

Abstract Submitted
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Alpha Background Rejection in Bolometer Detectors NICHOLAS DEPORZIO, Northeastern Univ, CUORE COLLABORATION — This study presents the modification of bolometer detectors used in particle searches to veto or otherwise reject alpha radiation background and the statistical advantages of doing so. Several techniques are presented in detail – plastic film scintillator vetoes, metallic film ionization vetoes, and Cherenkov radiation vetoes. Plastic scintillator films are cooled to bolometer temperatures and bombarded with 1.4MeV to 6.0MeV alpha particles representative of documented detector background. Quantum dot based liquid scintillator is similarly bombarded to produce a background induced scintillation light. Photomultipliers detect this scintillation light and produce a veto signal. Layered metallic films of a primary metal, dielectric, and secondary metal, such as gold-polyethylene-gold films, are cooled to milli-kelvin temperatures and biased to produce a current signal veto when incident 1.4MeV to 6.0MeV alpha particles ionize conduction paths through the film. Calibration of veto signal to background energy is presented. These findings are extrapolated to quantify the statistical impact of such modifications to bolometer searches. Effects of these techniques on experiment duration and signal-background ratio are discussed.

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