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Detection of residual krypton in xenon gas for WIMP dark matter searches[1] ATTILA DOBI, University of Maryland — The next generation of WIMP dark matter searches using liquid xenon as a target medium will require unprecedented rejection of residual krypton contamination. Krypton contains the beta emitting isotope ^{85}Kr, with a relative abundance of about 10^{-11} (^{85}Kr/^{nat}Kr), and this beta decay can be an important source of background for these experiments. Krypton is typically present in commercially produced xenon at the level of tens of parts-per-billion, about four orders of magnitude too large for present day dark matter experiments such as XENON, LUX, and XMASS. Additional processing via gas chromatography and distillation are used to separate krypton from xenon, but measuring the remaining krypton level at the part-per-trillion (ppt) level is challenging. Recently we have developed a highly sensitive and simple technique to measure residual krypton contamination in xenon gas using an RGA mass spectrometer and a liquid nitrogen cold trap. We describe here the results of our calibration experiments to determine the ultimate limit of detection of the method, and we discuss the implications for the next generation of WIMP dark matter experiments.

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