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EXO-200 event reconstruction

EXO-200 utilizes dual liquid xenon time projection chambers (TPCs) to observe the double beta (bb) decay of Xe-136. Each TPC yields 37 scintillation channel waveforms and 38 each of ionization and charge induction channel waveforms; all of which are 2 ms in length and sampled at 1 MHz. In order to observe bb decay and suppress residual radio active backgrounds from otherwise radio quiet detector component materials, the data is reconstructed using a custom built algorithm. This process includes signal finding and signal parameter estimation—from the individual channel waveforms—and a global signal clustering that assembles the found signals into individual charge deposits colocated in space and time. The resulting position of, and energy deposited in, each cluster forms the observed topology of an event. The details of EXO-200 event reconstruction applied to EXO-200 data, both to observe the standard model double beta decay of Xe-136 and in the search for the neutrinoless mode, will be presented.

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