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Depleted Argon from Underground Sources

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Argon is a powerful scintillator and an excellent medium for detection of ionization. Its high discrimination power against minimum ionization tracks, in favor of selection of nuclear recoils, makes it an attractive medium for direct detection of WIMP dark matter. However, cosmogenic ^{39}Ar contamination in atmospheric argon limits the size of liquid argon dark matter detectors due to pile-up. The cosmic ray shielding by the earth means that Argon from deep underground is depleted in ^{39}Ar . In Cortez Colorado a CO_2 well has been discovered to contain approximately 500ppm of argon as a contamination in the CO_2 . In order to produce argon for dark matter detectors we first concentrate the argon locally to 3-5% in an Ar, N_2 , and He mixture, from the CO_2 through chromatographic gas separation. The N_2 and He will be removed by continuous cryogenic distillation in the Cryogenic Distillation Column recently built at Fermilab. In this talk we will discuss the entire extraction and purification process; with emphasis on the recent commissioning and initial performance of the cryogenic distillation column purification.

Author: Dr BACK, Henning (Princeton University)

Co-authors: Prof. ALTON, Andrew (Augustana College); Mr GORETTI, Augusto (Princeton University); Mr LOER, Ben (Princeton University); Mr KENDZIORA, Cary (Fermi National Accelerator Laboratory); Prof. GALBIATI, Cristiano (Princeton University); Mr MONTANARI, David (Fermi National Accelerator Laboratory); Prof. CALAPRICE, Frank (Princeton University); Mr MOSTEIRO, Pablo (Princeton University); Dr PORDES, Stephen (Fermi National Accelerator Laboratory)

Presenter: Dr BACK, Henning (Princeton University)

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