Contribution ID: **546** Type: **Poster**

Atmospheric Argon Instrumentation for LEGEND-1000 at LNGS

Tuesday, 18 June 2024 17:30 (2 hours)

LEGEND-1000 is a next-generation ton-scale experiment searching for neutrinoless double beta decay of ^{76}Ge using p-type, high-purity germanium detectors. The experiment is planned for 1000 kg of Ge detectors enriched to more than 90% in ^{76}Ge.

The experiment is going to be installed at LNGS (3800 mwe) to reduce direct and induced backgrounds from cosmic rays.
While standard analysis techniques are very effective in removing prompt backgrounds, muon-induced events, associated with the production of long-lived isotopes in Ge detectors, require the application of delayed coincidence cuts between muon veto, liquid argon veto and the Ge detectors.

We present the design principles for the new active veto for LEGEND-1000 at LNGS. The goal is to instrument the atmospheric liquid argon volume and enhance the delayed coincidence cut efficiency by identifying neutron captures in argon via de-excitation gammas. We will discuss the various readout options considered and their performance, estimated through Geant4 simulations.

This work is supported by the U.S. DOE and the NSF, the LANL, ORNL and LBNL LDRD programs; the European ERC and Horizon programs; the German DFG, BMBF, and MPG; the Italian INFN; the Polish NCN and MNiSW; the Czech MEYS; the Slovak SRDA; the Swiss SNF; the UK STFC; the Russian RFBR; the Canadian NSERC and CFI; the LNGS, SNOLAB, and SURF facilities.

Poster prize

Yes

Given name

Michele

Surname

Morella

First affiliation

Gran Sasso Science Institute

Second affiliation

INFN LNGS

Institutional email

michele.morella@gssi.it

Gender

Male

Collaboration (if any)

Primary authors: MORELLA, Michele (Gran Sasso Science Institute and INFN LNGS); CESARANO, Raoul (Gran Sasso Science Institute and INFN LNGS)

Co-authors: BARTON, CJ (Roma Tre University and INFN Roma Tre); CATTADORI, Carla (INFN Milano Bicocca); MACOLINO, Carla (L'Aquila University and INFN LNGS); WIESINGER, Christoph (Technische Universität München); BORRA, Francesco (Roma Tre University and INFN Roma Tre); SALAMIDA, Francesco (L'Aquila University and INFN LNGS); SALAMANNA, Giuseppe (Roma Tre University and INFN Roma Tre); ABRITTA, Igor (Roma Tre University and INFN Roma Tre); PERTOLDI, Luigi (Technische Universität München and INFN Padova); NEUBERGER, Moritz (Technische Universität München); DI MARCO, Natalia (Gran Sasso Science Institute and INFN LNGS); BRUGNERA, Riccardo (Padova University and INFN Padova); MEIRELES, Sincler (L'Aquila University and INFN LNGS); CALGARO, Sofia (Padova University and INFN Padova); SCHÖNERT, Stefan (Technische Universität München); BIANCACCI, Valentina (Gran Sasso Science Institute and INFN LNGS); D'ANDREA, Valerio (INFN Roma Tre)

Presenters: MORELLA, Michele (Gran Sasso Science Institute and INFN LNGS); CESARANO, Raoul (Gran Sasso Science Institute and INFN LNGS)

Session Classification: Poster session and reception 1

Track Classification: Neutrinoless Double Beta Decay