# Cosmogenics: long-term goals

- To understand and being able to model parameters of the neutron flux underground (spectra at high energies, yields etc) - significant progress has been achieved.
- To model effects that neutrons (and other particles) produced by cosmic-ray muons produce in high-sensitivity dark matter, neutrino-less double-beta decay and neutrino experiments - ongoing work with new results obtained.

# Cosmogenics: short-term goals

- Short-term goals (person responsible, deadline):
  - Basic principles and procedures for benchmarking (G4/FLUKA) - Vitaly (6 March) - done.
  - Understanding difference between G4 versions / physics lists (JENDL cross-sections, Shielding/QGSP) - Denis - look at the cross-section (31 March), Angela - look at her simulations again (31 March) - done, bugs corrected, better understanding of the 'parameter definitions' etc; the work is still ongoing: we need better understanding of the models and their effects on neutron production.
  - Basic comparison between G4 (several versions) and FLUKA: primary muons of different energies travel through different materials, comparison of neutron yields and spectra - Denis, Tony (30 April) - work is ongoing, first results achieved and shown at this meeting (Anthony and Tony).
  - Rock composition to be sent to Vitaly for MUSIC - Dongming, Chao (31 March) - done.
  - MUSIC/MUSUN for Homestake (flat surface) - Vitaly (31 May) - done, also for a proper mountain profile.

# Cosmogenics: short-term goals

- (*n,an*) processes in lead (*a* is a positive integer), comparison between G4 (several models) and FLUKA (procedures probably similar to primary muons) - Melinda, Ray, Tony, Denis (31 June) - no progress yet, task re-assigned to Anthony and Tony.
- Check the number of stopping muons and the effects of muon capture - Dongming, Chao (31 May) - the work has not been completed yet but some work has been done; Chao and Dongming to report results.

# Cosmogenics: medium-term goals

- Medium-term goals:
  - Implementation of new methods of treating muon inelastic scattering in GEANT4 (if necessary) - Denis, December 2011 (to be reviewed in June depending of its importance, other tasks and other factors) - done, more work is on-going to improve models.
  - (alpha,n) reactions in GEANT4 - Denis (+ others), 2 years (ideally) - will hopefully be addressed within a couple of years.

# New short-term goals

- Web-page with plots, values for neutron flux, neutron yield etc – Tony and Anthony.
- Essential parameters for Monte-Carlo simulations and experiments to be given for comparison: energy thresholds, multiplicity, ‘definitions of parameters’, normalisation, detector life-time – Prisca to initiate this.
- Events on the cavern surface with all particles and all parameters included: how to share them – Chao, Melinda.
- Variation in muon flux with depth: 1 m w. e. steps (changes in water content, for instance) – Vitaly.
- Results to be put on the web-page as soon as they are obtained (also to monitor the progress) - all.

# Other goals

- More data: neutron captures (linked to neutron yields), neutron energy spectra, multiplicity, radial distances, different materials – DarkSide, Neutron Multiplicity Meter, Borexino, Soudan detector, ZEPLIN-III veto – all.
- Dedicated measurements at CERN - Cheng Ju Lin (Jason, Tony, Yuen-Dat Chan, Vitaly).
- Think about other goals, in particular in connection with a possible new proposal for funding.