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Used Nuclear Fuel as a Xenon Source

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Decades of innovation have established xenon TPCs as a leading detector technology in the search for new physics in the form of Majorana neutrinos and WIMP-like dark matter. Searches for both phenomena have probed significant parameter space but have yet to make a discovery. To further augment sensitivity, new experiments will require greater xenon masses. While these two new physics channels have differing detector requirements, they have a common need for a large amount of xenon. This requirement for tons (even kilotons) of xenon drives up the cost of these experiments and makes their development susceptible to the waverings of a limited market of atmospheric-xenon.

An alternative source of xenon could be found in used nuclear fuel (UNF). Xenon is a dominant fission product and is present in UNF at concentrations thousands of times greater than in the atmosphere. Canada's fleet of CANDU reactors has been adding to UNF inventory for over half a century. In this talk, I will discuss the possibility of tapping into this resource and what potential steps may be required.

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