Prex Meeting

SAM Geometry Optimization

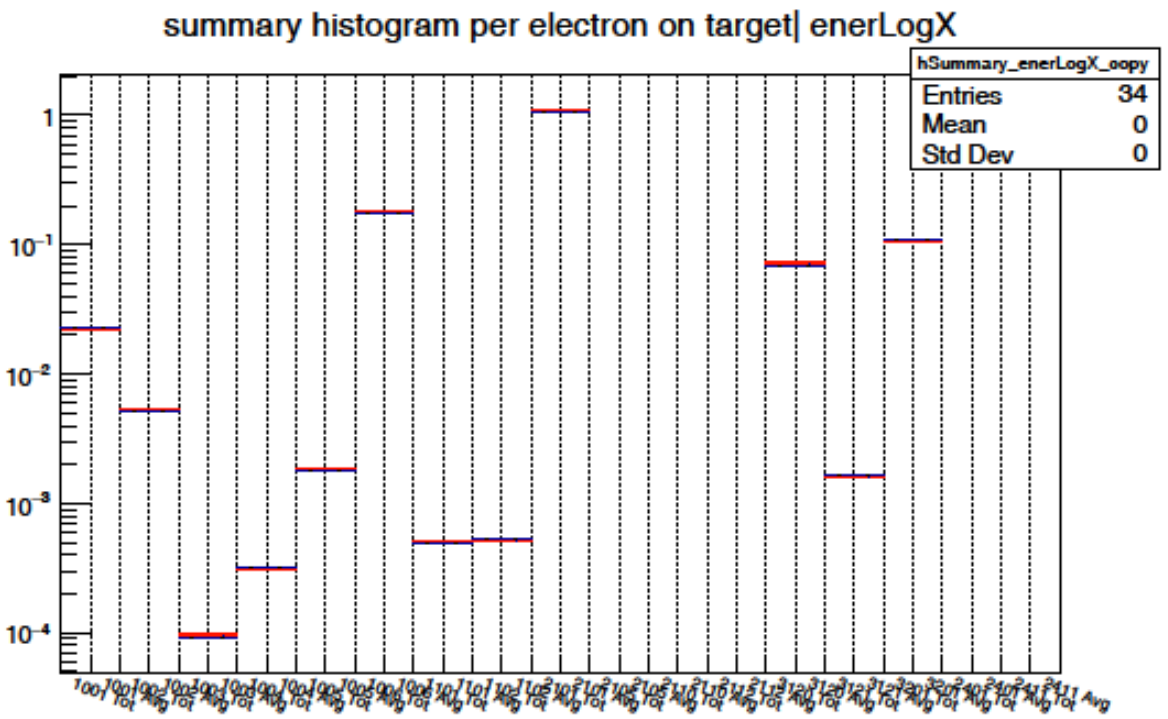
Cameron Clarke

5-30-2018

Scattered flux at all detectors

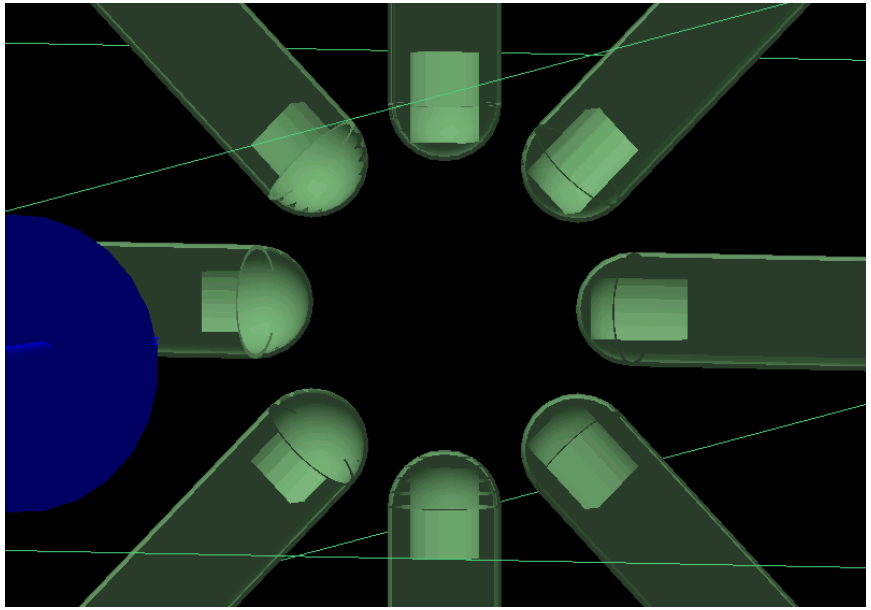
(6.3M events or so)

My results (generator 7, full prex geometry) match Ciprian's results



Potential methods of reducing radiation

1) Spherical end cap (can be done, yields a small improvement, may be necessary for thinner Al)

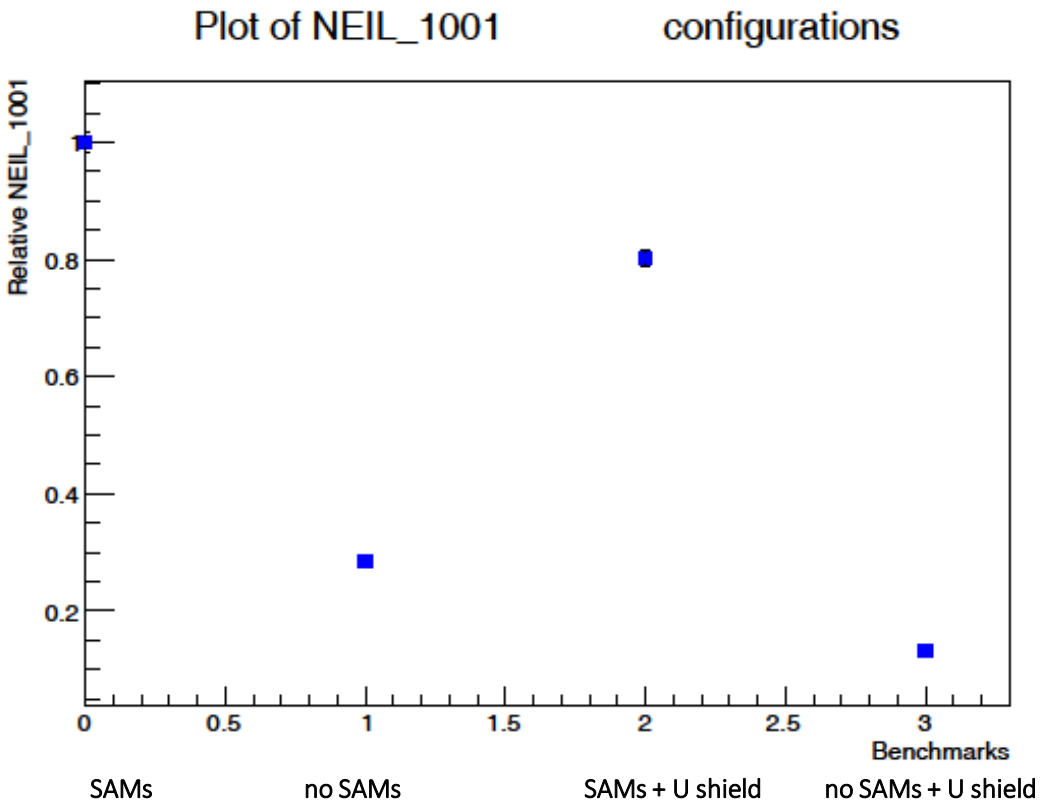


2) Changing parameters of the SAMs
- Thickness of Quartz
- Thickness of aluminum wall and window
- Radial offset of entire aparatus

Baseline simulations

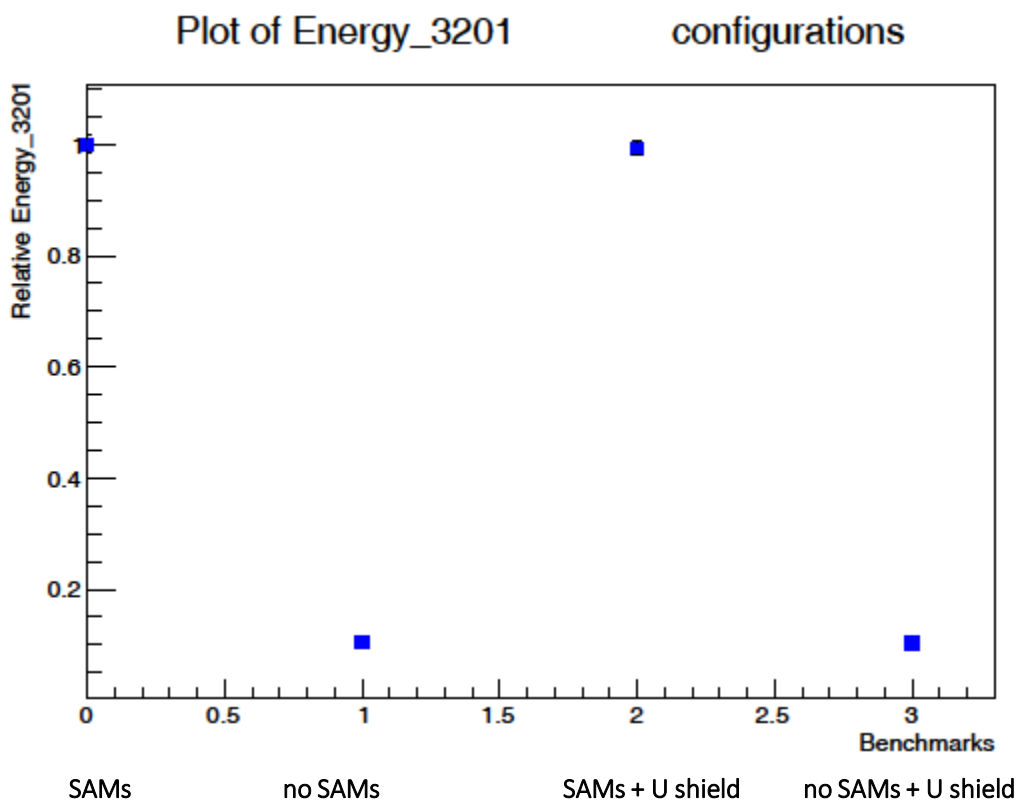
NEIL in LHRS

(cylindrical endcap)



Energy Deposited in O-Ring

Neutron Flux > 25 MeV on the Roof (looks similar)



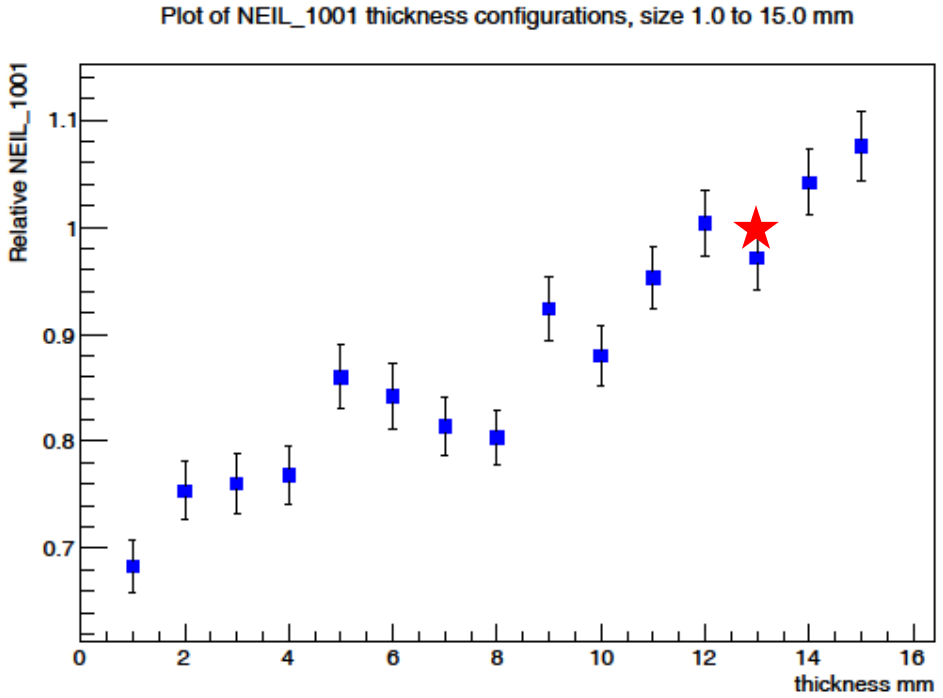
- I didn't include the U shield in my configuration simulations – it affects the NEIL on the LHRS calculations some, and I assume it will affect the configurations simulations proportionately
- The goal (for these simulations neglecting the U shield for NEIL) to match the levels obtained pre-SAM inclusion is

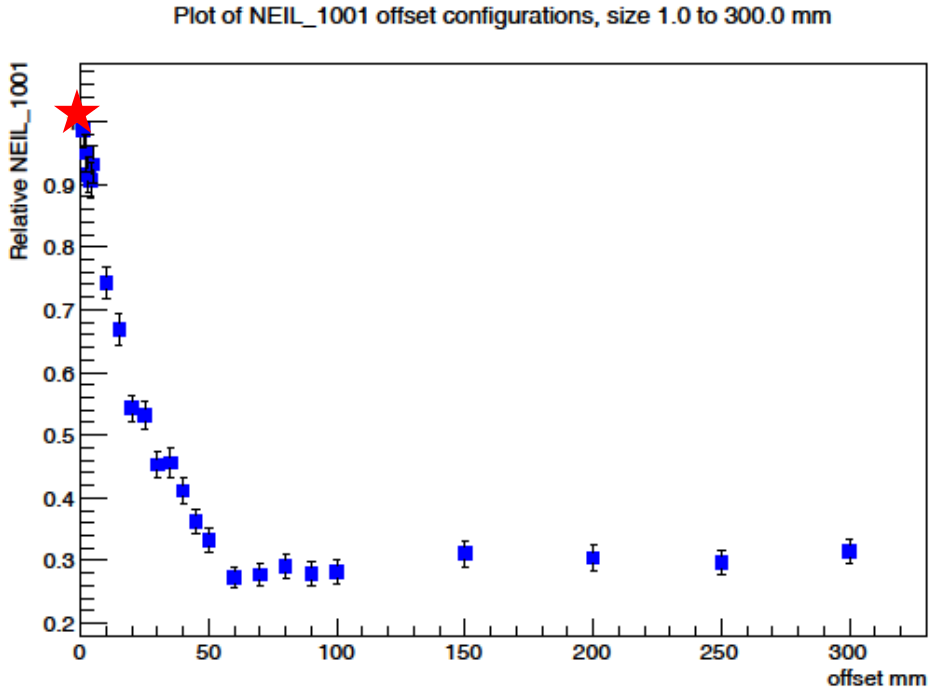
1. NEIL on LHRS to go down to 0.3
2. Energy in the O-Ring to reach 0.1
3. Flux (not shown) of E>25MeV Neutrons to the roof to go below 0.65

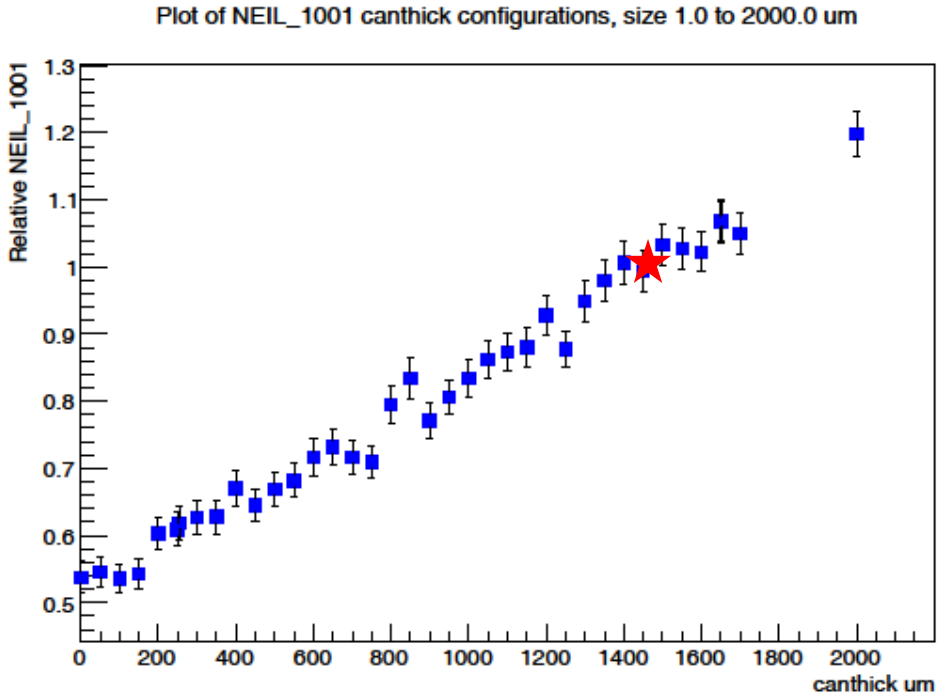
★ = the baseline configuration

Combined goal for matching no SAM configuration is
NEIL -> 0.28

NEIL calculations in LHRS







Individually, each configuration still overshoots the target “no SAM” configuration quite substantially, but when combined together they reach pretty close (The O-Ring is still concerning)

This is just a summary of data plotted, available below.

Baseline: Quartz Thickness=13mm, offset=0mm, Aluminum Can Thickness=1500um								
Configuration	Qthick=6mm		Offset=15mm		Canthick=254um		**Summary**	
Detector:	SAMs	no SAMs	SAMs	no SAMs	SAMs	no SAMs	**Combined**	**Goal**
det-1001-LHRS NEIL	0.84	2.95	0.67	2.36	0.62	2.18	0.35	0.28
det-1006-Roof Flux	0.85	1.32	0.736	1.14	0.87	1.35	0.54	0.64
det-3201-O-Ring Energy	0.72	6.89	0.645	6.17	0.50	4.78	0.23	0.10

Goal for matching no SAM configuration is NEIL -> 0.28, Roof Flux -> 0.65, O-Ring Energy -> 0.1

There is a ~10% uncertainty on these baseline numbers, and on each configuration, so this is only a rough estimate

The “Combined” configuration uses

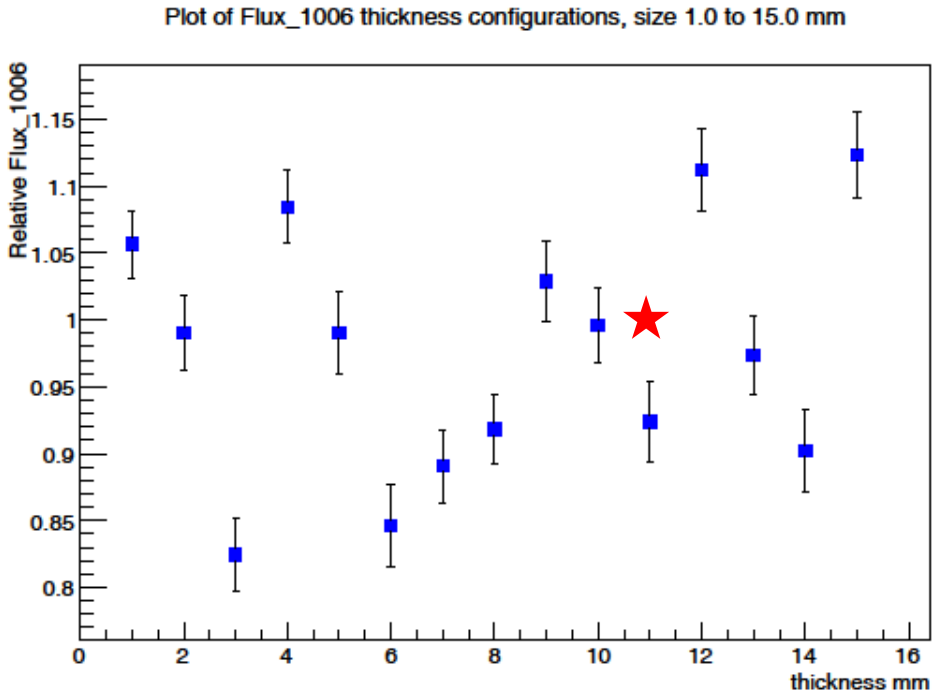
- 6mm thick quartz
- 15mm radial offset1
- 10mills of an inch (0.254 mm) thick aluminum walls

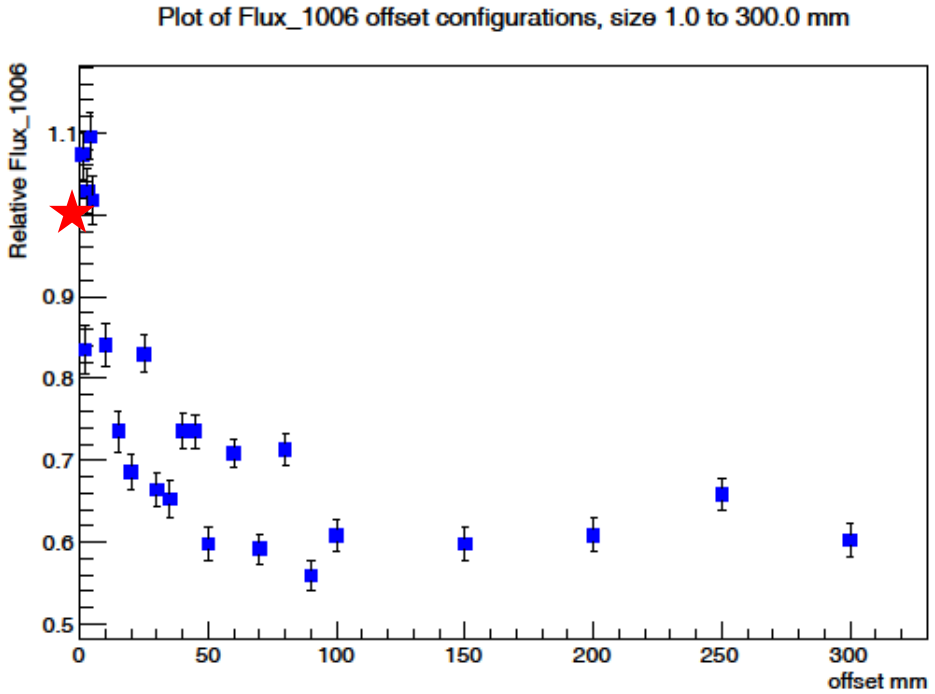
Supplementary

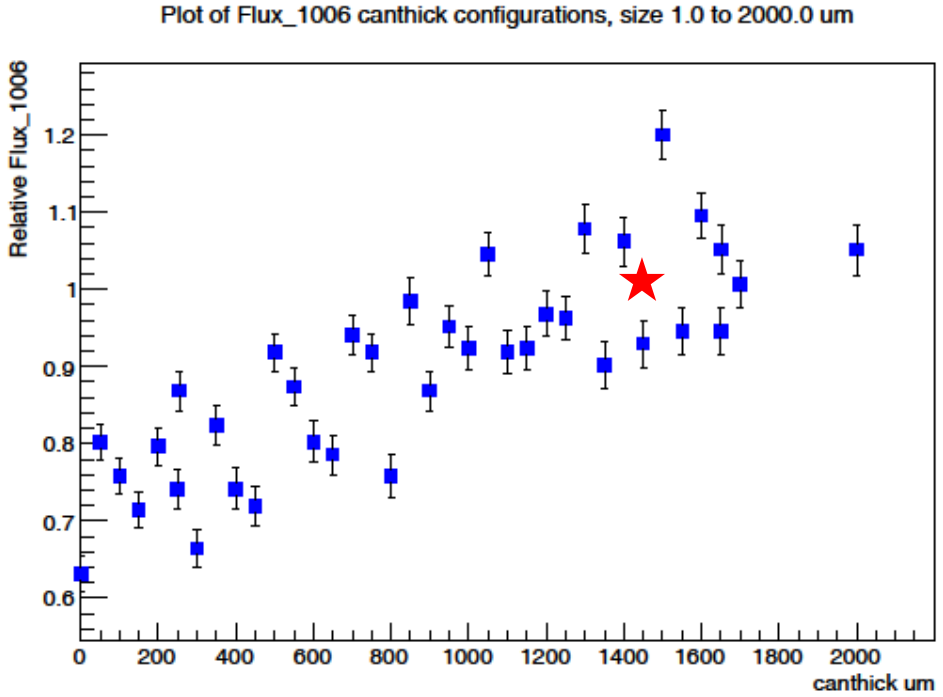
★ = the baseline configuration

Combined goal for matching no SAM configuration is
Roof Flux -> 0.65

Flux on Roof







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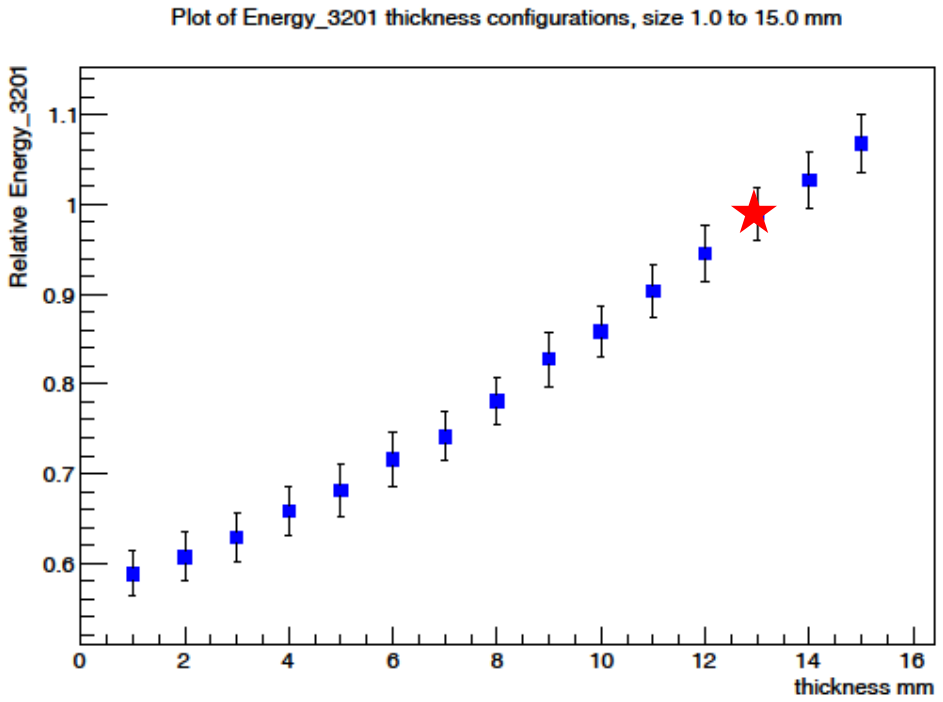
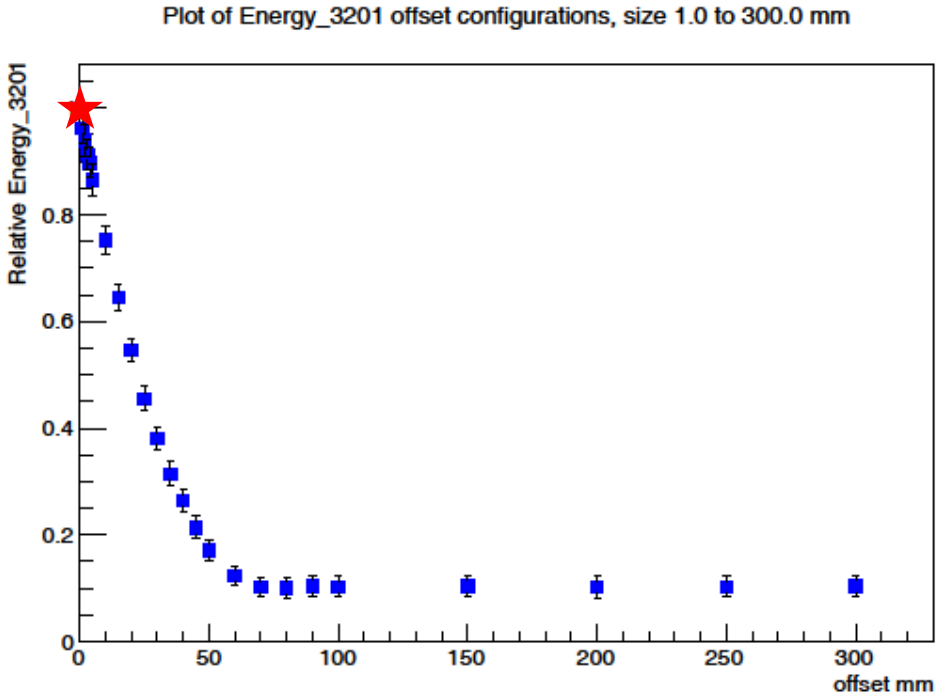
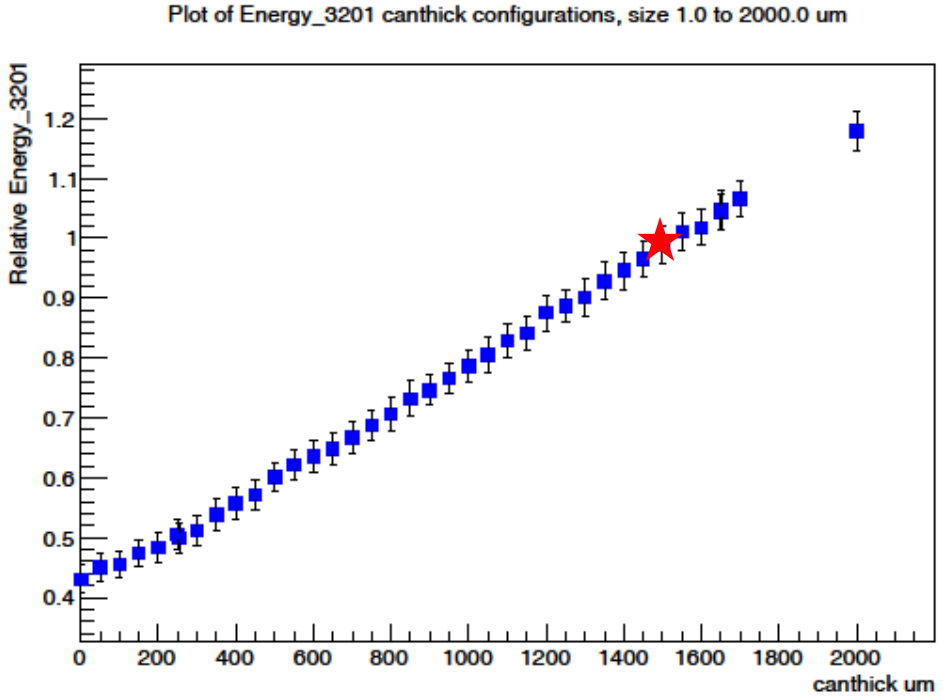
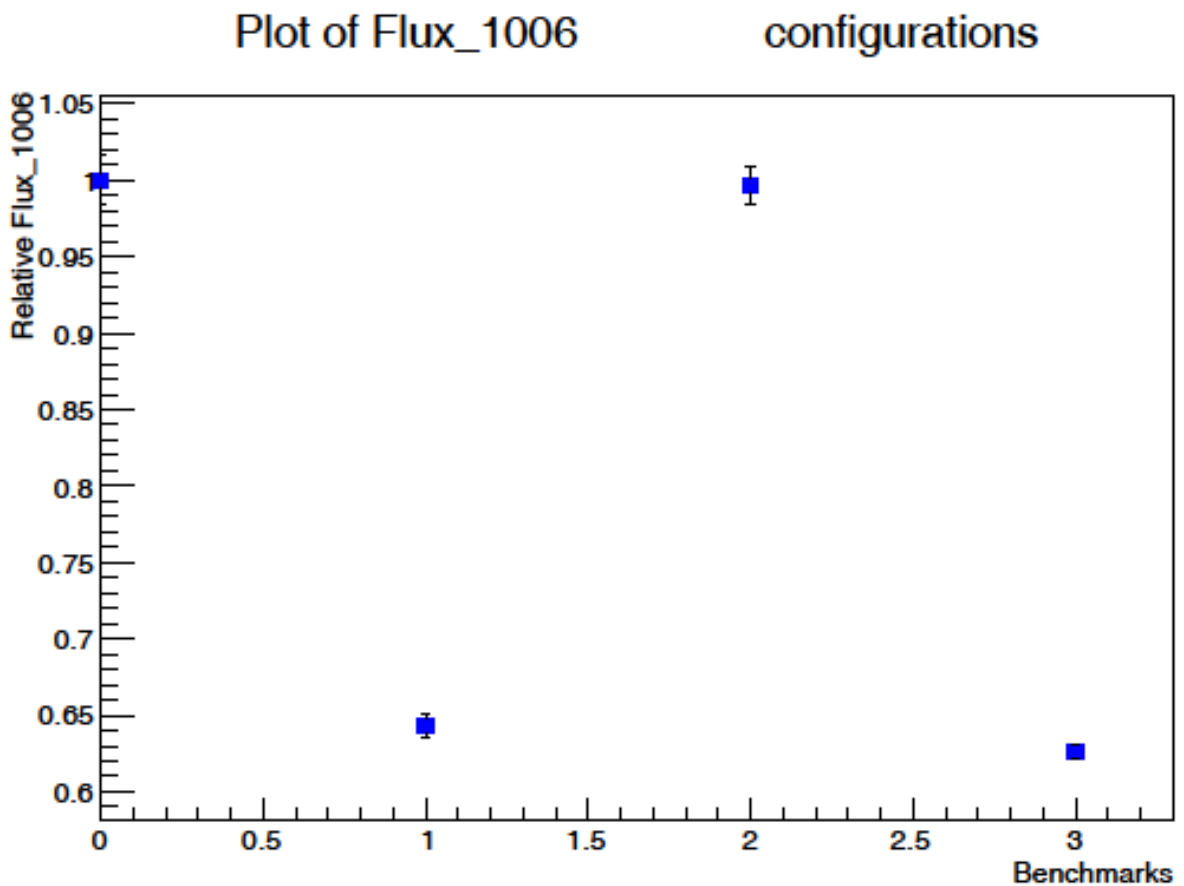
Energy in O-Ring







This is the Relative flux on the roof plot that didn’t fit in slide 3



Editable excel data inclusion

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