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Optimization of Background Rejection in XENON10 LUIZ DE VIVEIROS, Brown University, XENON COLLABORATION — The XENON10 Dark Matter Experiment, deployed at Gran Sasso Labs in Italy on March 2006, has been operating in dark matter search mode and (as of Dec 2006) has collected over 2 live months of data. The detector uses dual-phase (gas/liquid) xenon target of 15kg to search for nuclear recoils associated with WIMP events. The detector is able discriminate electron recoil and nuclear recoil events by means of the ratio of primary (prompt) scintillation to secondary scintillation from electro-luminescence caused by ionization electrons extracted into the gas phase. Better than 99% discrimination of gamma background (at 50% acceptance for nuclear recoil events) has been demonstrated in the initial running, with a gamma background of <1 event/kg/keV/day. The detector has threshold <10keV for nuclear recoil energy, and is sensitive to single electrons extracted from the liquid xenon. We will discuss parameters and methods used to optimize the rejection of electron recoil events which would otherwise look like nuclear recoil events. One such technique uses the primary scintillation hit pattern to identify electron recoil events that (as a result of field geometry in detector) have reduced charge collection, which therefore lowers the measured s2/s1 ratio. We will report on the results of the first 2 months of live operation and the estimated WIMP sensitivity achieved, and the factors affecting the overall dark matter sensitivity of the detector.

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