



LEnuSTORM flux at LEMMOND

Leon Halić, Ruđer Bošković Institute 2nd ESSnuSB+ annual meeting, Hamburg



What is this talk about?



Maja's talk on Monday

LEnuSTORM: muon momentum



8

Neutrino fluxes from LenuSTORM determined the needed muon momentum

The needed muon momentum constrains the LenuSTORM design

• Nominal muon momentum: 400 MeV/c



Ting Wing Choi, Leon Halic

M. Olvegård, September 23, 2024

How were these neutrino fluxes obtained?







Simulate different (anti)muon energies and see the neutrino fluxes they produce

The goal was to obtain flux shape and relative normalization



Normalization is comparable between different simulations

The absolute value of normalization has NO meaning and does NOT represent expected number of interactions







Work done by Ting Wing Choi

Initial simulation was a simple decay of muons from a point source





Final simulation



Work done by Leon Halić

Initial simulation was a simple decay of muons from a point source





Final simulation



Work done by Leon Halić

The decay vertices were distributed along the straight section of LenuSTORM ring following the exponential decay distribution

The neutrinos from the decay were propagated to the detector plane

Neutrinos that crossed the detector were considered as the final flux



Final fluxes



Work done by Leon Halić

Fluxes for different energies

Fluxes normalizations are comparable between each other

Higher energies give higher neutrino count due to more neutrinos being produced within the angle threshold





Final fluxes



Work done by Leon Halić

Fluxes for different energies

Fluxes normalizations are comparable between each other

Higher energies give higher neutrino count due to more neutrinos being produced within the angle threshold



R

Final fluxes



Work done by Leon Halić





R





Work done by Leon Halić

Electron antineutrino

Entries - 100 MeV 2.5 200 MeV 300 MeV 400 MeV Fluxes for different energies – 500 MeV - 600 MeV – 700 MeV – 800 MeV Fluxes normalizations are comparable between each other 1.5 Higher energies give higher neutrino count due to more 0.5 neutrinos being produced within the angle threshold

> 1800 2000 E / MeV

1600

1400

200

400

600

800

1000

1200























WP4 mentioned in both this meeting and the recent milestone that the current best value for the length of the straight section of the muon ring is 75 m – this analysis was done with 30 m

The effect of this longer straight section on the neutrino flux should be studied more

Maybe a possibility of putting the LEMMOND closer in the case of a longer muon ring?

To help us reach a conclusive decision, absolute normalization should be known