

Status report (28 Dec. 2016)

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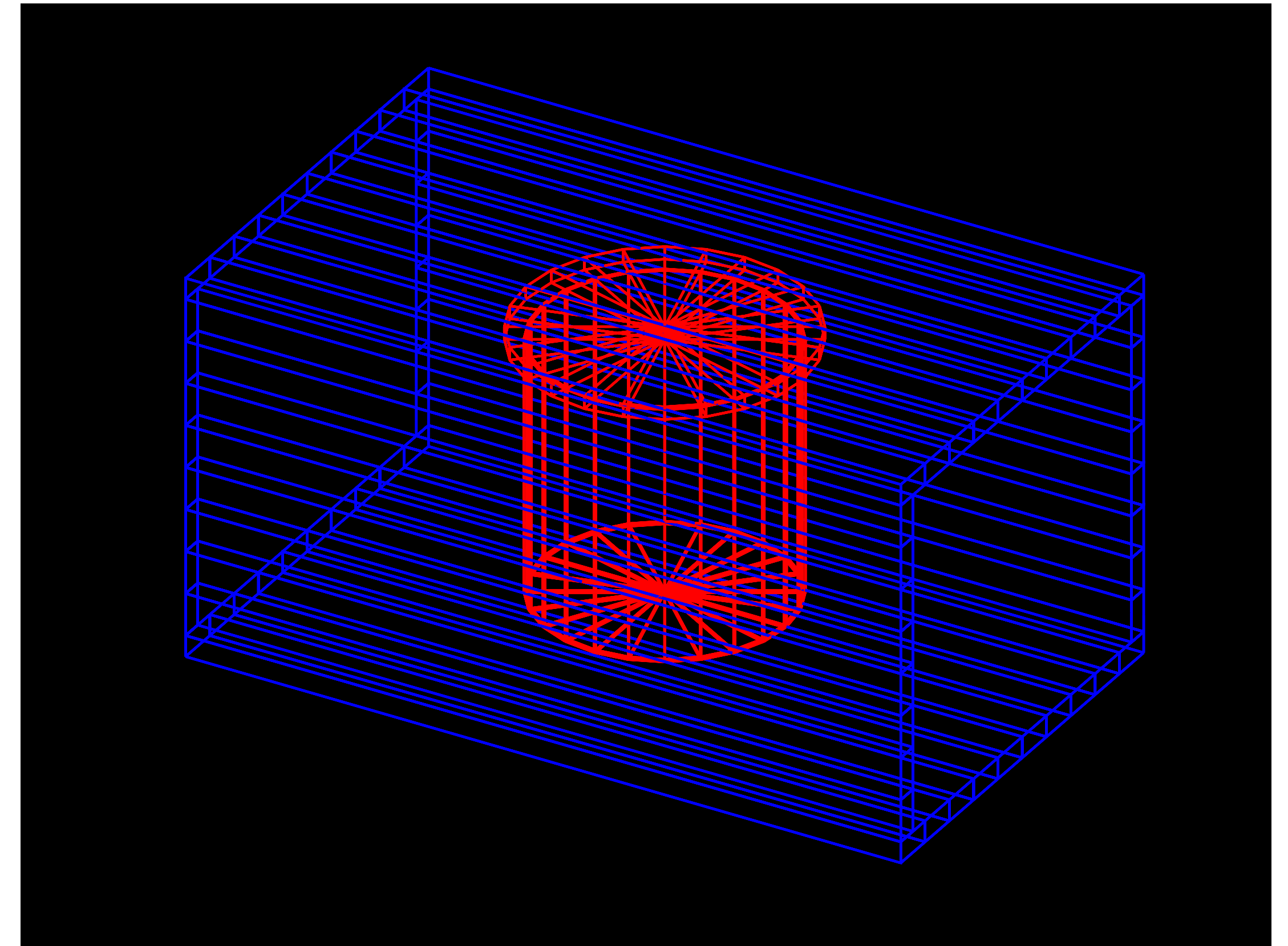
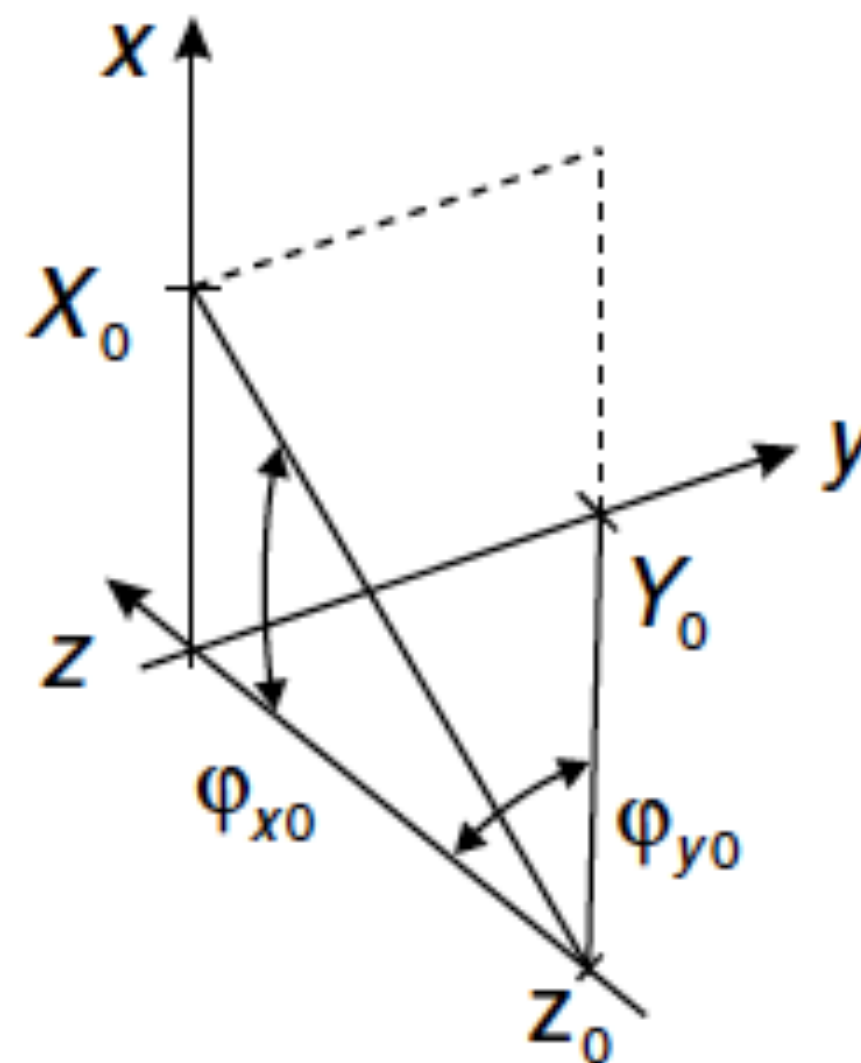
Solid Angle Covered by Detector

- Calculated solid angle for each height of the top detector and both annihilation positions.
- Formula for the solid angle of a rectangular area:

$$\Omega_{\text{RE}} = \sin^{-1} \left(\frac{X_0 Y_0}{A_X A_Y} \right) \text{ where}$$

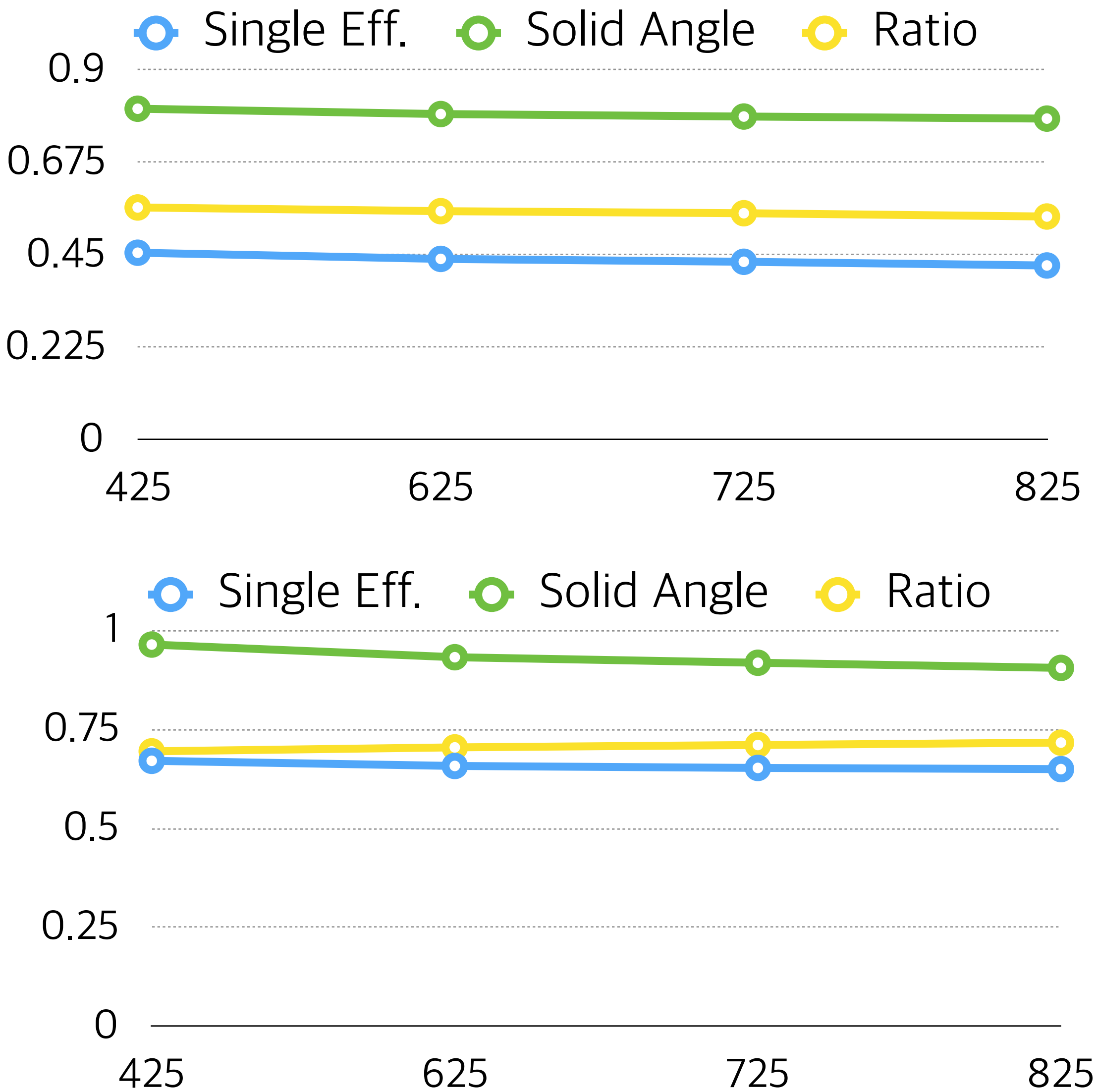
$$A_x^2 = z_0^2 + X_0^2$$

$$A_y^2 = z_0^2 + Y_0^2$$



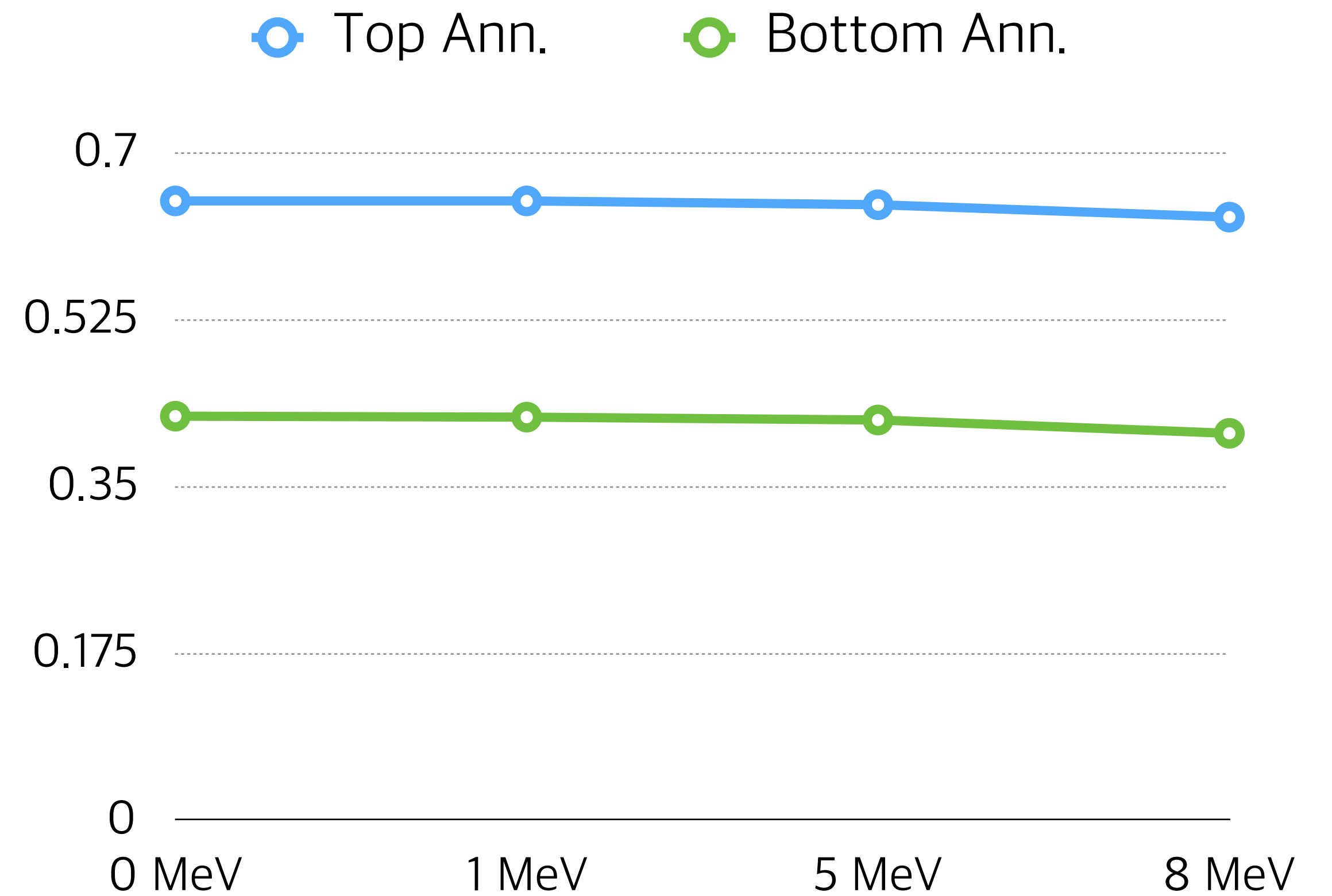
Solid Angle & Single Pic Det. Eff.

Top det. Height (mm)		425 (+0 cm)	625 (+20 cm)	725 (+30 cm)	825 (+40 cm)
Top ann.	Single Eff.	0.455	0.440	0.433	0.424
	Solid Angle (srad/4 π)	0.805	0.792	0.786	0.781
	(eff.)/(s. ang.)	0.565	0.556	0.551	0.543
Bot. ann.	Single Eff.	0.671	0.658	0.653	0.650
	Solid Angle (srad/4 π)	0.965	0.933	0.919	0.906
	(eff.)/(s. ang.)	0.695	0.705	0.711	0.717



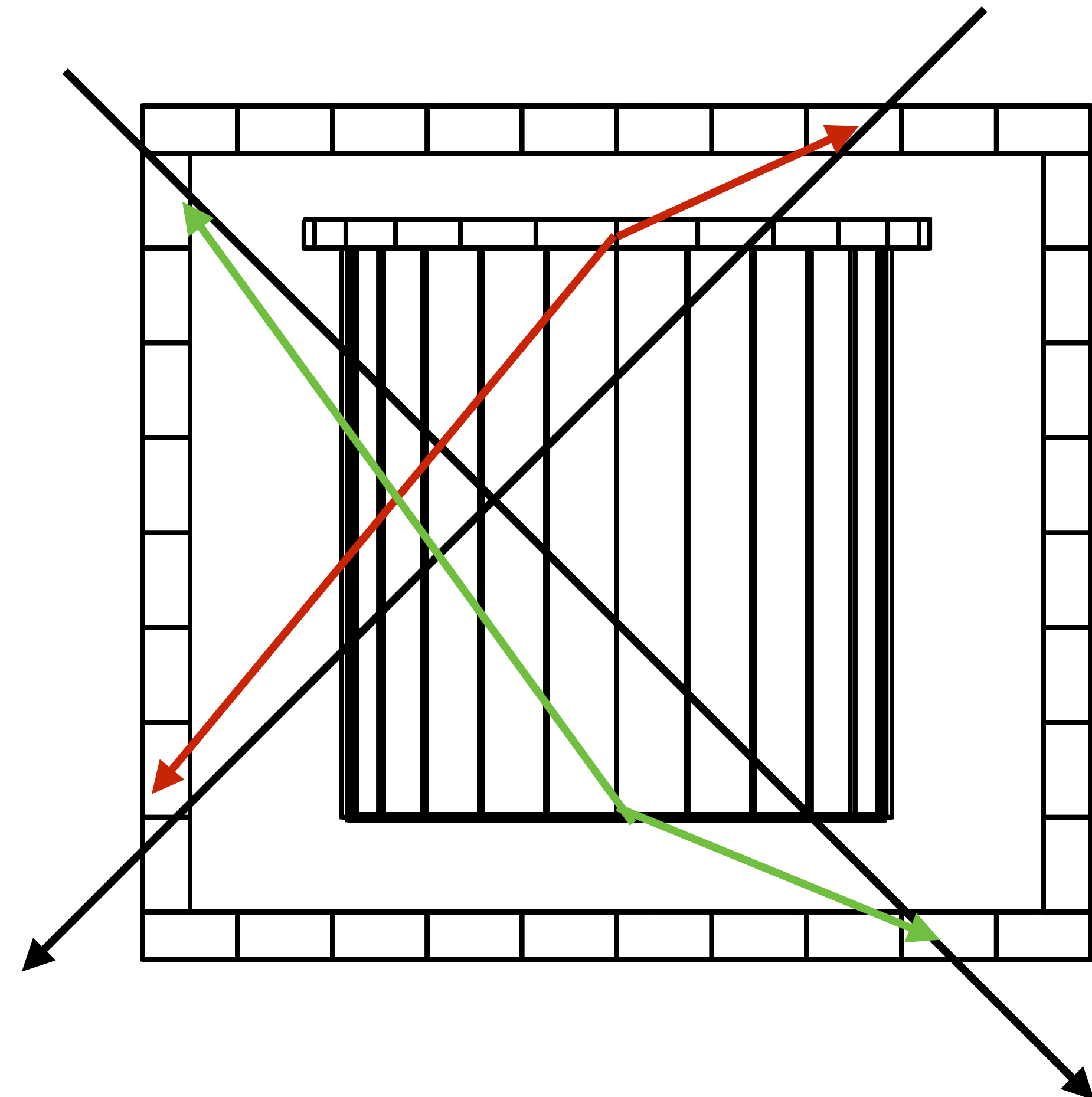
Threshold Effect

Bottom / Threshold	0 MeV	1 MeV	5 MeV	8 MeV
425	0.671	0.671	0.667	0.652
625	0.658	0.657	0.654	0.640
725	0.653	0.653	0.649	0.636
825	0.650	0.650	0.646	0.633
Top / Threshold	0 MeV	1 MeV	5 MeV	8 MeV
425	0.455	0.454	0.452	0.442
625	0.440	0.440	0.437	0.424
725	0.433	0.432	0.429	0.415
825	0.424	0.423	0.420	0.406



Side-Bottom / Top-Side Combination

- To increase the efficiency consider the events with the **Side-Bottom** or **Top-Side** combinations
- Side-Bottom: a few **highest** side bars
- Top-Side: a few **lowest** side bars



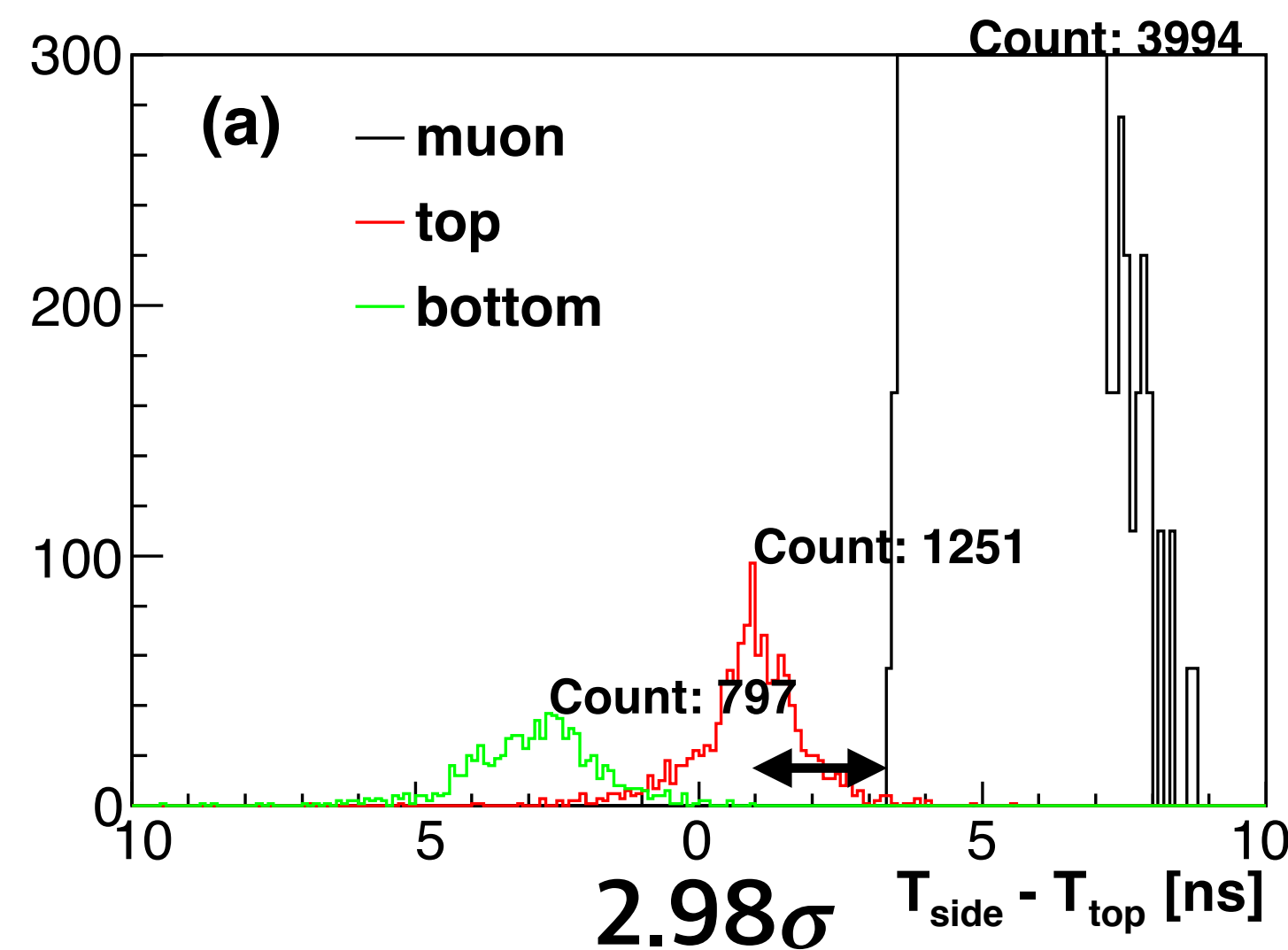
Top-Side Combination

Top Det. Height = 825 mm

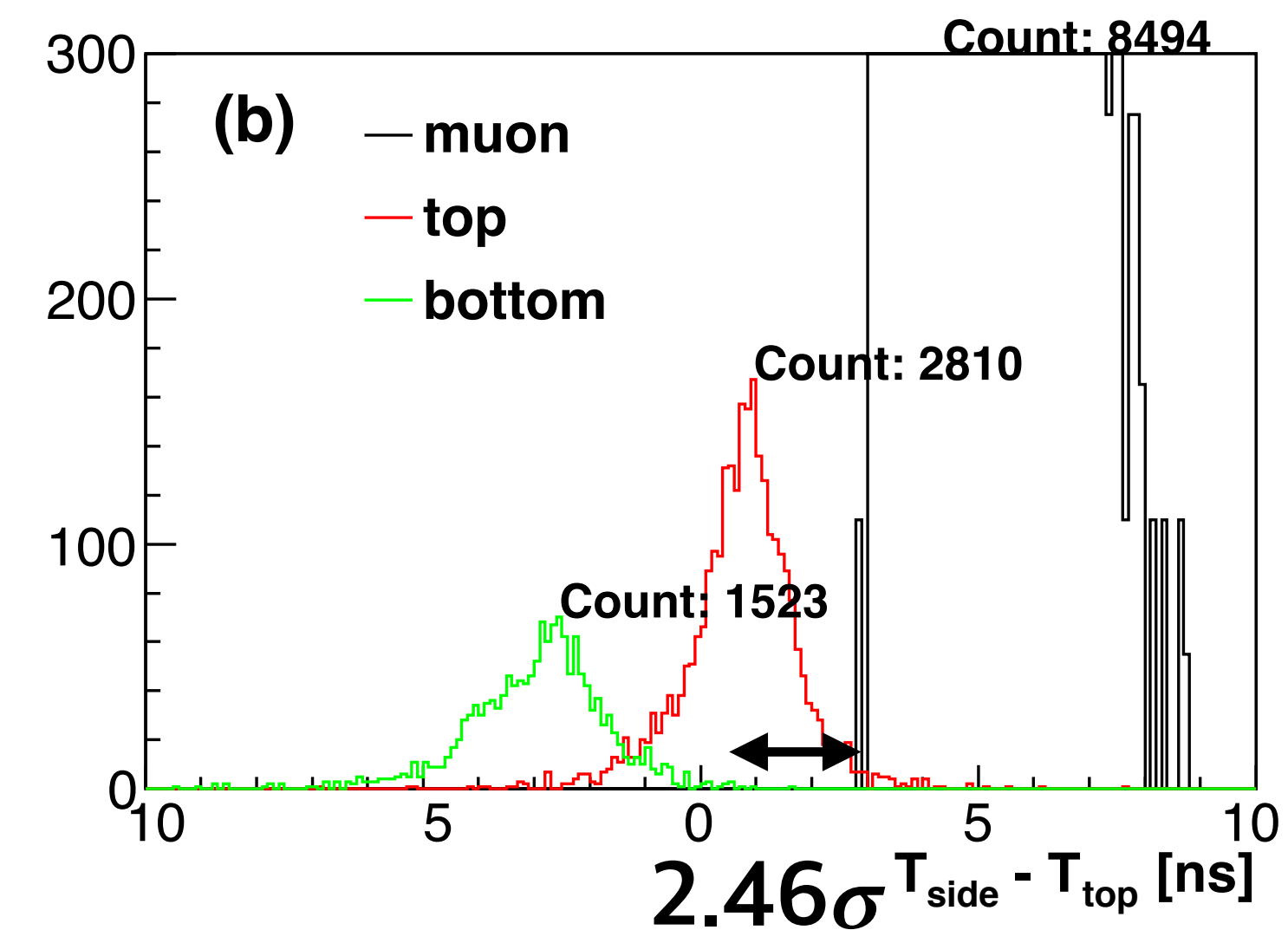
Additional Eff.

# Bar	Top Ann.	Bottom Ann.
1	1.25%	0.80%
2	2.81%	1.52%
3	4.61%	2.53%
4	6.75%	3.38%

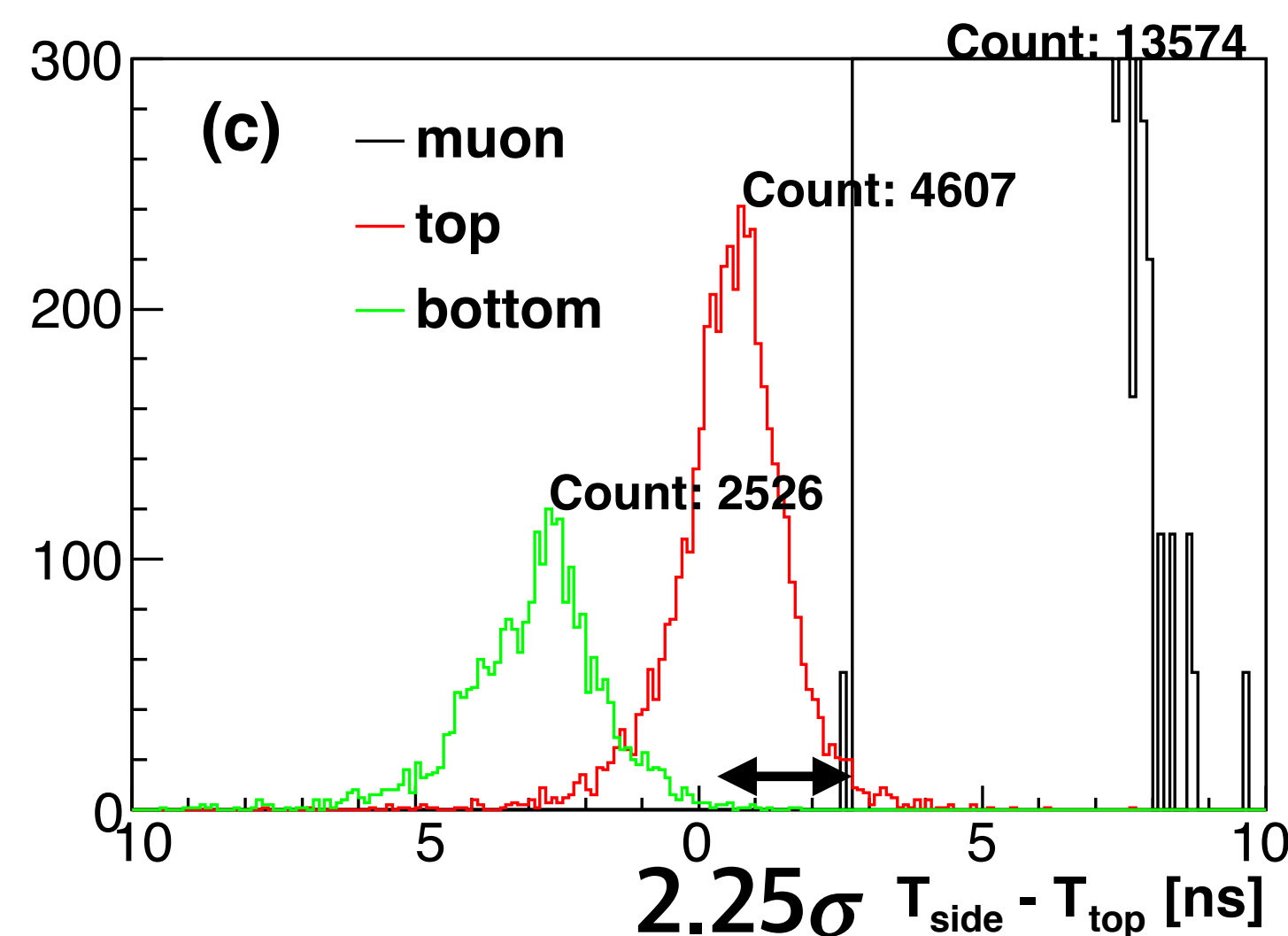
of Lowest Side Bars = 1



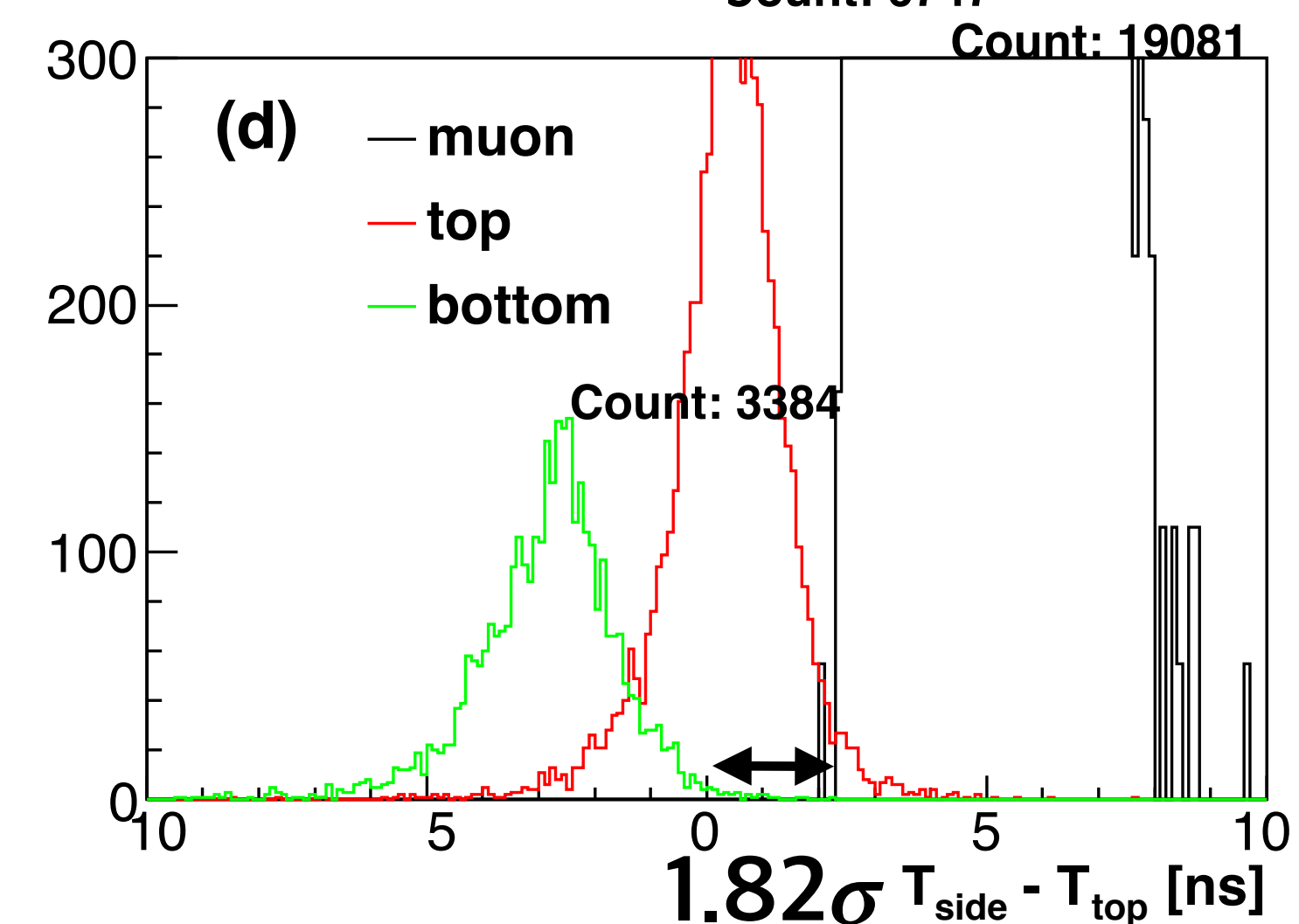
of Lowest Side Bars = 2



of Lowest Side Bars = 3



of Lowest Side Bars = 4



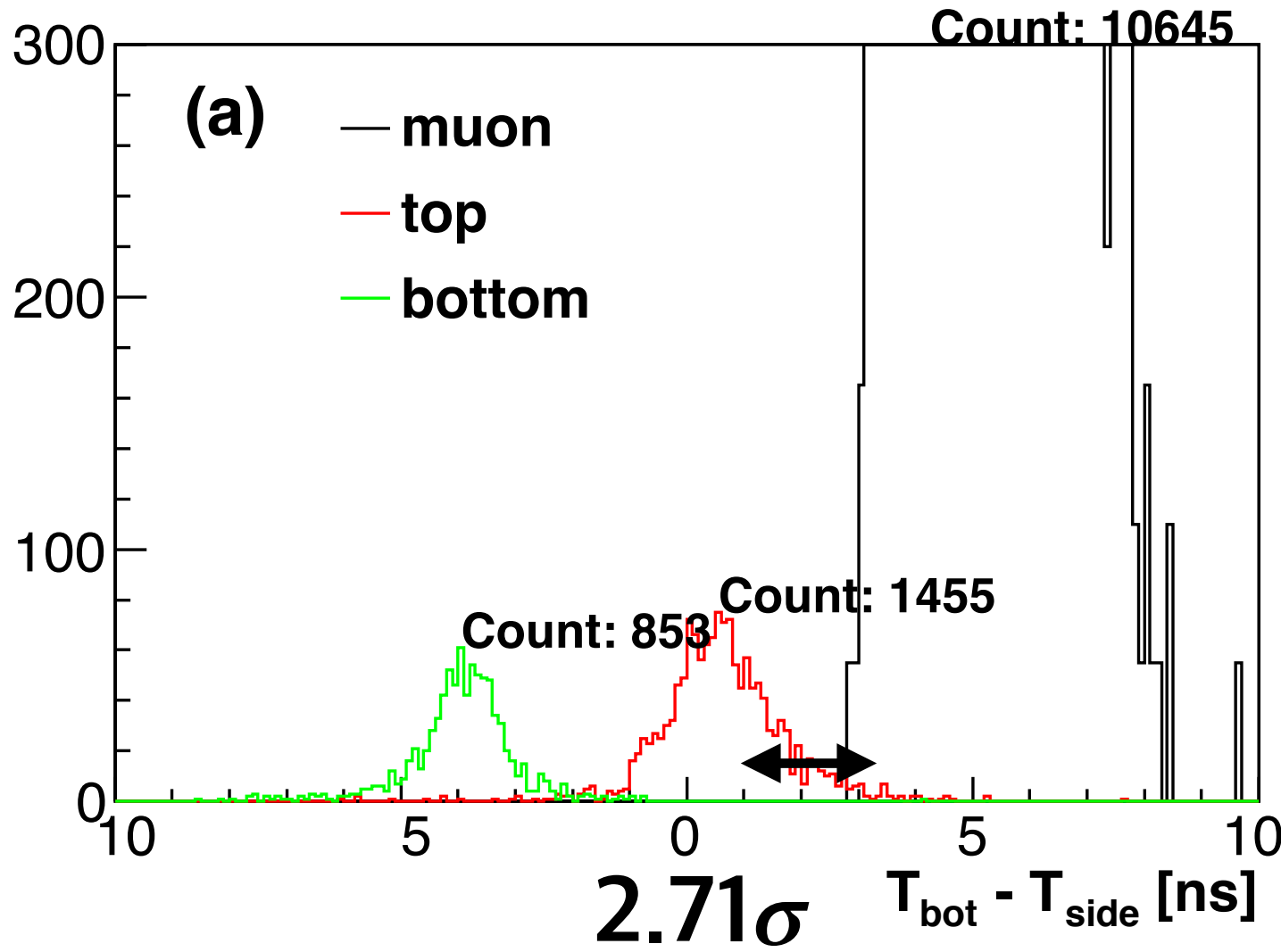
Side-Bottom Combination

Top Det. Height = 825 mm

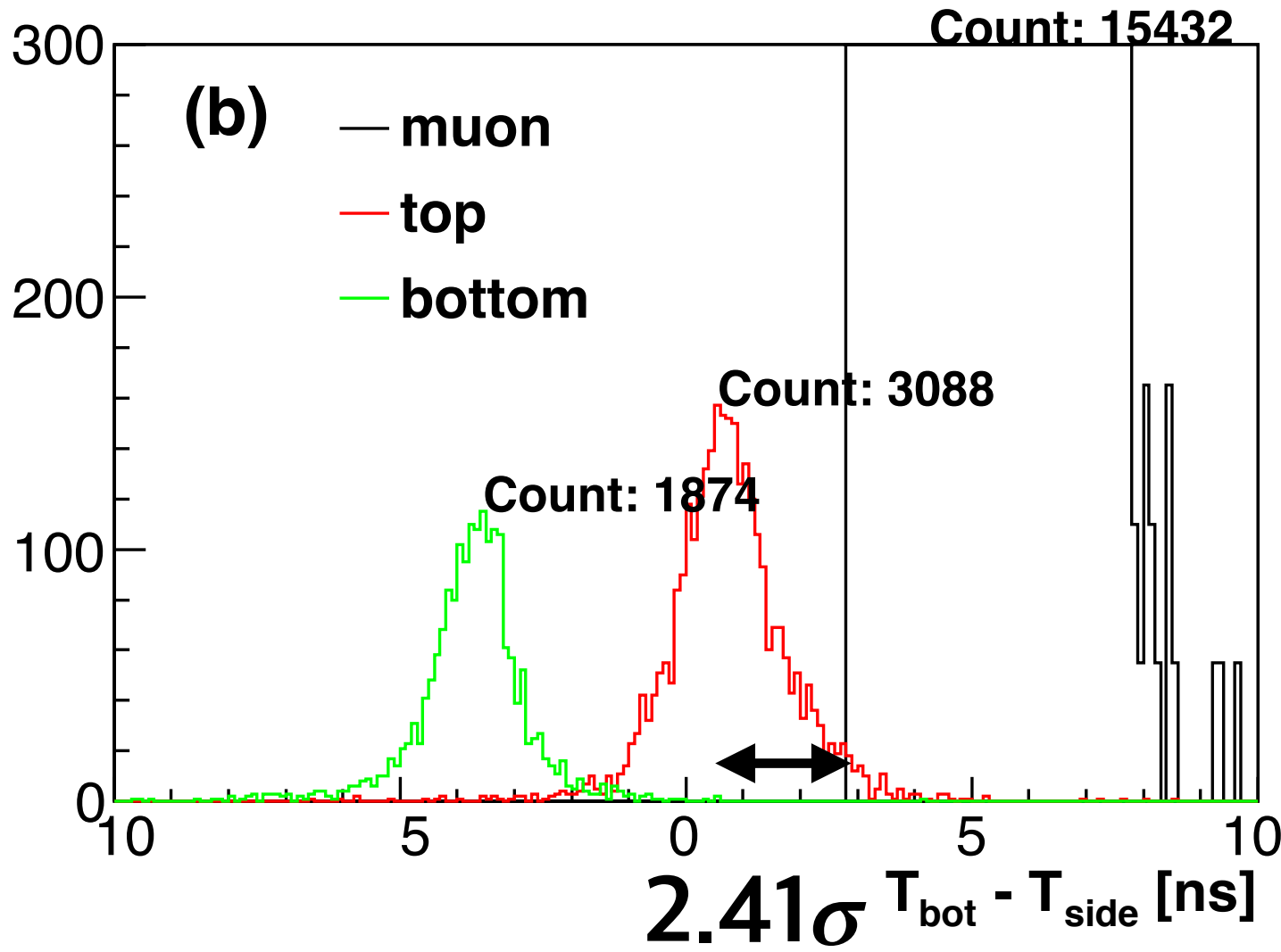
Additional Eff.

# Bar	Top Ann.	Bottom Ann.
1	1.46%	0.85%
2	3.09%	1.87%
3	4.64%	3.35%
4	5.75%	5.30%

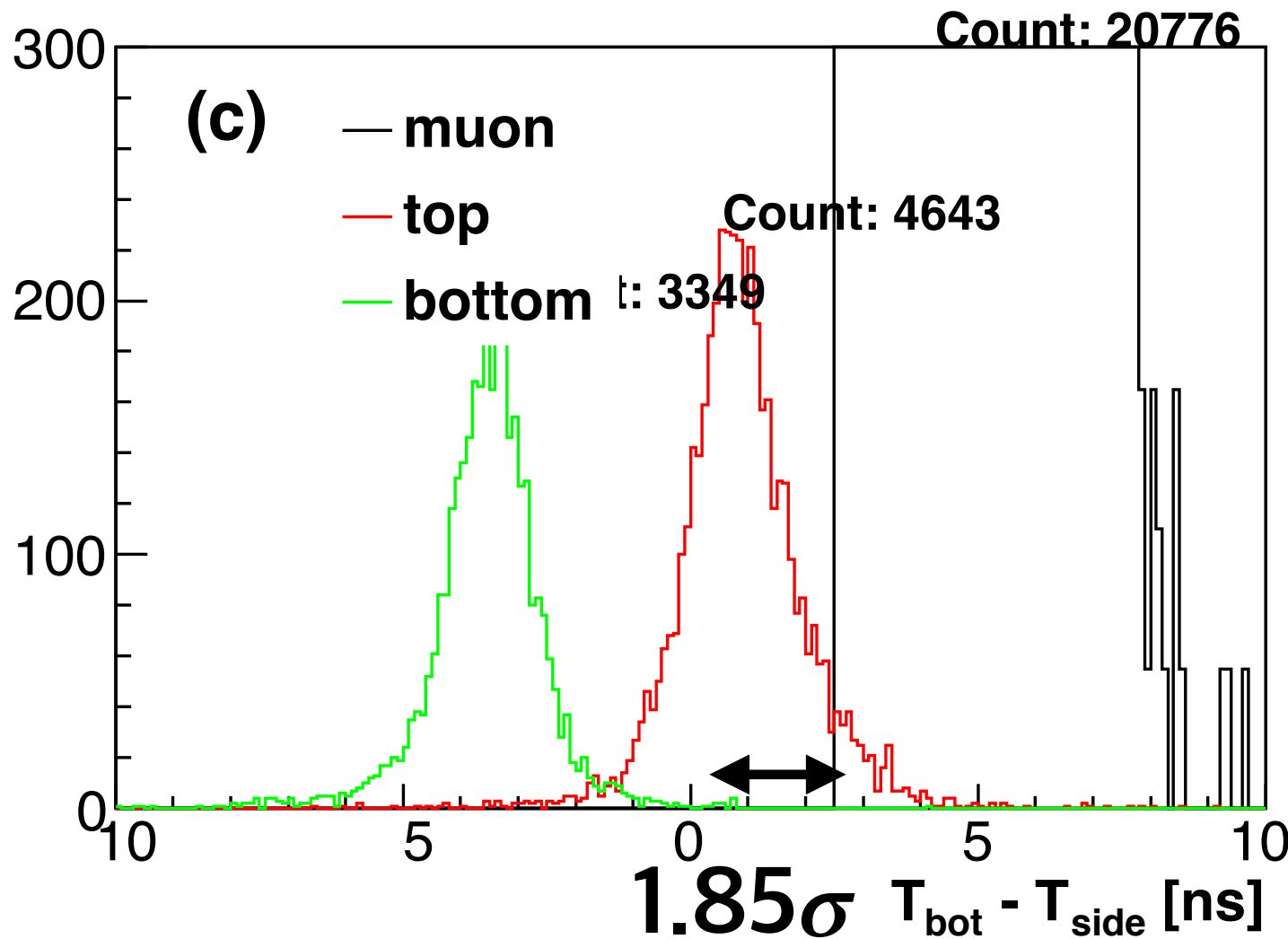
of Highest Side Bars = 1



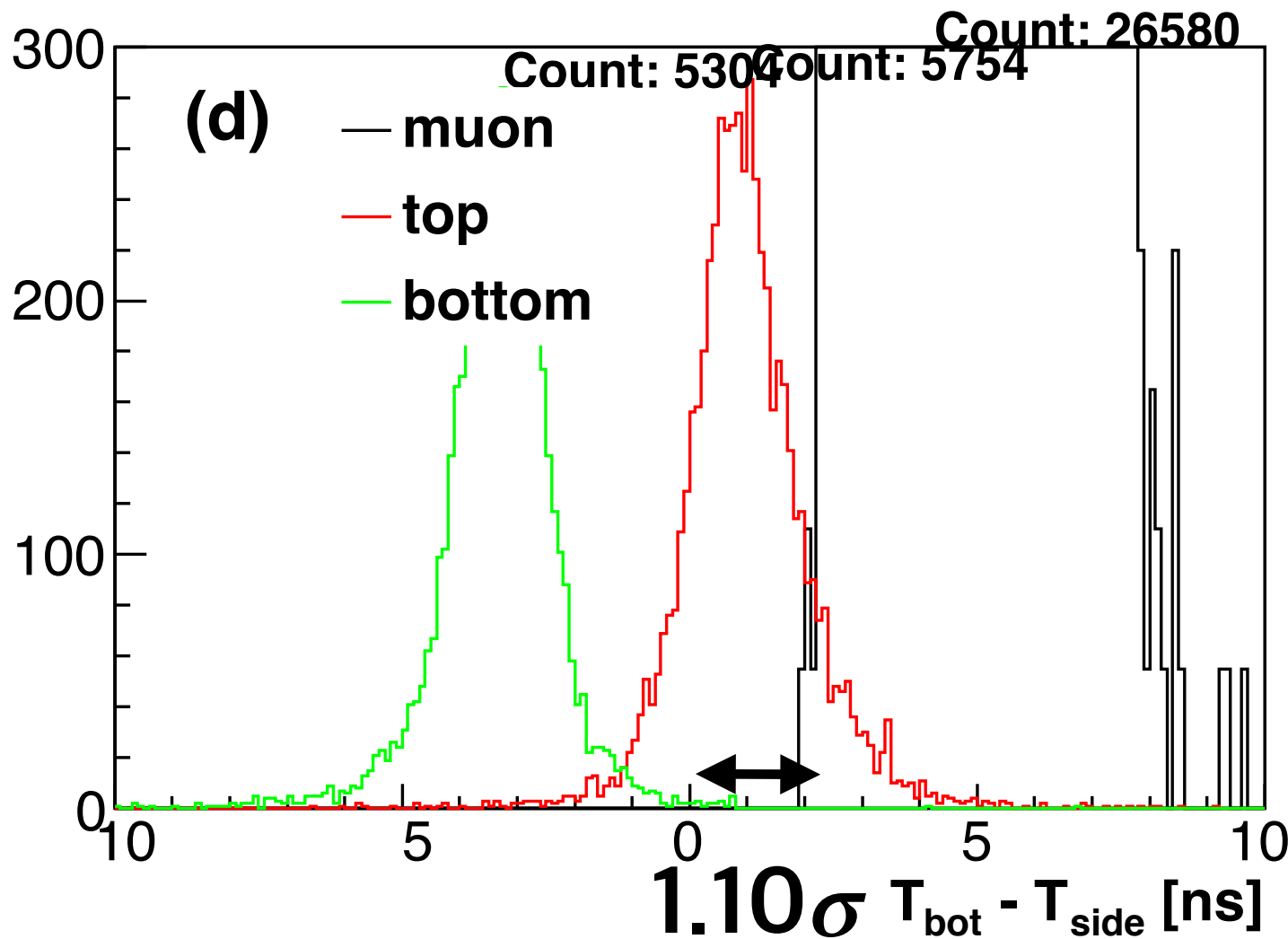
of Highest Side Bars = 2



of Highest Side Bars = 3



of Highest Side Bars = 4



Side-Bottom / Top-Side Combination

Additional Eff.

# Bar	Top-Side		Side-Bottom		Sum	
	Top Ann.	Bottom Ann.	Top Ann.	Bottom Ann.	Top Ann.	Bottom Ann.
1	1.25%	0.80%	1.46%	0.85%	2.71%	1.65%
2	2.81%	1.52%	3.09%	1.87%	5.9%	3.39%
3	4.61%	2.53%	4.64%	3.35%	9.25%	5.88%
4	6.75%	3.38%	5.75%	5.30%	12.5%	8.68%

To-Do List

- Check all secondary particles with the energy threshold