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Nuclear Physics Backgrounds for Liquid Argon Neutrino Detectors VICTOR GEHMAN, KELSEY OLIVER-MALLORY, Lawrence Berkeley National Laboratory, KATE SCHOLBERG, Duke University — We present an analytic calculation of the radioactive backgrounds in neutrino detectors using liquid argon as their active medium, using the proposed LBNE far detector as a concrete example. These radioactive backgrounds are one of the main factors that will set the low-energy threshold of such a detector and will play an important role in its overall data rate. The presence or absence of these backgrounds will also determine the ultimate sensitivity of a liquid argon based neutrino detector to astrophysical neutrino signals, most importantly, those from galactic supernova bursts. The radioactive backgrounds in this study fall into two categories: intrinsic radioactivity from detector construction materials (^{232}Th, ^{238}U, ^{60}Co, ^{40}K, ^{85}Kr, and ^{39}Ar), and cosmogenic backgrounds originating from *in situ* activation of the argon. We include neutron and proton flux as a function of detector overburden, both in terms of direct energy depositions and for cosmogenic activation. We then use this depth dependent background model to study the sensitivity of a large liquid argon detector to supernova burst neutrinos using both analytic and Monte Carlo techniques.

Victor Gehman
Lawrence Berkeley National Laboratory

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