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ANAIS-112: updated results on annual modulation with three-year exposure

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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 2.5-2.7 σ 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 σ will be within reach in 2025.

Submitted on behalf of a Collaboration?

Yes

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