GALACTIC DARK MATTER SERACHES IN THE BOULBY MINE

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The current status and planned future developments of galactic dark matter searches in the Boulby mine, N. Yorkshire, UK, are described. A ~ 50 kg array of NaI crystal scintillator detectors is being brought into operation in a low background environment. Many of the sub-units are unencapsulated to allow control of surface contamination sources of background.
At present, the spin-independent WIMP-proton cross-section limit is 3×10^{-5} pb at 80 GeV WIMP mass. Improved background discrimination is expected from three detectors based upon liquid Xe. ZEPLIN I, with 4 kg of liquid Xe is already deployed and uses pulse shape discrimination. ZEPLIN II and ZEPLIN III exploit the ionisation to scintillation ratio to discriminate and require an additional gas phase with electric field drift to transfer the ionisation charge to the secondary scintillation region. For ZEPLIN II at 30 kg the emphasis is on a high mass detector while for ZEPLIN III, at 6 kg and a higher electric field, the emphasis is on low detector threshold. A directional, gas-based electric field drift detector filled with a low A gas (initially CS_2 where drift spread is suppressed) is also under development to allow search for the definitive correlation of any signal found with galactic motion. Initially a 1 m^3 detector is being constructed, but a scale-up to 10 m^3 is planned.