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SoLid technology and construction

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Although the phenomenon of neutrino oscillations has been discovered more than 10 years ago, some anomalies still remain in the neutrino oscillation data [1]. One of these is the reactor antineutrino anomaly, showing a deficit of detected neutrinos from a reactor when compared to what is expected from calculated fluxes. A possible explanation would be the existence of a sterile neutrino, which is a fourth light neutrino (mass of about 1eV) that only couples to Standard Model neutrinos via oscillation at short distance [2]. To resolve these
inconsistencies and test the sterile neutrino hypothesis, precise measurements very close to a reactor core need to be performed.

This is the aim of the SoLid experiment. The experiment makes use of a novel detector technology
based on the combination of 5cm x 5cm x 5cm PVT cubes and 6LiF:ZnS screens. This technology provides an improvement for the background rejection capabilities, the neutron
identification and the localization of the inverse beta decay compared to the standard
liquid scintillators + Gd detectors.

During the past 2 years the SoLid collaboration has build 2 prototype detectors, NEMENIX and the SubModule1(SM1), to prove the feasibility of the detector technology. The experience of the Collaboration during the construction, commissioning and data taking with the 288kg SM1 detector will be reported and will be used to build the 1.5 ton full scale SoLid detector by fall 2016.

This poster will cover the novel technology used in the SoLid experiment and will discuss the improvements made on the design and electronics for the construction of the full SoLid detector.

References

[1] K. N. Abazajian et al., Light sterile neutrinos: A white paper" arXiv:1204.5379

[2] G. Mention et al., The reactor antineutrino anomaly" DOI:10.1103/PhysRevD.83.073006
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