

Developments in surface background removal for the DARWIN liquid xenon detector

In the current state of rare-event searches, an increase in target mass is necessary to improve the experiments sensitivity. This will be the case of the multi-ton liquid xenon DARWIN detector aiming at the direct detection of dark matter as well as studying neutrino physics. Even if very low background levels have already been achieved in such detectors, further control and reduction are both critical and challenging. A significant contribution comes from natural radioactivity. Several strategies have been adopted to tackle this issue. Materials are screened and selected for radio-purity and detector manufacturing is tightly controlled. As observed in XENON1T, for instance, a surface background coming from radon daughters can reduce the sensitivity of an experiment. Therefore, surface cleaning techniques are explored to mitigate this effect and will be extensively used for the future experiment DARWIN. The compatibility of such surface treatments with the operation of a liquid noble-gas time projection chamber is currently being demonstrated in a dedicated setup. This talk will highlight the promising results already obtained and potential leads for future improvement.

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