



Canadian Association
of Physicists

Association canadienne
des physiciens et physiciennes

Contribution ID: 2099

Type: Oral (Non-Student) / Orale (non-étudiant(e))

CUTE –A low background facility for testing cryogenic detectors

Thursday 14 June 2018 08:30 (15 minutes)

The Cryogenic Underground Test (CUTE) facility is under construction at SNOLAB, aiming to test the performance of the cryogenic detectors of the Super Cryogenic Dark Matter Search (SuperCDMS) experiment.

The 'Ultra Quiet Technique'(UQT®) is applied to reduce the vibration transmission from an advanced dry dilution refrigerator (CryoConcept, France) that allows operating the cryogenic detectors at low temperature. In addition, a dedicated suspension system has been developed to decouple the cryostat from the environment with a low stiffness support.

The CUTE facility is designed for an expected background rate less than ~ 3 events/(keV kg d) at the energies below 2 keV. This is achieved by placing the dilution refrigerator in a drywell in the center of a 3.6 m diameter water tank. A 10 cm of low-activity lead will be placed inside the drywell to further reduce the gamma background from environment. The Bremsstrahlung from ^{210}Pb contamination in the lead will be reduced by a 2 cm inner layer of copper or archeological lead.

Thus, the expected background will allow not only to perform any required calibrations and functionality tests, but also to measure the cosmogenic activation of the detector target material. The cosmogenic ^3H in Ge and ^{32}Si in Si are expected to be the limiting background components for SuperCDMS at low energy. Furthermore, the sensitivity to very low mass WIMPs can be improved taking advantage of the low energy threshold in the new SuperCDMS detectors.

We report here the current status and scientific program of the CUTE facility to host various cryogenic detectors for performance testing and unique physics runs.

Author: NAGORNY, Serge (Queen's University)

Presenter: NAGORNY, Serge (Queen's University)

Session Classification: R1-3 Particle Physics IX (PPD) | Physique des particules IX (PPD)

Track Classification: Particle Physics / Physique des particules (PPD)