Abstract

Re-analysis of published data from the UKDMC NaI(Tl) dark matter experiment is presented using latest spin factors and comparison is made with the sensitivity predicted for NAIAD, a 100 kg NaI detector concept based on unencapsulated NaI(Tl). We present experimental results and Monte Carlo simulations for NAIAD and show that a factor of 1.5–2 improvement in energy threshold is achievable over conventional NaI dark matter detectors with consequent $\sim 50\%$ improvement in nuclear recoil discrimination at 10 keV. An overall improvement in sensitivity to spin dependent WIMP interactions of factor 50, based on 100 kg $\times$ yrs of data, is predicted relative to previous UKDMC limits.

PACS: 29.40.Mc; 14.80.Ly
Keywords: Scintillation detectors; Dark matter; WIMP; Pulse-shape discrimination