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Atom counting system to measure ultra-low Kr-85 contamination in liquid xenon dark matter detectors TAE HYUN YOON, LUKE GOETZKE, ANDRE LOOSE, ELENA APRILE, TANYA ZELEVINSKY, Columbia University — The XENON experiment aims at the direct detection of dark matter in the form of Weakly Interacting Massive Particles (WIMPs) via their elastic scattering off Xe nuclei. To achieve the required sensitivity, it is necessary to suppress Kr contamination of Xe which causes background events in Xe targets through Kr-85 beta decay. Magneto-optical techniques are used to cool and trap metastable Kr atoms from a RF plasma discharge. Fluorescence from single trapped Kr atoms can be detected with a sensitive photodetector. The cold-atom apparatus has been initially tested with Ar to avoid contamination by Kr. Several recent improvements increase the capture efficiency, including source cooling and additional transverse cooling of the metastable atomic beam. Results from tests with Ar and single atom detection with Kr will be presented.

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