

Progress Report

USD Group

Status report

1) Radiogenic subgroup

We finalized our goal with the emphasis on validating the calculation of (a, n) neutron between simulation packages and experimental data. Bi-weekly group meetings were arranged to discuss the assignments and the progresses being made. The detailed topics and minutes for each meeting have been posted in the meeting page: <http://zzz.physics.umn.edu/lowrad/radio>.

The ways to compare the (a, n) neutron yield from USD web database and SOURCES code were extensively discussed. With the new semester begins, we are going to doodle-pool a meeting time to continue the work.

Homestake gamma-rays measurements for the 4850-level has been done with the germanium detector. The results have been compared with the previously measurements done by NaI detectors. A good agreement was achieved.

The simulated (alpha,n) neutron from rock at the 4850 level was also compared to the recent measurements from DIANA, the results agree with each other.

2) Depth Study

The comparison of muon spectrum at Homestake Mine/Soudan Mine using MUSUN and Geant4 simulation is completed and the detailed report is uploaded to the page: https://zzz.physics.umn.edu/lowrad/_media/dm_task_force/comparison_geant4_vs_musun_v6.docx.

For the background study of a LAr detector at Homestake Mine, we conducted the simulation with the input from Angie (9990 files of 20K muons each, <http://cdmsnano.fnal.gov/xfer/simData/2013muonFiles/>). The data analysis is on the way.

Status report cont.

3) Neutron detector at Soudan Mine

Over two year background data have been collected at Soudan Mine. Muon /neutron flux have been measured. Simulations are also conducted to determine the according absolute fluxes. A preliminary result shows the phenomenon of annual modulation in terms of the event rate. Detailed analysis is undergoing to determine if the modulation dominated by muons.

4) LBC at SURF

A n-type germanium low background detector is being built at SURF with a threshold down to 10 keV, which is sensitive to ^{210}Pb at a level of ~ 50 mBq/kg.