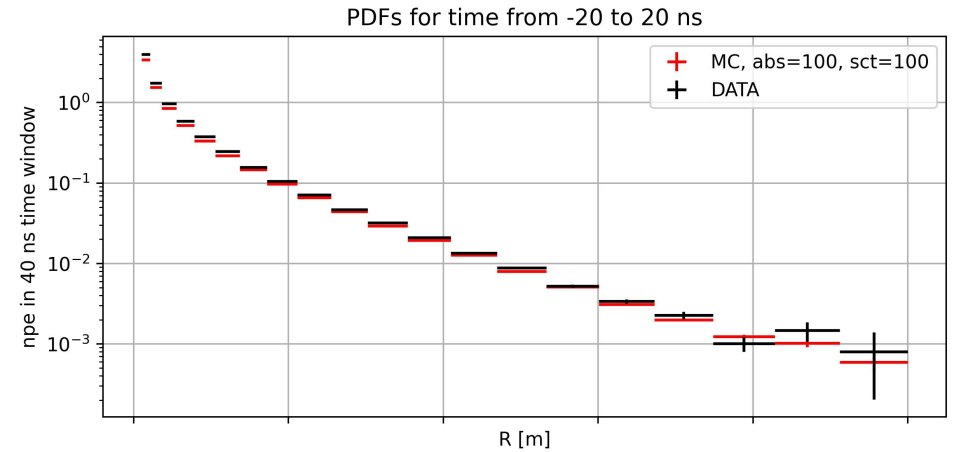


2D chi2 map for absorption and  
normalisation scaling



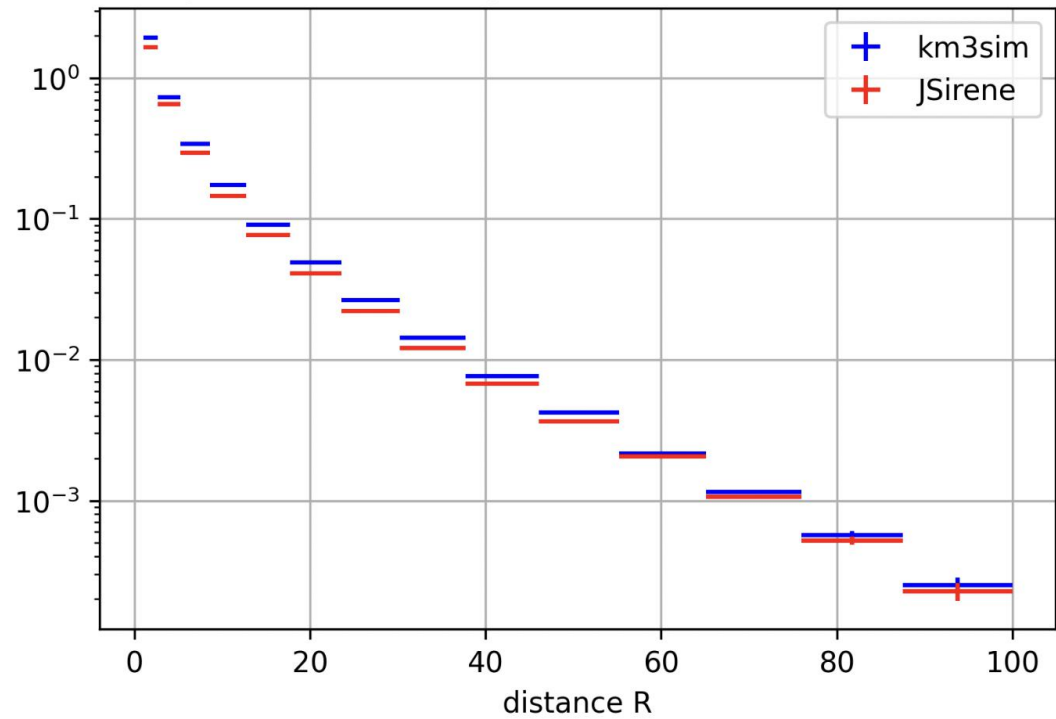


- Data is above MC by ~13% for short distances for all MC samples
- Maitha compared PDFs created using the light generation files using KM3Sim and JSirene

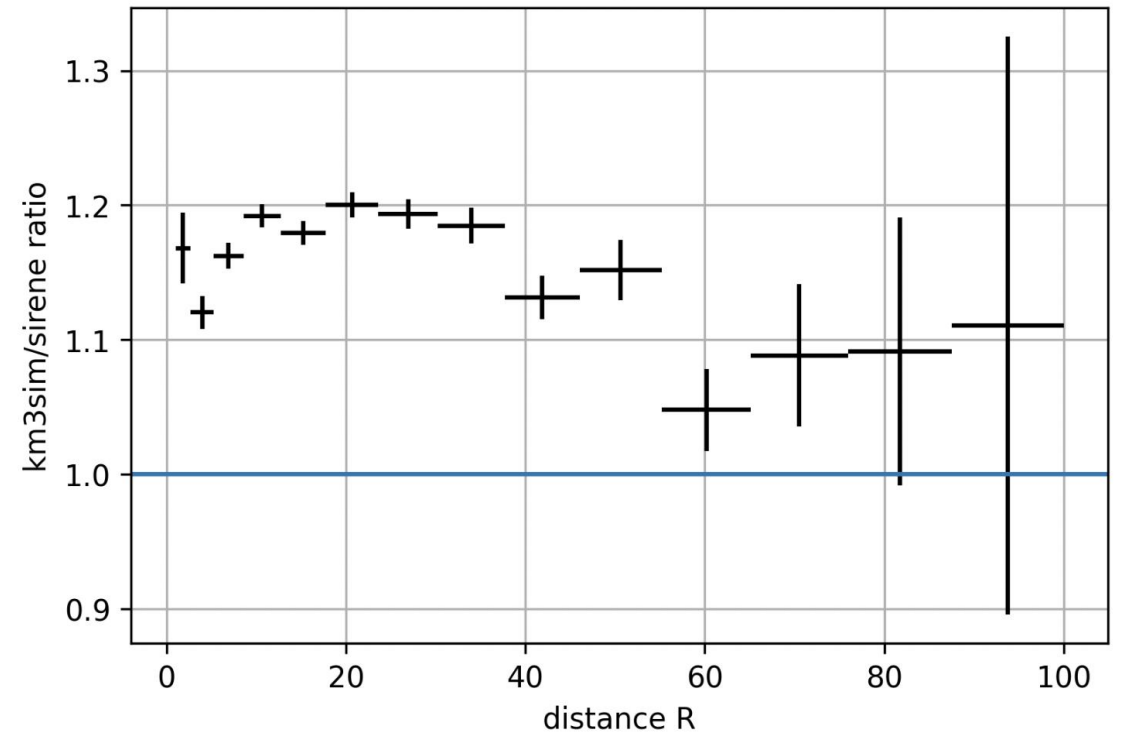


# 1D PDF (all energy, all directions, time window -20 to 20)

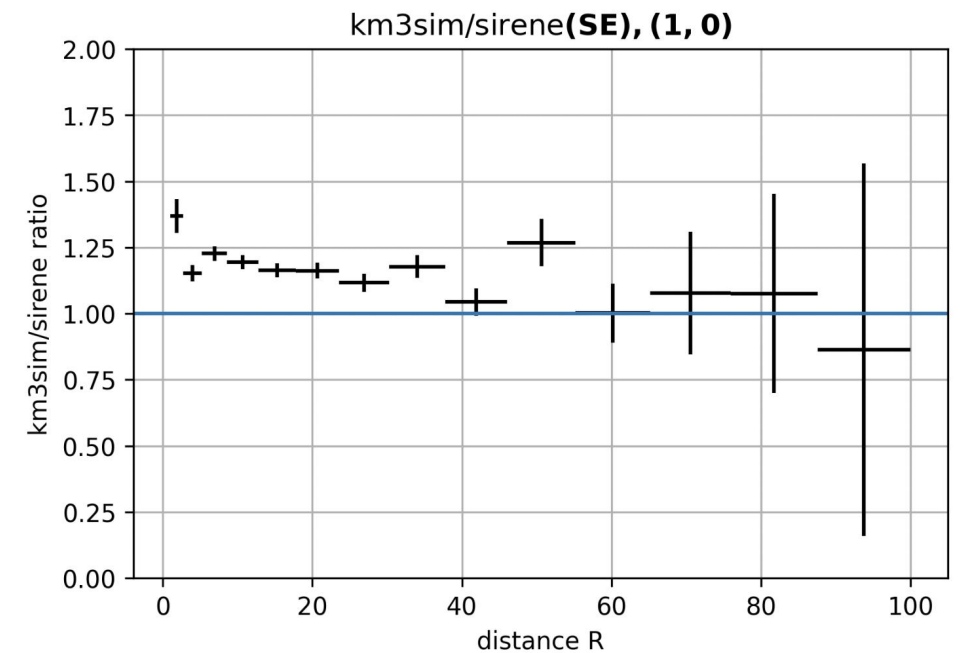
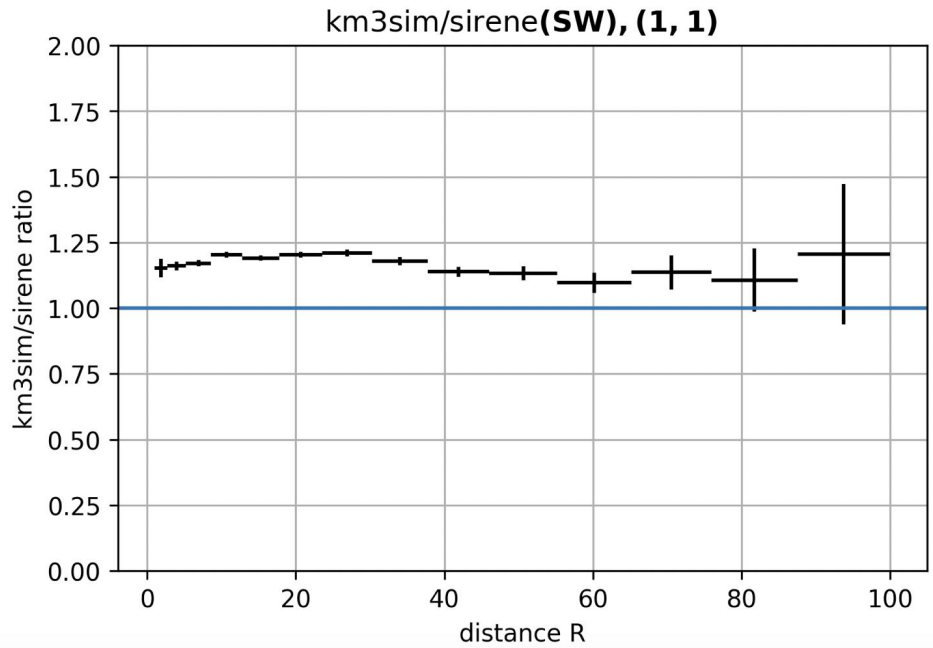
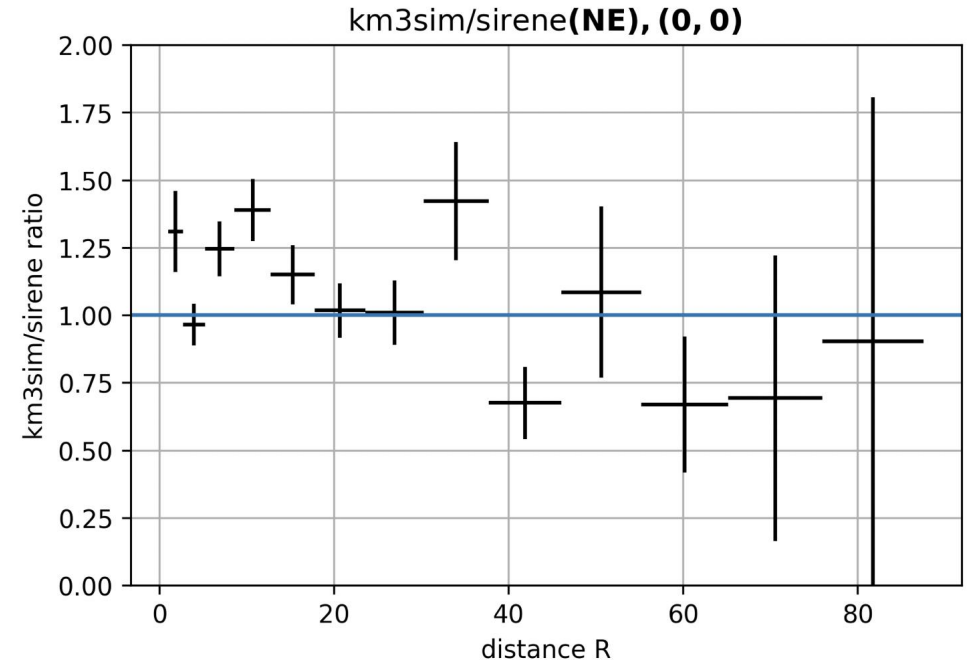
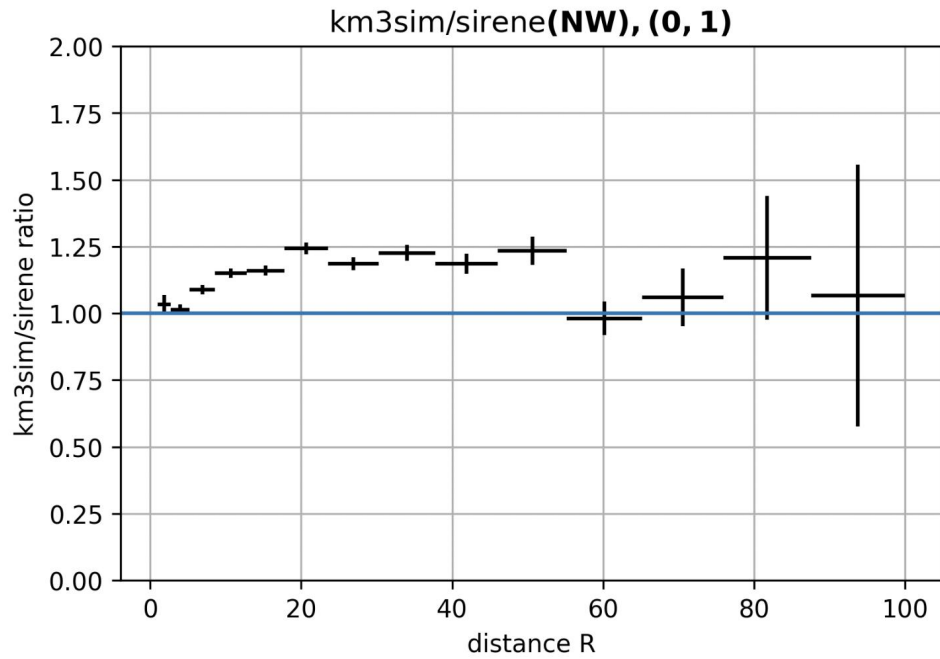
km3sim JSirene PDFs comparison (timewindow: -20 to 20 [ns])



km3sim/sirene



**time window -20 to 20 [ns] , different directions.**



- Smaller discrepancy found by Vladimir in [this git issue](#)
- We used the default 0.5mm cut in KM3Sim
- More checks to follow

