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Towards a robust model-independent test of DAMA/LIBRA: ANAIS-112 six-year exposure results and prospects

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The ANAIS experiment aims to verify or refute in a model independent way with a high statistical significance the longstanding positive annual modulation signal observed by DAMA/LIBRA. For this goal, ANAIS experiment uses the same target, NaI(Tl), and technique, the analysis of the annual modulation in the scintillation signal observed at very low energy. ANAIS–112 consists of nine modules, 12.5 kg each, of NaI(Tl) arranged in a 3×3 configuration, plus a blank module without NaI(Tl) crystal. ANAIS-112 has been continuously collecting data at the Canfranc Underground Laboratory in Spain since August 2017, demonstrating outstanding performance. Updated results with six-year exposure will be presented: they are consistent with the absence of modulation and incompatible with the DAMA/LIBRA result with a sensitivity above 4σ C.L. Systematics affecting this test will be analysed and discussed. Finally, updated sensitivity projections will be provided, pointing at a 5σ exclusion of the DAMA/LIBRA signal with the data accumulated by the end of 2025.

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