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Development and Characterization of CdZnTe Detectors for Neutrino Physics Research

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CdZnTe crystals contain 9 double beta decay isotopes and can serve as a source and detector at the same time in a search for neutrino-less double beta decay. In particular, ^{116}Cd and ^{130}Te are suitable isotopes in such a search due to their high Q-values. The endpoint of the beta spectra resulting from double-beta decay of these isotopes is well above natural gamma lines which constitute backgrounds to a potential signal. Detectors for neutrino-less double beta decay searches require good energy resolution and effective background rejection. The latter can be realized with position sensitive detectors with particle tracking capabilities. CdZnTe detectors can be operated at room temperature and bear the potential to satisfy the above requirements. We are developing and characterizing the performance of co-planar and pixilated CdZnTe detectors, study their charged particle tracking capabilities and evaluate the use in future neutrino-less double beta decay search experiments. Results from our laboratory measurements will be presented.

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