

Abstract Submitted
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Ultra-high resolution alpha particle spectroscopy using cryogenic microcalorimeters R. D. HORANSKY, J. N. ULLOM, J. B. BEALL, W. B. DORIESE, W. D. DUNCAN, L. FERREIRA, G. C. HILTON, K. D. IRWIN, C. D. REINTSEMA, L. VALE, National Institute of Standards and Technology, M. W. RABIN, A.S. HOOVER, S. P. LAMONT, C. R. RUDY, Los Alamos National Laboratory — We have built a novel alpha particle detector using a transition edge sensor (TES) thermometer attached to a bulk superconducting absorber and have measured < 2.5 keV resolution at 5.3 MeV . We have used the microcalorimeter to measure a mixture of Pu isotopes and are able to individually resolve peaks corresponding to ^{239}Pu and ^{240}Pu which are separated by 12.9 keV. The $^{240}\text{Pu}/^{239}\text{Pu}$ activity ratio is a key parameter for determining whether a plutonium sample is weapons or reactor grade. Conventional silicon based detectors achieve resolutions no better than 10 keV, severely limiting current actinide assays. In addition, the microcalorimeter alpha detector has shown significantly better resolution for gamma rays. The origin of the resolution difference for gamma and alpha interactions may be due to lattice damage and is currently under study.

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