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LEGEND-200: From Construction to Physics Data Taking

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The LEGEND Collaboration pursues an experimental program to search for the neutrinoless double-beta ($0\nu\beta\beta$) decay of ${}^{76}\text{Ge}$ with discovery potential at half-lives beyond $T_{1/2}(0\nu\beta\beta) = 10^{28}$ yr. The first phase, LEGEND-200 has started operations at LNGS with 140 kg of HPGe detectors and plans to install additional detectors in the near future. With an exposure of 1 ton-year and a background index in the region of interest of less than $2 \cdot 10^{-4}$ cts/(keV kg yr), LEGEND-200 will reach a sensitivity of $T_{1/2}(0\nu\beta\beta)$ of about 10^{27} years.

In this talk, we present the experimental setup of LEGEND-200, the installation and commissioning of the first 140 kg of enriched detectors, and the performance of the sub-detector systems. We discuss the energy resolution, stability, and performance of the pulse shape discrimination of the HPGe detectors, the photoelectron yield and suppression factors of the liquid argon instrumentation, and the efficiency of the water Cherenkov detector.

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Submitted on behalf of a Collaboration?

Yes

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