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COSINUS: Cryogenic calorimeter for the direct dark matter search with NaI crystals

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COSINUS (Cryogenic Observatory for Signatures seen in Next-generation Underground Searches) is a cryogenic calorimeter operated at mK temperature, dedicated to the direct dark matter search in underground laboratories. Its main goal is to cross-check the annual modulation signal the DAMA collaboration has been detecting since many years and which has been ruled out by other experiments in some dark matter scenarios. COSINUS can provide a model independent test by the use of the same target material, with the additional chance of discriminating β/γ events from nuclear recoils on an event-by-event basis, by the application of the well-established technique developed within the CRESST collaboration. By analogy, each module is constituted by two detectors: the light detector, that is a silicon beaker equipped with a Transition Edge Sensor (TES) and the phonon detector, a small cube of NaI crystal interfaced to a carrier of a harder material (e.g. CdWO_4), also instrumented with a TES. The obstacles in operating NaI for cryogenic applications are well-known: The TES-based technology had never been applied to NaI crystals. However, the employment of this material is crucial to pursue our main goal and COSINUS is the first who achieved the result of operating NaI crystals as cryogenic calorimeters. During this talk, we present the COSINUS project, we describe the achievements and the challenges of the COSINUS prototype development and we discuss the status and the perspectives of this NaI-ce cryogenic frontier.

Less than 5 years of experience since completion of Ph.D

Y

Student (Ph.D., M.Sc. or B.Sc.)

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