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# Radiogenic neutron background predictions in DEAP-3600 and in situ measurements

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Neutron-induced backgrounds are among the dominant backgrounds in low-background experiments. One of the main processes that produce these neutrons is the ($\alpha$,n) reaction occurring in detector components. An accurate understanding of these backgrounds is important for any low-background experiment. In this talk, we will present NeuCBOT, a new tool for calculating ($\alpha$,n) yields and neutron energy spectra in arbitrary materials. By combining NeuCBOT calculations with ex situ measurements of the radioactive contamination of detector components, we will predict the neutron backgrounds in the DEAP-3600 Weakly Interacting Massive Particle detector.

DEAP-3600 is a single-phase detector located at SNOlab with over three tonnes of liquid argon. When neutrons scatter in the liquid argon, they produce a scintillation signal that can be differentiated from most backgrounds using pulse shape discrimination. After the neutron scatters in the argon, it will slow down and eventually capture in one of the detector components. By detecting coincidences between the nuclear recoils in the liquid argon and the signal produced by neutron capture products, we can place an in situ constraint on the neutron background rate in the experiment. By doing so, we will show that the neutron background rate in DEAP-3600 is consistent with the predictions made by NeuCBOT.

**Author:** WESTERDALE, Shawn (Carleton University)

**Presenter:** WESTERDALE, Shawn (Carleton University)

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