APR05-2004-000038

Abstract for an Invited Paper
for the APR05 Meeting of
the American Physical Society

The XENON10 Dark Matter Experiment

ELENA APRILE, Department of Physics, Columbia University

The XENON Dark Matter Project uses liquid xenon as target and detector to search for dark matter particles with a sensitivity reach more than a factor of thousand beyond current limits. The 1000 kg target is distributed in an array of ten independent, two-phase time projection chambers with simultaneous measurement of ionization and scintillation. The distinct ratio of the two signals for nuclear recoil events (from dark matter WIMPs and neutrons) and for electron-like events (from dominant gamma-rays background) is the basis for XENON event-by-event discrimination capability. The detector's 3D event localization and the active shield of liquid xenon scintillator which surrounds the target, provide additional background rejection capabilities. As part of the XENON R&D phase, supported by NSF, we have carried out a series of measurements with dual phase TPC prototypes, aimed at optimizing light and charge response to nuclear recoils down to an energy threshold of 16 keV. I will review the progress achieved to date, and present the status of the development of XENON10. This detector, with an active target of 10kg, is being realized as the first step in the XENON phased approach towards the full 1 tonne scale experiment. The expected performance and sensitivity of XENON10 will be also presented.