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COSINUS: Probing the DAMA/LIBRA claim with NaI-based cryogenic detectors

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Dark matter is a main ingredient of the cosmos, its nature however is still in the dark. At present, after enormous progress in direct dark matter searches, the situation of this key question of today's particle physics is controversial: DAMA/LIBRA observes an annual modulation signal at high confidence matching the expectation for dark matter. In the so-called standard scenario, however, the DAMA/LIBRA signal is incompatible with the null-results of numerous other direct searches.

COSINUS aims to disentangle this inconsistency by providing a fully model-independent clarification of the DAMA claim. To exclude material effects, COSINUS will use crystals of sodium iodide, just as the DAMA/LIBRA experiment. Yet, COSINUS will not operate them as mere scintillation detectors, but as so-called cryogenic scintillating calorimeters at milli-Kelvin temperatures providing a coincident, independent measurement of both the temperature signal and the scintillation light signal caused by a particle interaction. Since the amount of produced light depends on the particle type (light quenching), this yields identification of the type of interacting particle on an event-by-event basis.

In this contribution we will present the recent achieved performance of first generation detectors. Furthermore, we will report first results on light quenching of nuclear recoils events in comparison to electron/gamma events measured at milli-Kelvin temperatures. We will conclude with a discussion on future steps and prospects.

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