

COSINUS: Direct dark matter searches using sodium iodide as a cryogenic calorimeter

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Among many earth-bound experimental attempts to detect dark matter (DM) particles, the DAMA/LIBRA experiment is the only one that has been claiming to observe the annual modulation of the event rate in the detector expected from DM in the Milky Way. The experiment is detecting the modulation signal for more than two decades with a statistical significance of 13.7 sigma. However, numerous null results of various other DM searches exclude the region of parameter space set by DAMA/LIBRA under standard assumptions. In order to resolve this decade-long tension, a model-independent validation must be performed using the same detector material: sodium iodide (NaI) crystals.

Cryogenic Observatory for Signals seen in Next-generation Underground Searches (COSINUS) is one of the several experiments designed to validate the DAMA/LIBRA results but is the only NaI-based experiment capable of identifying nuclear recoils on an event-by-event basis. With its low nuclear recoil energy threshold and the ability to discriminate between signal and background, COSINUS will provide a reliable comparison with DAMA/LIBRA.

Following years of research and development on prototype detectors, COSINUS is currently under construction at Laboratori Nazionali del Gran Sasso (LNGS) in Italy. In our talk, we present the key features and challenges of COSINUS, including its current status and future goals.

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