Contribution ID: **19**   Type: **not specified**

Analysis of backgrounds for the ANAIS-112 dark matter experiment

The **ANAIS (Annual modulation with NaI(Tl) Scintillators)** experiment aims at the confirmation or refutation of the DAMA/LIBRA positive annual modulation signal in the low energy detection rate, using the same target and technique, at the Canfranc Underground Laboratory (LSC) in Spain. ANAIS-112, consisting of nine 12.5 kg NaI(Tl) modules produced by Alpha Spectra Inc., is taking data smoothly in "dark matter search" mode since August, 2017, after a commissioning phase and operation of the first detectors during the last years in various set-ups. A large effort has been carried out within ANAIS to characterize the background of sodium iodide detectors before unblinding the data and performing the first annual modulation analysis corresponding to 1.5 years of data taking, which is about to be released.

In this presentation, the **background models** developed for all the nine ANAIS-112 detectors will be shown. Measured spectra from threshold to high energy in different conditions are well described by the models based on quantified activities independently estimated following several approaches. In the region from 1 to 6 keVee the measured, efficiency corrected background level is 3.58+-0.02 keV-1 kg-1 d-1; NaI crystal bulk contamination is the dominant background source being 210Pb, 40K, 22Na and 3H contributions the most relevant ones. The background models have also allowed to predict the evolution in time of the rates in different energy windows, supporting the assumed trends in the annual modulation analysis.

This background level obtained in the region of interest, added to the achieved 1 keVee analysis threshold (thanks to the outstanding light collection and robust filtering procedures developed), allow ANAIS-112 to be sensitive to the modulation amplitude measured by DAMA/LIBRA and to be able to explore at three sigma level in five years the DAMA/LIBRA single-out WIMP parameter region.

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