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Argon Depletion for a Large Scale Dark Matter Detector[1] DANA BYRAM, JASON SPAANS, DONGMING MEI, YONGCHEN SUN, CHRISTINA KELLER, DUSTIN NOWOTNY, University of South Dakota, CUBED COLLABORATION — Our project intends to provide argon depleted of ^{39}Ar by utilizing established thermal diffusion methods for isotopic separation. The depleted argon can then be used as a target material for next generation large scale dark matter detectors. Thermal diffusion exploits an established temperature gradient to produce a concentration gradient along the length of a vertical column. In this concentration gradient, the heavier isotopes accumulate at the bottom end of the column and the lighter isotopes at the top. We have built an automated twenty column thermal diffusion system. Each three meter column consists of a copper tube encasing a tungsten wire which is heated to 1200 K. The copper tube is surrounded by a water bath which is maintained at a temperature of 300 K, thus establishing a temperature gradient between the copper column and the tungsten wire. We expect to deplete the ^{39}Ar isotope by a factor of 10 with the current design with the ultimate goal of a depletion factor of 100. The results of this effort will be reported utilizing the more abundant isotope ^{36}Ar. In addition, the current effort for obtaining ^{39}Ar results will be presented.

[1]South Dakota Board of Regents, NASA

Dana Byram
University of South Dakota

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