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The LEGEND-200 LAr veto system in the search of neutrinoless double beta decay

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The new experiment at Laboratori Nazionali del Gran Sasso, called LEGEND-200, will search for neutrinoless double beta decay ($0\nu\beta\beta$), a yet-to-be-observed weak radioactive transition. The discovery of $0\nu\beta\beta$ decay would prove unambiguously not only the existence of new lepton-number-violating physics but also its connection to the mysterious origin of the neutrino mass.

LEGEND-200 will use about 200 kg of high-purity germanium, acting simultaneously as source and detector, deployed bare in ultra-pure Liquid Argon (LAr). The LAr scintillation light was successfully used in the previous GERDA experiment to actively veto background events, like β decays near or on the detector surface and γ background from natural decay chains. It was one of the key factors in achieving the lowest background index and the best half-life sensitivity. For this reason an upgraded version of LAr veto will be deployed in LEGEND-200.

The LAr veto system, which surrounds the germanium detectors, is composed of two concentric curtains made of WaveLength Shifting (WLS) fibers, realized by coating the fibers with TetraPhenyl Butadiene (TPB). The TPB shifts first the LAr scintillation light from vacuum-ultraviolet to blue light, then the WLS fibers shift the light to green light which is read-out by SiPMs mounted on both ends of the fibers. The read-out system, based on SiPMs and front-end electronics, is already in the commissioning phase. In this talk an overview of the LEGEND-200 LAr veto system and preliminary performance will be illustrated.

Collaboration

LEGEND

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