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Depleted Argon for Large Scale Dark Matter Detectors[1] JASON SPAANS, DONGMING MEI, YONGCHEN SUN, CHRISTINA KELLER, University of South Dakota — Our project aims 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 a thermal diffusion system that consists of a copper column encasing a tungsten wire which is heated to 1200 K. The copper column 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 preliminary results of this effort will be reported utilizing the more abundant isotope ^{36}Ar.

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