Monte Carlo simulation of the CUPID array

Joe Camilleri

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jcamilleri@vt.edu

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CUPID experiment

- Proposed $0\nu\beta\beta$ search using bolometric array of 1596 lithium molybdate crystals, deployed in the CUORE[1]cryostat.
- Aims to eliminate dominant background of alpha particles present in CUORE.

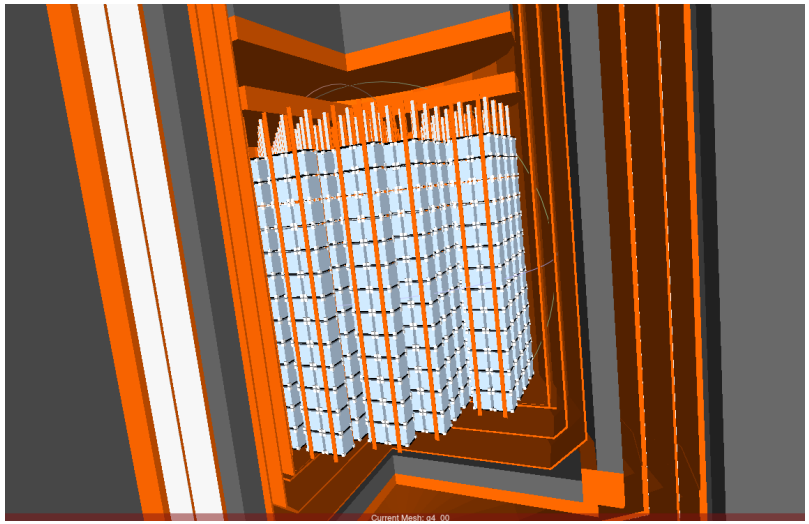

Figure: rendering of proposed CUPID array of Li_2MoO_4 crystals

[1]Clarke and Braginski 2004.

lithium molybdate

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

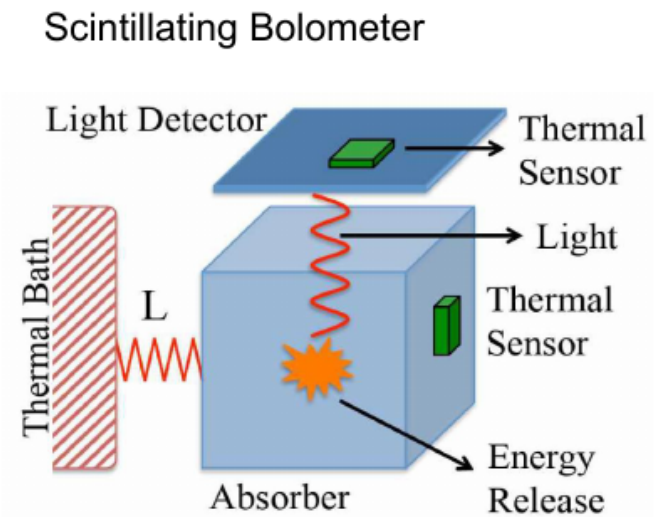

Figure: CUPID bolometer and rejection scheme

2ν events and muons

- 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.