

Monte Carlo simulation of the CUPID array

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- Proposed $0\nu\beta\beta$ search using bolometric array of 1596 lithium molybdate crystals, deployed in the CUORE¹ cryostat.
- Aims to eliminate dominant background of alpha particles present in CUORE.

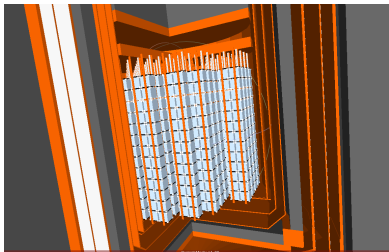


Figure: rendering of proposed CUPID array of Li_2MoO_4 crystals

¹Clarke and Braginski 2004.

- Li_2MoO_4 crystals allow for discrimination of α backgrounds from $\beta\beta$ events ($Q=3034\text{keV}$) via high-light yield scintillation signals.
- relatively high isotopic abundance of ^{100}Mo (10%)
- enrichment above 95% already demonstrated in CUPID-Mo

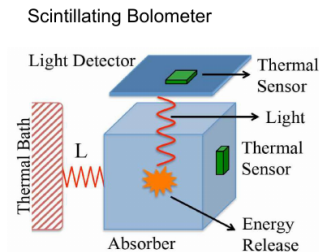
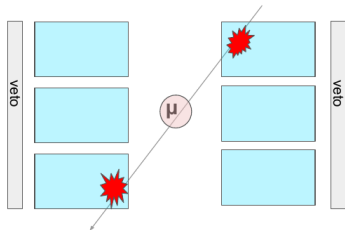


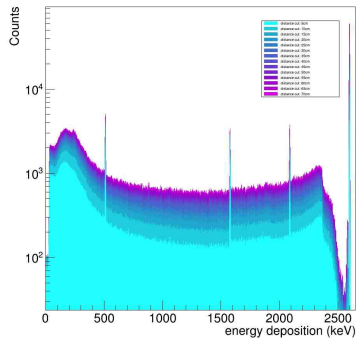
Figure: CUPID bolometer and rejection scheme

- With respect to coincidences, the rate of $2\nu\beta\beta$ events is not negligible in CUPID array (calculate this)
- Minimizing the distance cut helps avoid mis-labelling random $2\nu\beta\beta$ coincidences as multiplicity 2.
- Assuming a simple muon veto geometry, increasing the distance cut rejects more muon events.

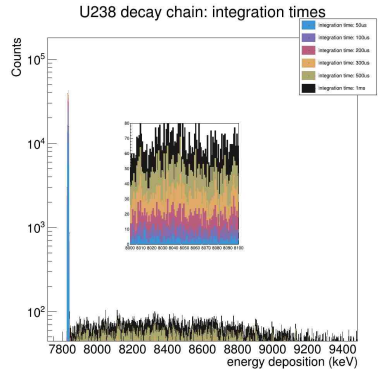


distance cut in the CUPID array

2.6MeV Gamma Spectrum: distance cuts



integration time in the CUPID array



$2\nu\beta\beta$ efficiency simulation