Contribution ID: **270** Type: **Poster**

Sensitivity of the DARWIN observatory to the neutrinoless double beta decay of 136-Xe

DARWIN will be a direct dark matter detection experiment using a multi-ton liquid xenon time projection chamber at its core. With 50 tonnes of natural xenon, DARWIN will be designed to explore the entire experimentally accessible parameter space for WIMPs. In addition, profiting from state-of-the-art techniques, DARWIN will achieve unprecedented levels of background, therefore creating the opportunity to observe other rare interactions. One ambitious goal is the search for the neutrinoless double-beta decay of 136-Xe which has an abundance of 8.9% on natural xenon. We present the expected half-life sensitivity of DARWIN to this rare nuclear decay process. The study is based on detailed Monte Carlo simulations of the backgrounds from detector materials, sources intrinsic to the xenon, as well as solar neutrinos. We show that DARWIN will be comparable to dedicated double beta decay experiments using enriched 136-Xe.

Mini-abstract

DARWIN will be comparable to dedicated double beta decay experiments using enriched 136-Xe.

Experiment/Collaboration

DARWIN Collaboration

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Session Classification: Poster Session 2