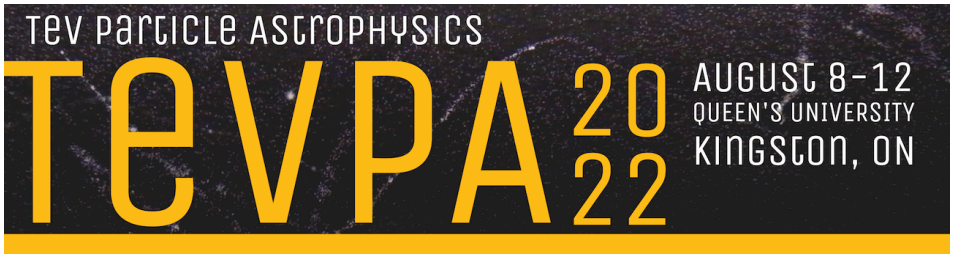

Contribution ID: **31** Type: **Parallel Talk**

LEGEND-1000: a future ton-scale experiment for Neutrinoless Double Beta Decay

Monday 8 August 2022 16:10 (20 minutes)

LEGEND-1000 [1] is a next-generation ton-scale experiment searching for neutrinoless double beta decay ($0\nu\beta\beta$) of ^{76}Ge using p-type, high-purity ICPC germanium semiconductor detectors. The experiment is based on 1000 kg of Ge detectors enriched to more than 90% in ^{76}Ge. The detectors are operated submerged in liquid argon (LAr), which act as a cooling medium and, through the detection of its scintillation light by a system of light-guiding fibers coupled to SiPMs, as active shield. Germanium detectors are intrinsically very pure and have a high density allowing to deploy substantial mass in limited volumes. The excellent energy resolution of germanium detectors (about 0.12% FWHM @ $Q_{\beta\beta}$) allows the identification of a peak at $Q_{\beta\beta}$ while pulse shape analysis makes background discrimination based on event topology possible. LEGEND-1000 is going to be installed in an underground laboratory to reduce direct and induced backgrounds from cosmic rays. The baseline design assumes LEGEND-1000 to be installed in the SNOLAB cryopit. A similar design could be set up at the alternative LNGS site. The goal for LEGEND-1000 is to have a background level of less than 1×10^{-5} cts/(keV kg yr). With an exposure of about 10 ton yr, this allows to probe $0\nu\beta\beta$ decay half-life of ^{76}Ge beyond 10^{28} years with a 99.7% CL discovery sensitivity. This corresponds to a full coverage of $m_{\beta\beta}$ values suggested by a possible inverted neutrinos mass ordering.
The goals, design and background reduction strategies of LEGEND-1000 will be presented.

[1] LEGEND-1000 PreConceptual Design Report, LEGEND Collaboration, N. Abgrall et al., arXiv:2107.11462 [physics.ins-det]

Collaboration name

LEGEND

Author: MORELLA, Michele

Presenter: MORELLA, Michele

Session Classification: Neutrinos

Track Classification: Neutrinos