Summary of yesterday's session

Yesterday we concluded:

- (α,n) cross sections, neutron energy spectra, correlated neutron-gamma emission are important for understanding the background in Dark Matter and neutrino experiments (various fields nuclear physics).
- (n,γ) cross sections, correlated γ-ray emission and some decay data are also relevant.

Status of the codes

There are several (α,n) yield calculators which depend on:
- Cross sections: evaluated, theory-driven (TALYS, EMPIRE), experimental points.
- Stopping powers: SRIM, ICRU, GEANT4 (data and models)

The codes produce different neutron yields and spectra.
It is not evident which cross sections they are using in some cases.
When the cross sections are similar or the same, the codes seem to agree but this needs to be confirmed.
It is no evident how to quantify the uncertainty of the final result: neutron yields and spectra, impact on the veto.

Proposal: to perform inter-comparison and verification exercises + benchmarks are needed.

Proposal: to have common repository of cross sections which can be fed to the different codes.

Proposal (mid/long term): to perform sensitivity analyses by varying cross sections / model parameters and investigate the impact on the results.

Status of the data

- Energy dependent (α,n) cross section data show large discrepancies, not compatible with the declared uncertainties.
- Evaluated libraries (JENDL vs TENDL) also show important differences for several cases in which both are available.

New measurements addressing the actual needs should be carried out (some have been done already).

Actions: contact the IAEA (A. Koning – TALYS/TENDL and R. Capote – EMPIRE) + Dimitri Rochman (PSI – TENDL/TALYS) and ask for:

- A TENDL library which considers (a,X) reactions.
- help/support/guidance for running TALYS and TENDL for producing our own libraries.
- To propose the organisation of a CRP on (α,n) cross sections.

There are **specific nuclear data needs** for underground experiments:

- Identify the prioritary materials/isotopes.
- Identify prioritary reactions and secondary particle distributions: (α,n), (n,γ), decay properties, others?
- Are cross-sections at low temperatures necessary?

Proposal: to elaborate a list of open issues and recommendations, which should be part of the content of the proposed white paper summarising the conclusions of this meeting.