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ANAIS-112: testing the DAMA/LIBRA signal beyond 3 sigma

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To the date, the only positive signal of presence of dark matter (DM) in the Milky Way halo by direct observation of its interaction with a detector comes from the DAMA/LIBRA experiment in the Gran Sasso National Laboratory (LNGS). For more than 20 years it has observed an annual modulation in the low energy counting rate compatible with that expected due to the rotation of the Earth around the Sun. For most WIMP candidates this result is incompatible with the negative results of other experiments, remaining as one of the most intriguing puzzles in the field.
The goal of ANAIS-112 is to provide a direct and independent check of the DAMA/LIBRA DM positive result using the same type of detector: NaI(Tl) scintillators. The experiment was installed in August 2017 in the Canfranc Underground Laboratory (LSC) and is taking data since then with excellent performance. The results published so far, corresponding to 1.5 and 3 years of data collection, show no modulation and are incompatible with DAMA/LIBRA for a sensitivity of 2.5-2.7σ C.L. In this talk I will present a reanalysis of the 3 years data using new filtering protocols based on machine learning techniques, which notably increases the experimental sensitivity. New sensitivity prospects and preliminary modulation results will also be presented.

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