

COSINUS –Search for dark matter with cryogenic NaI detectors

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Dark matter is one of the largest unsolved mysteries in particle-astrophysics. Its existence is evident through the gravitational impact it has on astronomical observations and it makes up 26% of the mass-energy content of the universe. Over the past twenty-five years the DAMA/LIBRA (formerly DAMA/NaI) experiment has observed an annual modulation signal that is consistent with a dark matter explanation, but, in a standard halo scenario, the signal is contradicted by the null-results of numerous experiments that utilize different target materials. In order to perform a truly model-independent investigation of the DAMA/LIBRA result an experiment with the same target material is required. The COSINUS (Cryogenic Observatory for Signatures seen in Next-generation Underground Searches) experiment will use NaI crystals operated as cryogenic scintillating calorimeters to cross-check the DAMA/LIBRA result. These detectors will be cooled to milli-Kelvin temperatures and provide a measurement of both the phonon and scintillation light signal caused by particle interactions. This is the first cryogenic measurement of NaI detectors for a dark matter search and the dual channel capability will allow particle discrimination between electron and nuclear recoils on an event-by-event basis. In this talk we will present the current status of the experimental setup, which is currently ongoing at the Gran Sasso underground laboratories in Italy. Furthermore, we detail the recent results from the new “remoTES” detector prototype and the simulations for an active water Cherenkov muon veto.

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