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Background estimation of the XENON1T Dark Matter Search Experiment[1] PAOLO BELTRAME, UCLA, XENON COLLABORATION — We will present the background estimation of the XENON1T detector, the next generation of the XENON phased Dark Matter search program. Detailed studies of both the electronic recoil and nuclear recoil background have been performed, including irreducible contamination from *pp* chain solar neutrinos and $2\nu\beta\beta$-decay of ^{136}Xe. By exploiting the excellent self-shielding and 3D position resolution of a LXeTPC, by selecting existing low radioactivity detector materials and by placing the detector in a large active water shield and Cherenkov muon veto, the overall event rate within the fiducial target of 1.1 ton is estimated to be less than 0.5×10^{-4} events/kg/day/keV$_{ee}$. This rate translates to less than one event per ton per year in the WIMP search region – an unprecedented low background level for a dark matter experiment. For a $\sigma_{SI} \sim 10^{-45}$ cm^2 and 100 GeV/c^2 WIMP mass, XENON1T would detect of order 100 events in this exposure, providing statistics for placing significant constraints on the WIMP mass. In the absence of signal XENON1T would be capable of probing WIMP interaction cross-sections to $\sigma_{SI} \sim 2 \times 10^{-47}$cm^2 within 2 years of operation.

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