

Conceptual design of the COSINUS experiment using cryogenic NaI detectors for direct dark matter search

The COSINUS (Cryogenic Observatory for Signatures seen in Next-generation Underground Searches) project is in the final planning phase of building up the experiment at an underground site.

Crystals made of NaI will be operated as cryogenic detectors to search for DM-nucleus scattering with the aim of probing the long-standing results of the DAMA/LIBRA collaboration. Operating the detectors at milli-Kelvin temperatures allows for a two-channel read-out by simultaneously measuring the phonon and the scintillation light signal. This technique enables particle discrimination on an event-by-event basis helping to distinguish β/γ backgrounds from nuclear recoils. In order to fulfill the crucial task of background minimization, the detectors will be surrounded by a dedicated shielding setup built inside the underground laboratory.

Within this contribution, I will present results of the Geant4 simulations laying ground for the shielding concept of COSINUS, accompanied by data of detector prototype measurements and of our NaI crystals.

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