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Calibration of the NEXT-1 Time Projection Chamber for Neutrinoless Double Beta Decay Searches MAXIM EGOROV, Lawrence Berkeley National Laboratory, NEXT-100 COLLABORATION — We propose a high-pressure Xe-136 gas time projection chamber (TPC) for searches of neutrinoless double beta decay. Currently, the prototype NEXT-1 TPC has been constructed at Lawrence Berkeley National Laboratory that uses 1 kilogram of Xe-136. We used a radioactive Am-241, 59.4 keV gamma-ray source for calibration of the TPC, and a GEANT4 Monte Carlo simulation for determining the accuracy of the position and energy reconstructions. The detection mechanism in the TPC relies on the process of electroluminescent amplification that yields a large photon count for signal events. The optical settings were thus optimized to yield accurate position and energy reconstructions to 50% total, fully diffuse, reflectivity. We developed a maximum likelihood estimation method for position reconstruction that demonstrates 90.2% accuracy for simulated events. At full calibration energy, the energy resolution was found to be $\sim 4.6\%$ FWHM, with simulation showing similar results, but still not matching the expected resolution of $\sim 2.6\%$ FWHM. Accurate position reconstruction allows for an accurate radial correction on the energy, which could lead to an improved energy resolution.

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