

Spallation backgrounds

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Global picture

→ Number of generated muons at entrance of detector : 10^9

→ Number of SK-background isotopes needed : 10^6



MUSIC

Generates μ at surface and propagates them to SK underground (θ, ϕ)

FLUKA

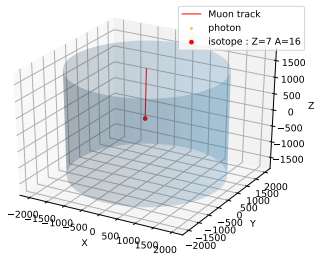
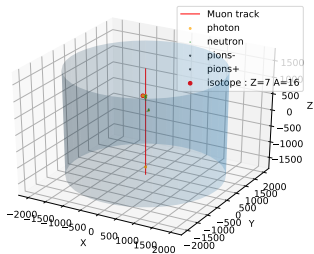
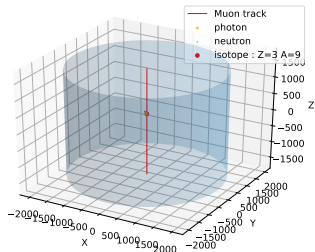
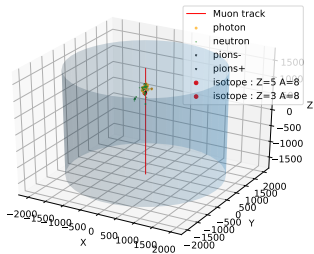
Propagates muons and secondaries in water (hadronic showers only)

10^4 isotopes simulated

SK DETector SIMulation

Simulation of μ , shower, n-capture

Shower visualization from FLUKA



Shower visualization from FLUKA

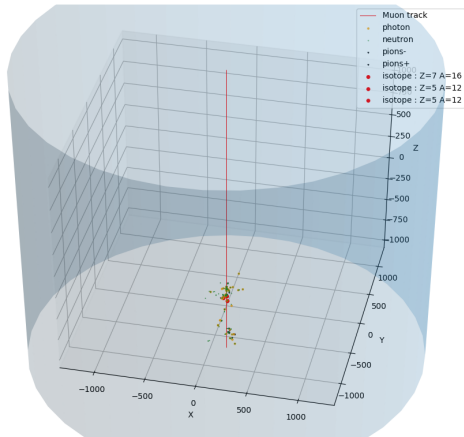


Figure 1: Shower visualization from FLUKA

- → proportion of stopping μ creating isotope non negligible : tension with data

Characterization :

- Muon energy E_μ
- # secondaries = $f(E_\mu)$
- # neutron captures
- Distance of istopes to track
- etc ...

→ What do we want to simulate ?

- ($t = 0$) Minimum ionizing muon
- ($t = \frac{c}{d}$) Generate the secondaries from hadronic shower (EM handled by Geant)
- ($t = t_{n-capt}$) Generate 2.2 MeV γ from n-H capture
- ($t = t_{decay}$) Generate γ/n from isotope decay

→ Few modifications to SKdetSim :

- Turn off muon nuclear interactions
- Turn off generation of particles created

→ Work in progress ...

- Output of FLUKA has been converted into zbs input files for SKdetSim
- ✗ Seg faulting when muon energy > 200 GeV