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The SoLid Experiment

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Oscillation to sterile neutrinos is considered as a possible explanation for the reactor and Gallium neutrino anomalies, which both measured a deficit of neutrinos at short distances from the respective sources.
The SoLid experiment will test this hypothesis by measuring neutrino energy spectra between 6-8 m from a reactor core and looking for distortions in the spectra at different distances caused by any oscillation.
The experiment uses a novel detector design built up from PVT scintillator cubes with one face covered by a mixture of lithium-6 fluoride and silver activated zinc sulphide.
Electron anti-neutrinos from the reactor are reconstructed from the detection of the positron and neutron from Inverse Beta Decay (IBD) events.
The positrons are detected in the PVT scintillator, while the neutrons thermalise and then react with the lithium-6, producing particles which are detected in the zinc sulphide scintillator.
Due to the properties of the two scintillators the positron and neutron signals can easily be distinguished.
The highly segmented detector means that precision timing and location of the detected neutron (relative to the prompt positron signal) can be used in identifying IBD events, enabling a strong suppression of an accidental combination of the background neutron signal with the high rate of gamma rays coming from the reactor.

The experiment will be performed at the BR2 research reactor at SCK-CEN in Mol, Belgium.
A small (8 kg) prototype detector was constructed in 2013 and has been deployed at the experimental site during a number of reactor on/off cycles.
The prototype detector is being used to understand the background signals expected for the experiment and to measure the detector response so that the full scale detector's design can be optimised.
In this talk the motivation for the experiment will be reviewed, the experimental set-up will be introduced and the detection principle will be explained using data collected by the prototype.

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