

Cosmogenic Neutron Multiplicity in Water at SNO+

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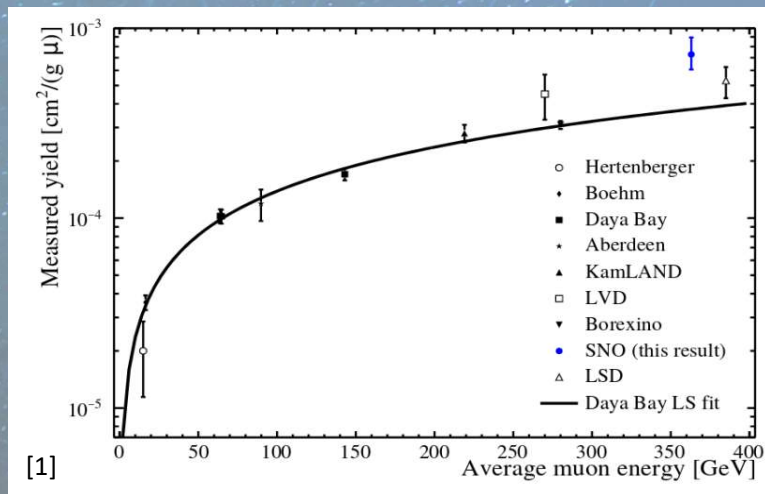
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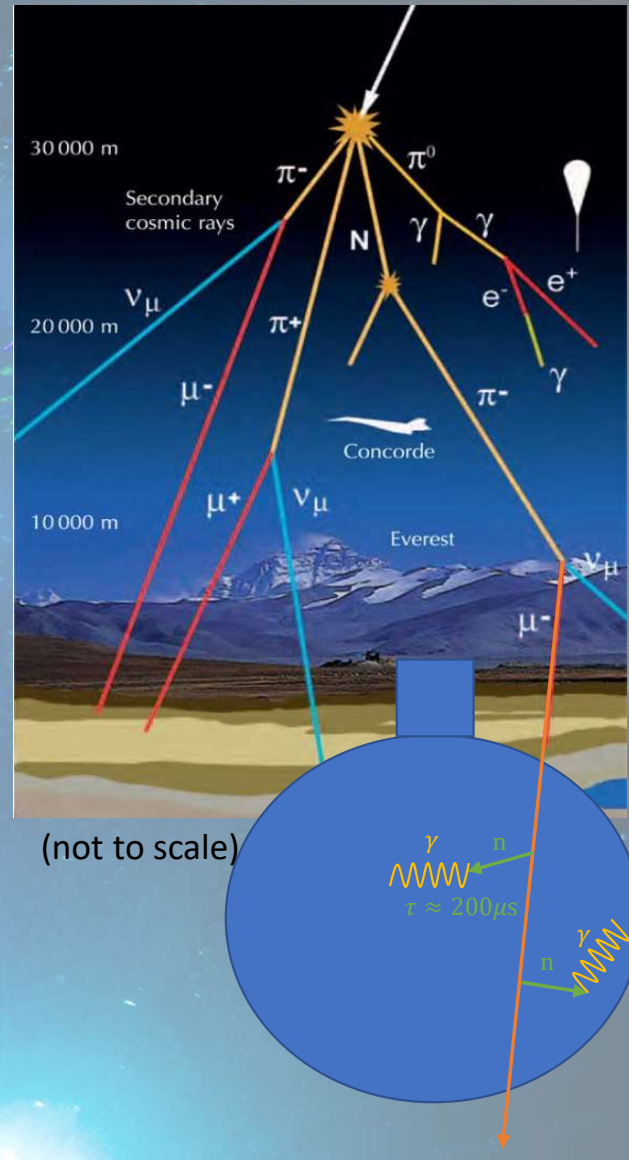
Cosmogenic Neutrons at SNO+

- SNO+ is an underground neutrino experiment
- ~ 3 high energy muons travel through the detector per hour

- Muon-induced neutrons pose as a background to many physics experiments which require very low backgrounds
- SNO+ can measure the neutron multiplicity for high energy muons in water and scintillator
- This poster presents the work done on measuring the neutron multiplicity in water



[1] Cosmogenic neutron production at the sudbury neutrino observatory, 2019



Neutron Selection Efficiency

$$Y_n^\mu = \frac{N_n^\mu}{L_\mu \rho}$$

Path length of the muon

Density of the medium.

Number of neutrons produced by a given muon - related to the number of neutron followers observed is the neutron selection efficiency ε

$$\varepsilon = \frac{\text{no. neutrons which pass selection cuts}}{\text{total number of neutrons generated along muon track}}$$

- The neutron selection efficiency is position dependant so must be evaluated for each individual muon
- The efficiency is low in water due only 9-25 PMT hits per neutron capture event
- The misreconstruction of the muon track must also be considered

