



Contribution ID: 33

Type: **not specified**

Optimization of the COSINUS experiment for background reduction using Monte Carlo simulations

Thursday 25 April 2024 14:40 (20 minutes)

COSINUS (Cryogenic Observatory for Signatures seen in Next-generation Underground Searches) is a direct detection dark matter experiment, whose goal is to perform a model-independent cross-check of the long-standing DAMA/LIBRA claim. The experiment uses NaI crystals as scintillating calorimeters which allow for the detection of both light and phonon signals, giving event-by-event particle discrimination. COSINUS is currently being constructed at the Laboratori Nazionali del Gran Sasso, in Italy. In this low background, underground facility, the detectors are located in a dilution refrigerator at the centre of a 7x7 m cylindrical water tank, which acts as both a passive and active shield. This talk will present the results of the detailed Monte Carlo simulations that optimized the geometry of the shielding in order to minimize dark matter like background events. Additionally, this talk will also discuss future modeling of the intrinsic radioactive background based on extensive material screening processes.

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Session Classification: Workshop