

RECENT RESULTS FROM SIMULATION STUDIES

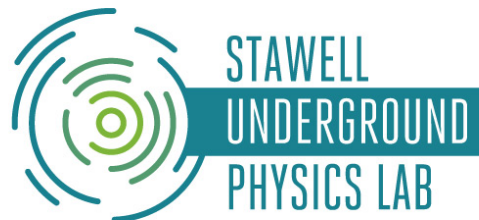
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28th of March 2017

Picture by M. Volpi



THE UNIVERSITY OF
MELBOURNE

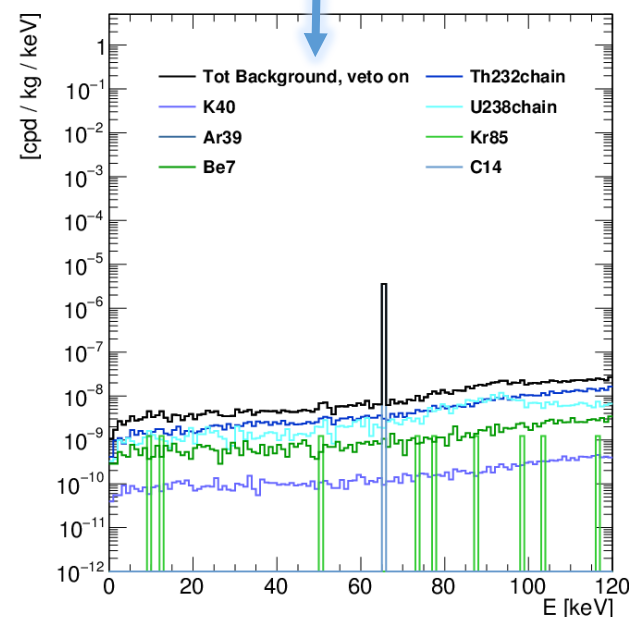


SCINTILLATOR BACKGROUND



Radioisotope	Typical level in equilibrated scintillator	Design level for Borexino	Level achieved in Borexino [4]
^{14}C	10^{10} cpd/ton	10^4 cpd/ton	3.5×10^4 cpd/ton
^7Be	2.7×10^3 cpd/ton	< 0.1 cpd/ton	Below threshold
^{222}Rn	10 Bq/m ³ in air 1.3×10^7 cpd/ton	< 0.1 cpd/ton	1 cpd/100 ton
^{210}Pb	2×10^4 cpd/ton	< 0.1 cpd/ton	15 cpd ^{210}Bi /100 ton
$^{238}\text{U}, ^{232}\text{Th}$	10^{-5} g-U(Th)/g-dust 10^5 cpd/ton	^{210}Bi and ^{210}Po $< 10^{-16}$ g-U(Th)/g-scintillator	6000 cpd of ^{210}Po /100 ton $< 10^{-17}$ g/g
^{40}K	10^{-6} g-K/g-PPO 2700 cpd/ton	< 0.1 cpd/ton $< 10^{-14}$ g-K/g-scintillator	< 1 cpd/100 ton $< 10^{-14}$ g-K/g-scintillator
^{39}Ar	13 mBq/m ³ -air 200 cpd/ton	< 0.027 cpd/ton < 500 nBq/m-N ₂	< 3 cpd/100 ton < 30 cpd/100 ton
^{85}Kr	1 Bq/m ³ -air 4.3×10^4 cpd/ton	< 0.01 cpd/ton < 100 nBq/m ³ -N ₂ < 0.01 cpd/ton	< 30 cpd/100 ton

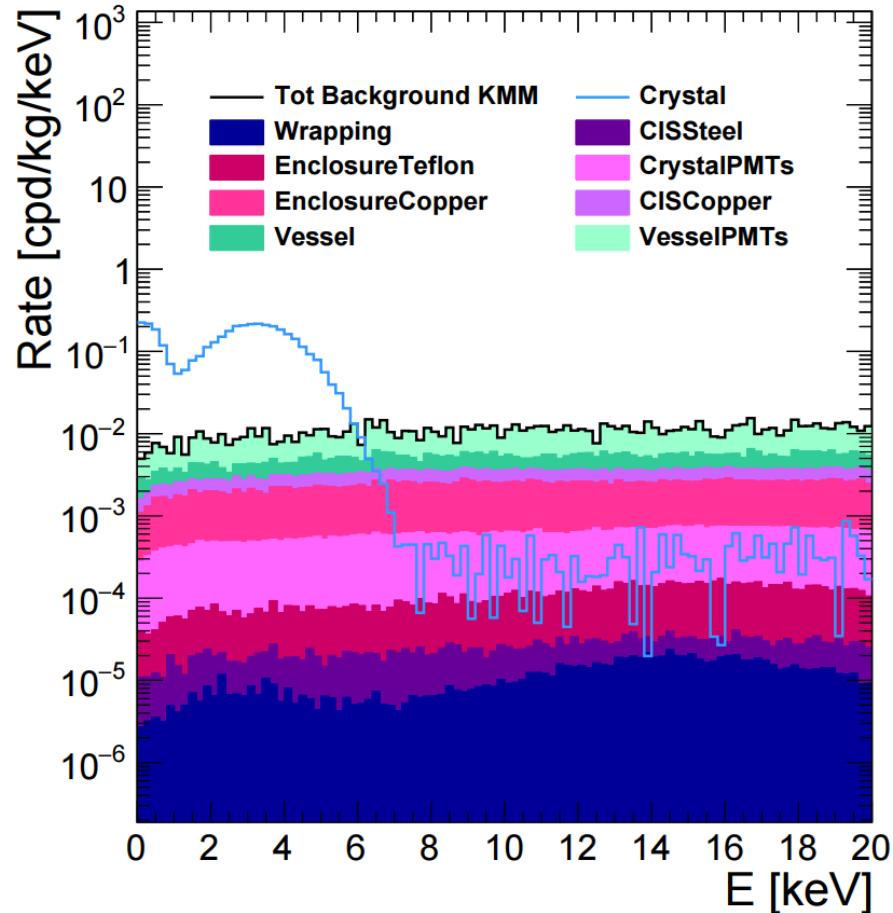
Not purified $\rightarrow O(10e-03)$ cpd/kg/keV



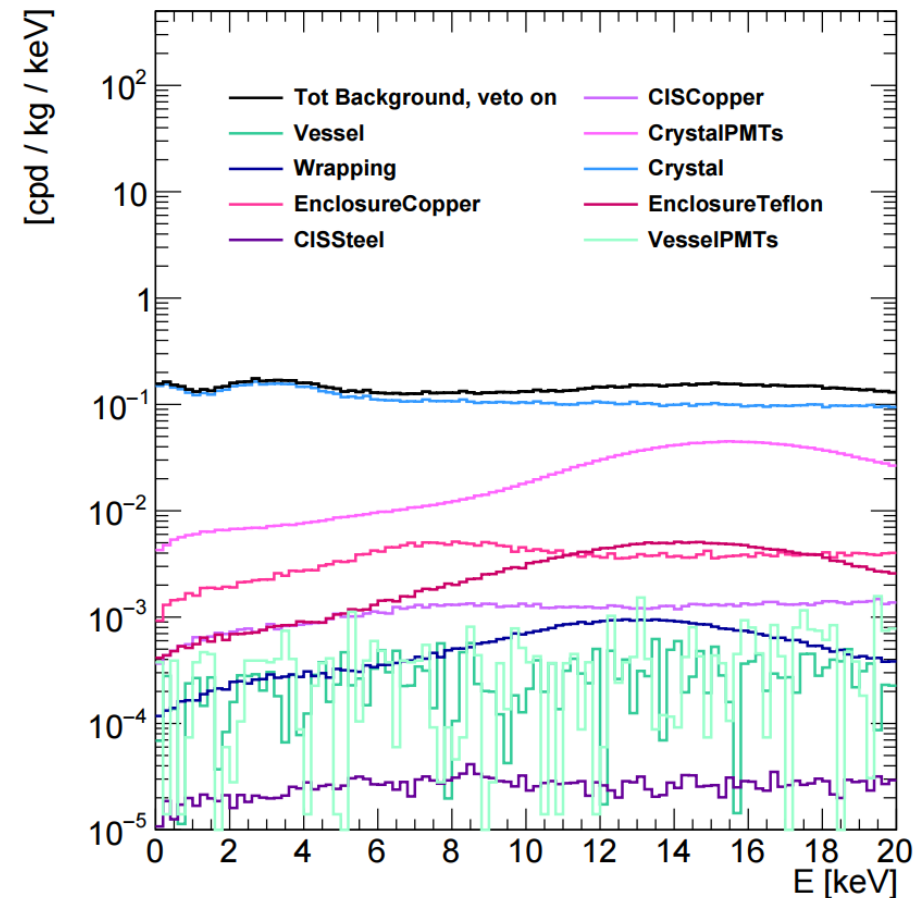
TOTAL BACKGROUND



Potassium measurement mode



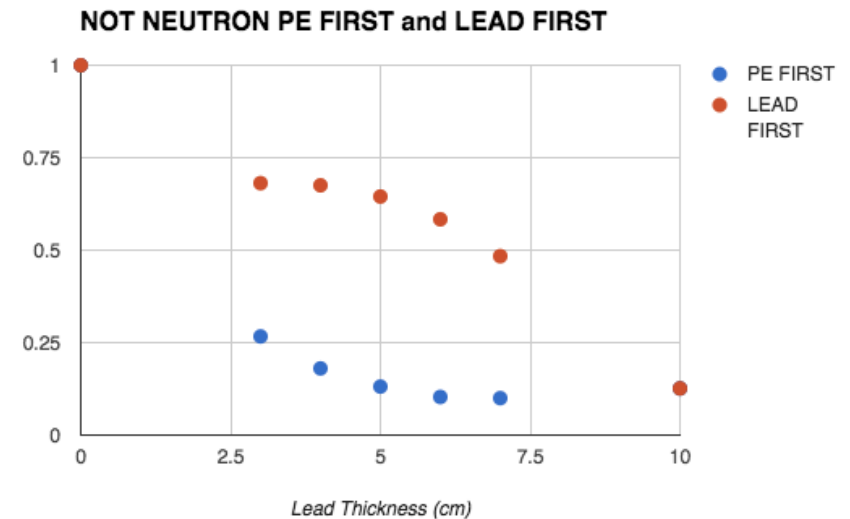
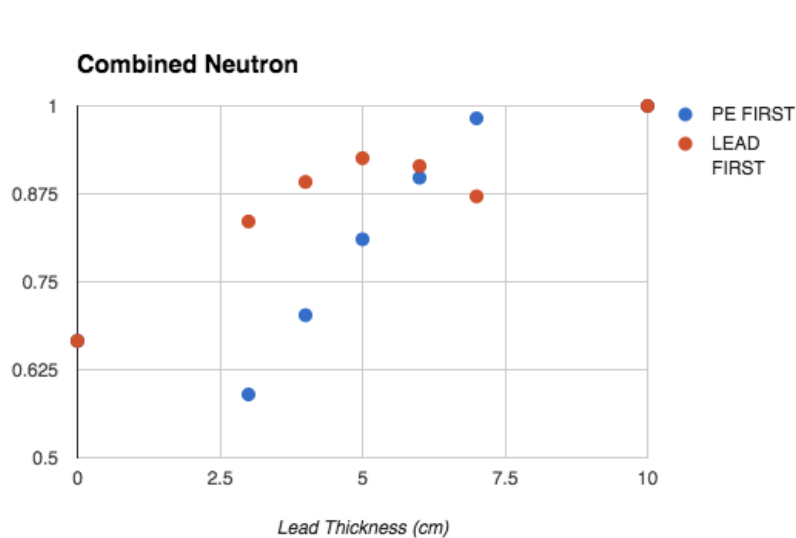
DM measurement mode



SHIELDING



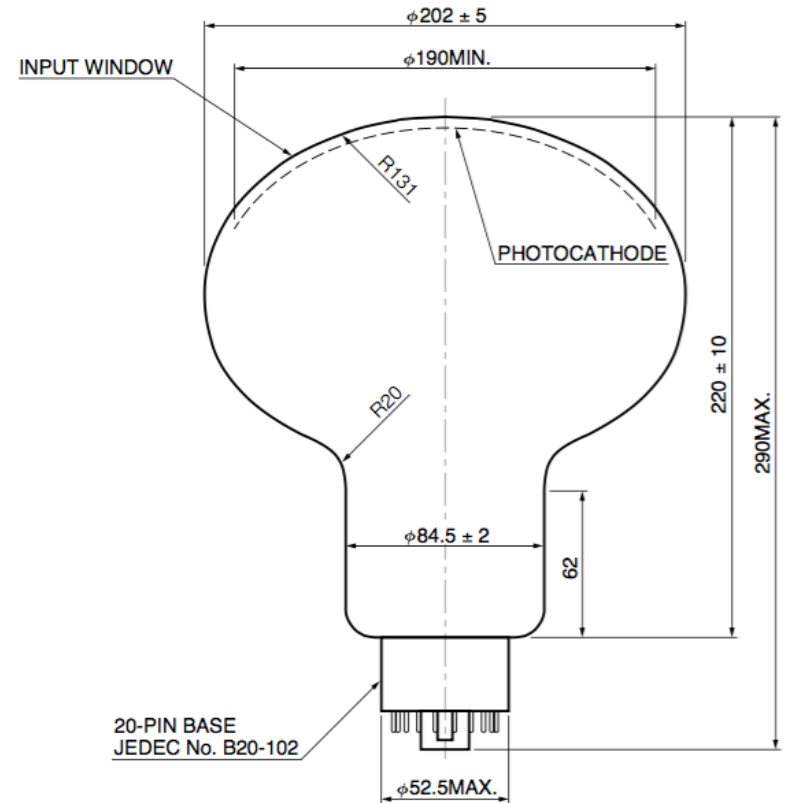
- Investigated the difference made by putting Lead or PE first in the shielding



- Detailed results here:

<https://docs.google.com/spreadsheets/d/1okQ9skCNsyEfOjPo43AZQHeoJt5PQuWWMeuUQtRk1ko/edit#gid=0>

PMT MODELING



Sensitive area only

Backup