

Nuclear recoil QF measurement for ANAIS-112

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ANAIS is an experiment aimed at directly detecting dark matter, with the objective to either verify or refute the annual modulation signal observed by DAMA/LIBRA. ANAIS-112, which consist of 112.5 kg of NaI(Tl) scintillators, has been taking data at the Canfranc Underground Laboratory in Spain since August 2017. The results obtained from the first three years of collected data do not indicate any modulation and are inconsistent with the DAMA/LIBRA's results. Furthermore, to effectively test this signal, it's essential to know the scintillation quenching factors (QF), used to convert the measured energies into nuclear recoil energies. Previous QF measurements in NaI(Tl) have shown discrepancies. Therefore, a dedicated neutron calibration strategy is currently being followed to understand the response of the ANAIS-112 detectors to nuclear recoils. This initiative includes two procedures: firstly, the sodium QF was evaluated by inducing nuclear recoils in the ANAIS-112 crystals using ^{252}Cf sources; and secondly, a dedicated measurement was performed using a monoenergetic neutron beam. Such measurement, which is presented in this dissertation, is focused on the analysis of different systematics affecting the QF measurements and analysis. Two different methods used in the previous QF measurements for calibrating the NaI(Tl) response to electron recoils are compared, and the differences in the QF results produced by that systematic are identified.

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