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P2.083 Improvements in the simulation code of the SOX experiment

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The SOX experiment aims to investigate the existence of sterile neutrinos by testing the Gallex and reactor anomalies with a short baseline oscillation experiment. The successful detection of a signal incompatible with the Standard Model prediction could imply the existence of at least one sterile neutrino and consequently it could be a breakthrough in the search for new physics.

The SOX project consists in deploying a high activity ^{144}Ce-^{144}Pr antineutrino source below the Borexino detector, exploiting the well proven capability of Borexino of detecting antineutrinos via inverse beta decay. We will study the eventual disappearance of antineutrino through both the comparison of the measured and expected antineutrino fluxes and with an oscillometric analysis.

A reliable simulation algorithm of the experiment is fundamental for the data analysis, both for sensitivity studies and for the calculation of the efficiency in detecting the inverse beta decay in the peripheral regions, close to the vessel surrounding the innermost active zone. The Borexino simulation code has been extended, in order to be ready for the SOX data analysis. This poster shows the most important achievements and improvements, together with some comparisons between calibration data and simulations, which demonstrate the level of understanding of the detector response and its modelling.

Finally, a novel efficient method for simulating external background events surviving the Borexino passive shield is presented. This technique allows to reliably predict the effect of the external contaminations and can be very useful for the next generation of liquid scintillator experiments.