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Depleted Argon extraction for Dark Matter Searches

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The DarkSide Collaboration just completed a 7-years effort in collection and purification of underground argon depleted in the radioactive ^{39}Ar , which pollutes atmospheric argon at the level of 1 Bq/kg. I will present the first results of the operation of the DarkSide-50 detector with underground argon.

The availability of tonne-scale batches of depleted argon is a key enabling element of large scale dark matter detectors. I will present the plans of the DarkSide Collaboration for the expansion of the collection of underground argon and for the possible, further active isotopic depletion of underground argon.

Summary

The URANIA Collaboration is planning to build and operate a plant capable of extracting and purifying 100 kg per day of naturally depleted argon from underground sources. Naturally depleted argon is one of the best candidates for large scale dark matter searches. Its large scale availability may enable a ultimate search for dark matter at Laboratori Nazionali del Gran Sasso with technology and detectors developed by the DarkSide Collaboration.

Exploiting technologies for purification of noble gases developed at Princeton, Fermilab, and LNGS, the URANIA Collaboration is also exploring the development of a state-of-the-art facility for active isotopic enrichment of stable isotopes, which may revolutionize the way specialized targets for low-background experiments are prepared.

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