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## AN AIS–112: updated results on annual modulation with three-year exposure

*Thursday 31 August 2023 16:15 (15 minutes)*

The ANAIS (Annual modulation with NaI(Tl) Scintillators) experiment is intended to search for dark matter annual modulation with ultrapure NaI(Tl) scintillators in order to provide a model independent confirmation or refutation of the long-standing DAMA/LIBRA positive annual modulation signal in the low energy detection rate, using the same target and technique. Other experiments exclude the region of parameters singled out by DAMA/LIBRA. However, these experiments use different target materials, so the comparison of their results depends on the models assumed for the dark matter particle and its distribution in the galactic halo. ANAIS–112, consisting of nine 12.5 kg NaI(Tl) modules produced by Alpha Spectra Inc., disposed in a 3×3 matrix configuration, is taking data smoothly with excellent performance at the Canfranc Underground Laboratory, Spain, since August, 2017. Last published results corresponding to three-year exposure were compatible with the absence of modulation and incompatible with DAMA/LIBRA for a sensitivity of  $2.5\text{--}2.7\sigma$  C.L. Present status of the experiment and a reanalysis of the first 3 years data using new filtering protocols based on machine-learning techniques will be reported in this talk. This reanalysis allows to improve the sensitivity previously achieved for the DAMA/LIBRA signal. Updated sensitivity prospects will also be presented: with the improved filtering, testing the DAMA/LIBRA signal at  $5\sigma$  will be within reach in 2025.

### Submitted on behalf of a Collaboration?

Yes

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