

Removal of Electronegative Impurities from Xenon in the Liquid Phase

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An essential requirement for dark matter detection using liquid xenon (LXe) time-projection chambers is the removal of electronegative molecules, which are outgassed from detector materials and to which drifting electrons attach, reducing the observable ionization signal. Such detectors to date have relied on the continuous removal of these impurities from evaporated xenon using high-temperature getters and gas pumps. Filtration of xenon in the liquid phase can benefit from the higher mass flows delivered by commercial cryogenic pumps, but it is a challenge to find a filter with a sufficiently high reaction rate and adsorption capacity at LXe temperatures while maintaining the radio-purity required for these experiments. The Xecclipse test stand at Columbia University was designed to study the filtration of electronegative impurities from xenon in the liquid phase. This talk will describe Xecclipse and its results, which guided the design of the XENONnT liquid purification system.

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Author: HOWLETT, Joseph (Columbia University)

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