

Abstract Submitted  
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**Argon Depletion for a Large Scale Dark Matter Detector**<sup>1</sup> DANA BYRAM, DONGMING MEI, DUSTIN NOWOTNY, University of South Dakota, JASON SPAANS — A system of Thermal Diffusion columns is being built and tested at the University of South Dakota for the purposes of providing argon depleted of <sup>39</sup>Ar. Thermal diffusion is a well-known technique in isotope separation, which introduces a radial temperature gradient in a gas column to produce a vertical concentration gradient via convective currents. In this concentration gradient, the heavier isotopes accumulate at the bottom of the column and the lighter isotopes at the top. The test system under development will allow us to deplete 1 kg of natural argon by a factor of 10 for over two months. This would lead to the full-scale production of depleted argon by using more columns that are longer in length. In addition, recycling depleted argon through the column yields further depletion up to a theoretical maximum factor of about 1000. This highly depleted argon could then be used as a target material for next generation dark matter detectors. Preliminary depletion results in 3 meter columns will be reported utilizing the more abundant isotope <sup>36</sup>Ar and progress toward an automated gas collection system will be discussed.

<sup>1</sup>CUBED

Dana Byram  
University of South Dakota

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