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New Measurement of ^{39}Ar in Underground Argon with a Low Background Liquid Argon Detector JINGKE XU, Department of Physics, Princeton University, DARKSIDE COLLABORATION — A low background liquid argon detector has been developed for sensitive measurements of the beta radioactive ^{39}Ar in argon from underground sources. The measurement is motivated by the need to improve on earlier studies that showed no sign of ^{39}Ar in certain sources of underground argon, but with a limited sensitivity of $\sim$ 5% relative to ^{39}Ar in atmospheric argon[1]. We will report preliminary measurements taken with the low background detector that was commissioned and operated at the Kimballton Underground Research Facility (KURF) in Virginia. A combination of passive and active background reduction techniques resulted in a very low background and a null result with sensitivity to ^{39}Ar less than 1% of atmospheric. The results confirm that underground argon is well suited for direct detection of dark matter WIMPs.

[1] D. Acosta-Kane et al., Nucl. Instr. Meth. A **587**:46 (2008)

Jingke Xu
Department of Physics, Princeton University

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