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Resistive Materials for Low Background Time Projection Chambers

Time Projection Chambers (TPCs) are widely used in particle physics experiments, with noble element targets currently being used to search for neutrino-less double beta decay, look for interactions of dark matter, and characterize the properties of neutrino oscillations. In order to further improve the sensitivity of these experiments, the next generation of proposed TPC detectors will contain tens to hundreds of tons of active target. Such large volume detectors require a large potential difference to maintain the desired drift electric field, corresponding to a significant amount of stored energy. Maintaining large voltages in noble element detectors has proven difficult and sudden discharges can damage nearby electronics and other detector components. The use of resistive materials can reduce the peak current produced during a discharge, thereby decreasing the likelihood of damage. In this poster we will survey different resistive materials for potential use in large, ultra-low background, noble TPCs, focusing on their radio-purity as well as their resistivity as a function of temperature.

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