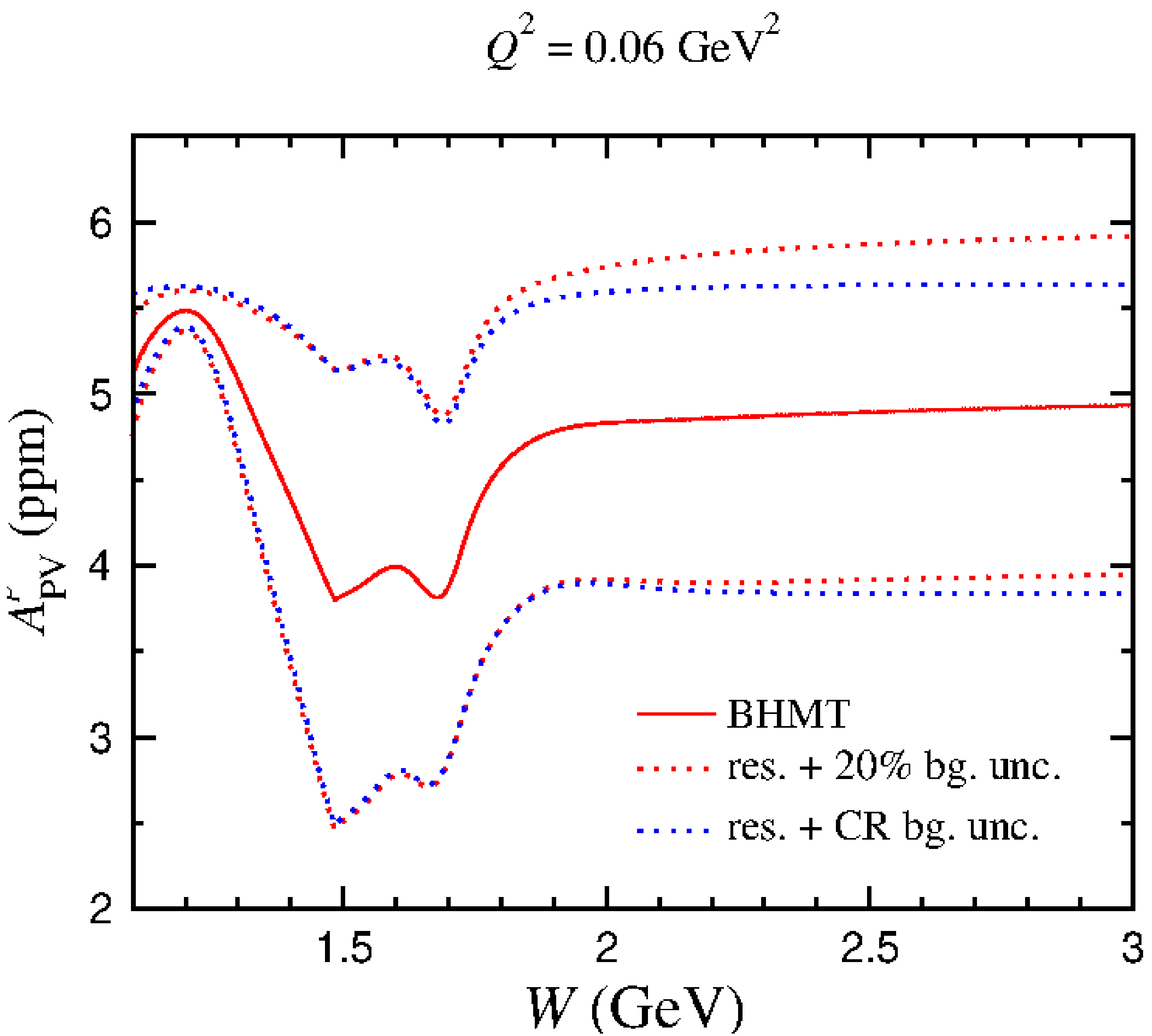
Can Qweak help?



Options:

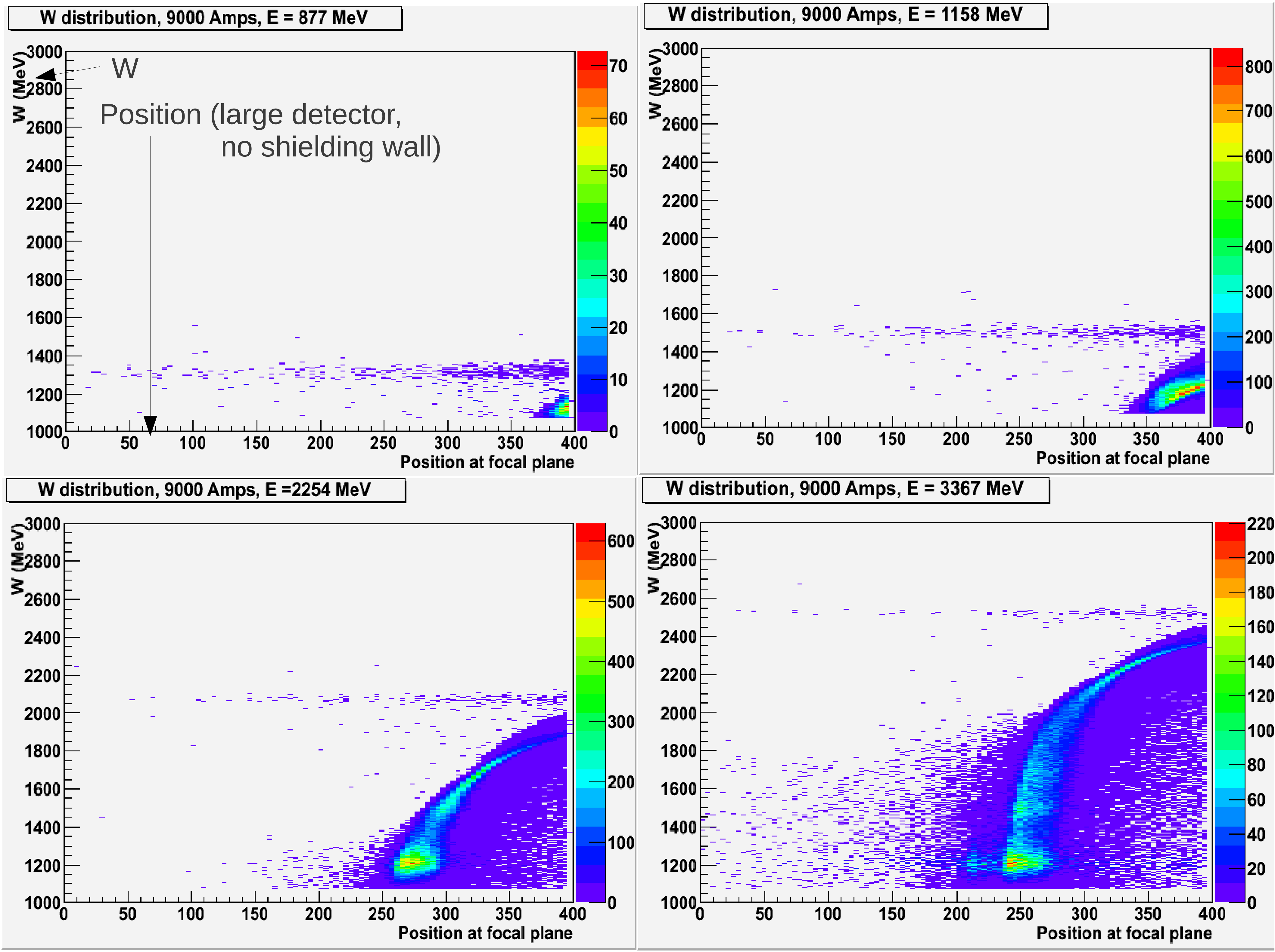
- Next week:	3367.7 MeV (4-pass)	P ~ 0.6
- Nominal running:	1158 MeV	P ~ 0.85
- End of run:	2253.7 MeV (2-pass)	P ~ 0.8
	3349.7 MeV (3-pass)	P ~ 0.76

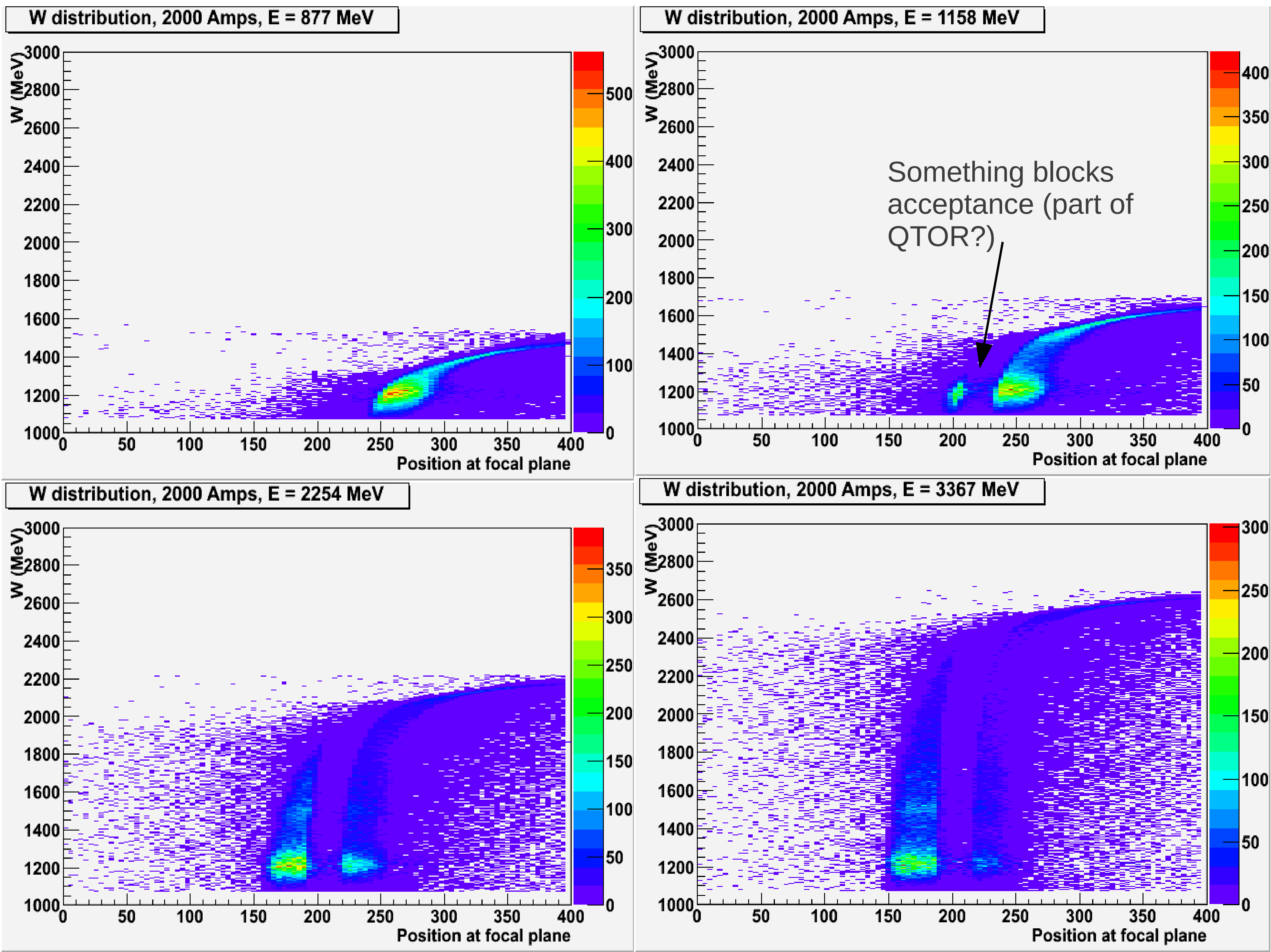
Thoughts:

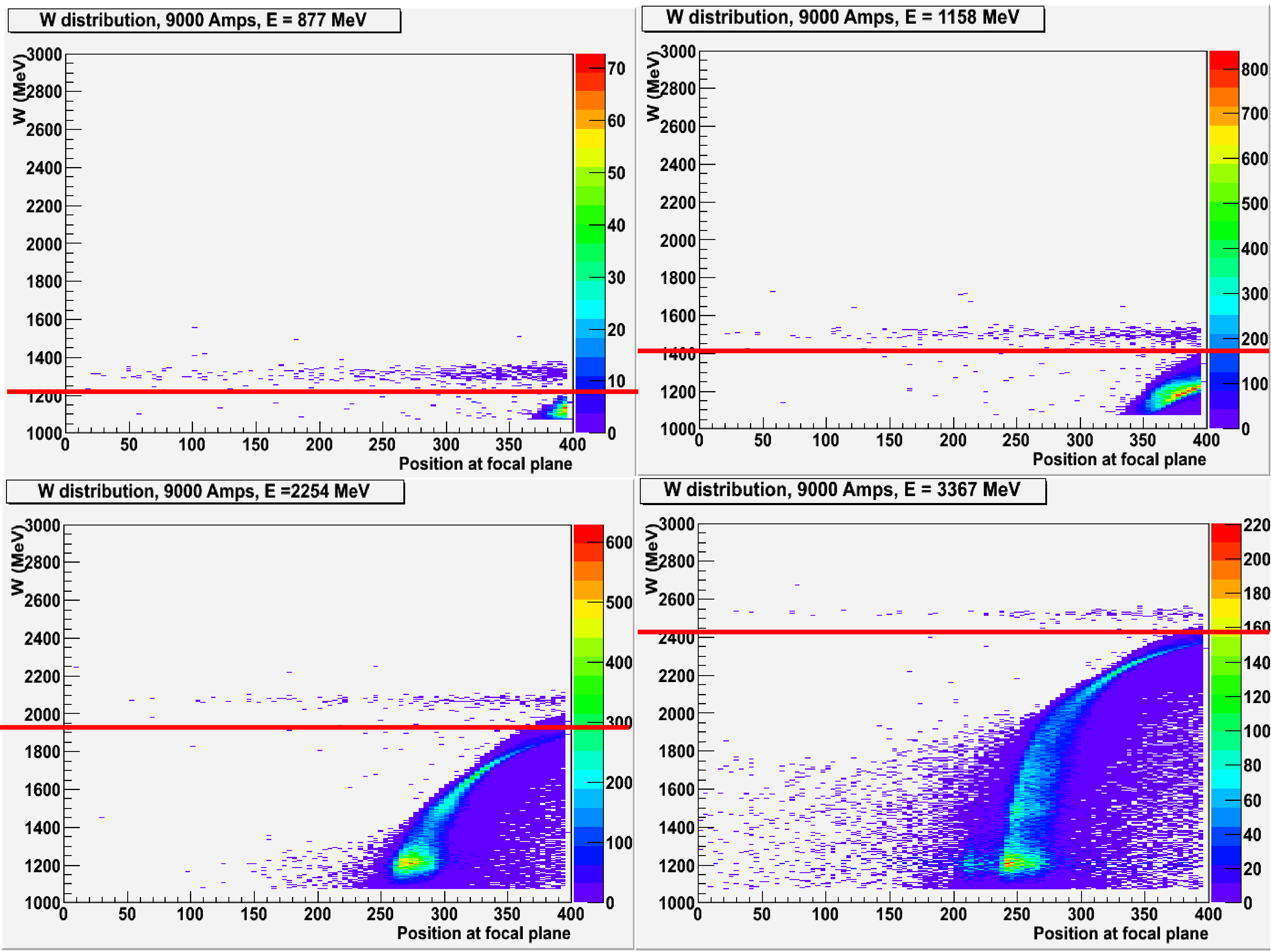
- Using the nominal energy would be difficult – would need to go to low field, worry about low energy backgrounds...

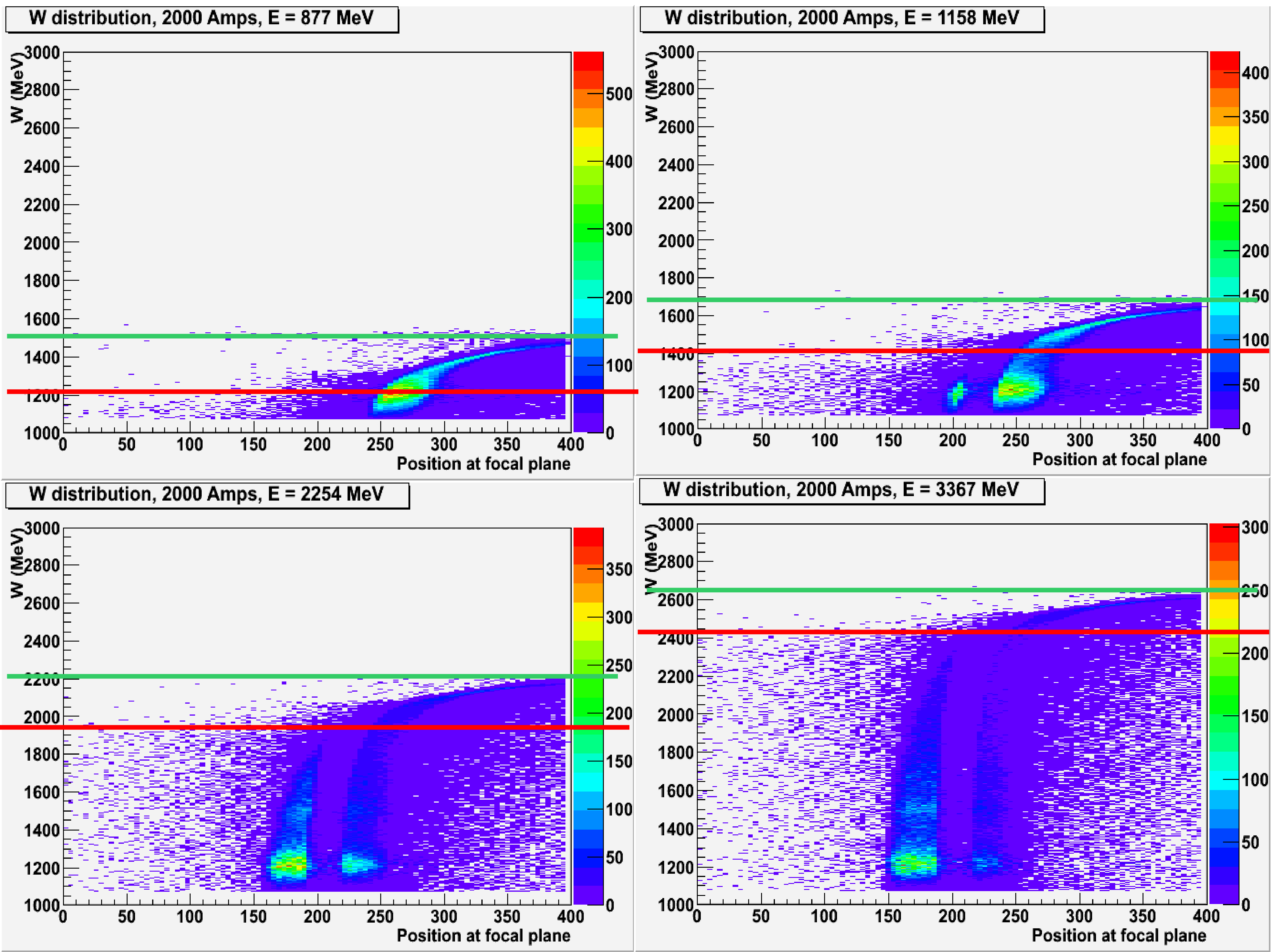
- 3.3-3.4 GeV may give us W = 2.2 GeV, but need to test backgrounds. Better polarization at end of run, but need to test feasibility of the measurement

- 2254 MeV can give us a measurement at W = 1.7 GeV

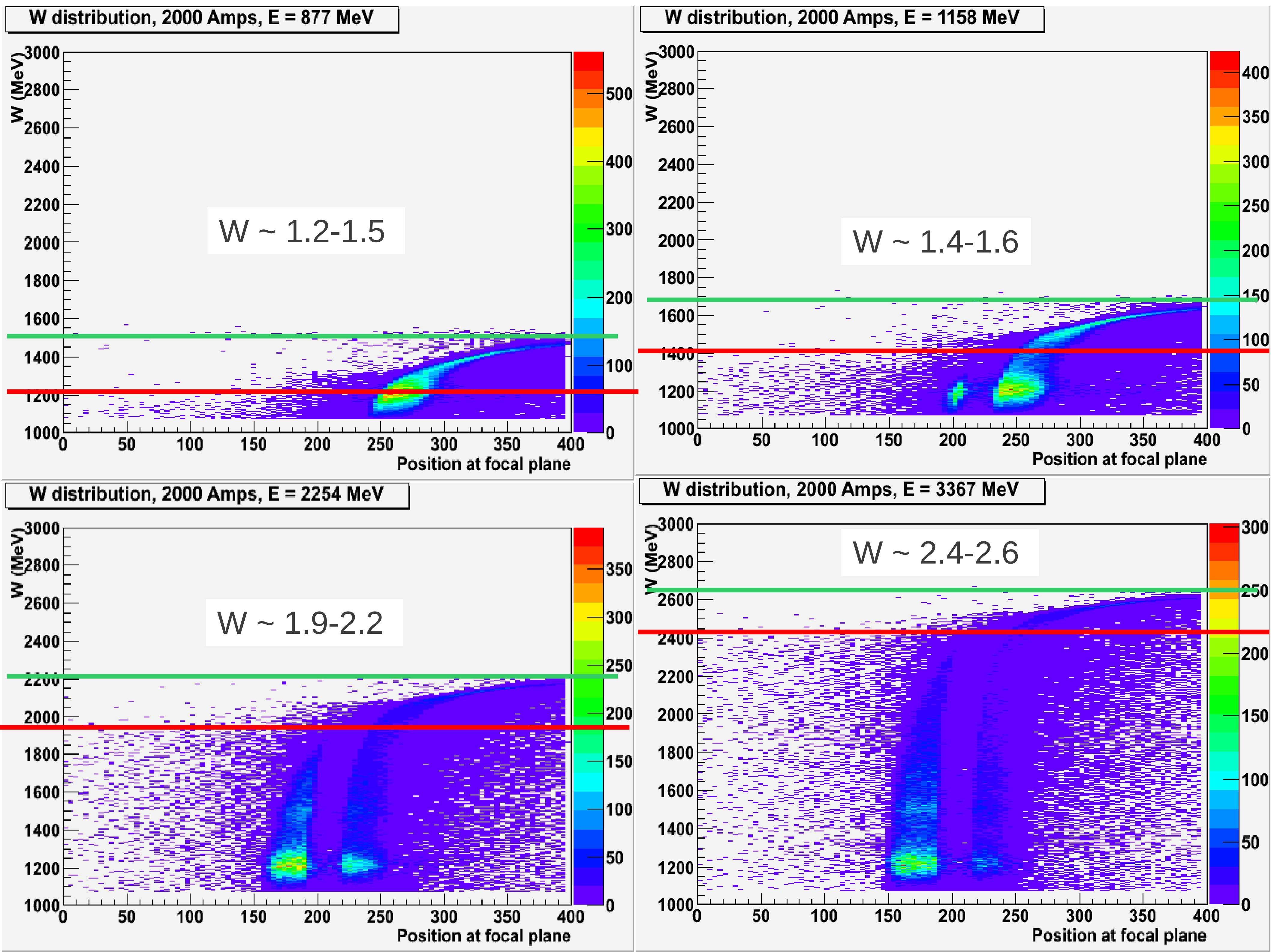

W distribution, 9000 Amps, E = 877 MeV
W
Position (large detector,
no shielding wall)
W (MeV)
Position at focal plane
W distribution, 9000 Amps, E = 1158 MeV
W (MeV)
Position at focal plane
W distribution, 9000 Amps, E =2254 MeV
W (MeV)
Position at focal plane
W distribution, 9000 Amps, E = 3367 MeV
W (MeV)
Position at focal plane


W distribution, 2000 Amps, E = 877 MeV
W (MeV)
Position at focal plane
W distribution, 2000 Amps, E = 1158 MeV
Something blocks acceptance (part of QTOR?)
W (MeV)
Position at focal plane
W distribution, 2000 Amps, E = 2254 MeV
W (MeV)
Position at focal plane
W distribution, 2000 Amps, E = 3367 MeV
W (MeV)
Position at focal plane


W distribution, 9000 Amps, E = 877 MeV
W (MeV)
Position at focal plane
W distribution, 9000 Amps, E = 1158 MeV
W (MeV)
Position at focal plane
W distribution, 9000 Amps, E =2254 MeV
W (MeV)
Position at focal plane
W distribution, 9000 Amps, E = 3367 MeV
W (MeV)
Position at focal plane



W distribution, 2000 Amps, E = 877 MeV
W distribution, 2000 Amps, E = 1158 MeV
W distribution, 2000 Amps, E = 2254 MeV
W distribution, 2000 Amps, E = 3367 MeV
W (MeV)
Position at focal plane



W distribution, 2000 Amps, E = 877 MeV
W ~ 1.2-1.5
W distribution, 2000 Amps, E = 1158 MeV
W ~ 1.4-1.6
W distribution, 2000 Amps, E = 2254 MeV
W ~ 1.9-2.2
W distribution, 2000 Amps, E = 3367 MeV
W ~ 2.4-2.6
W (MeV)
Position at focal plane

E = 3367 MeV:

Statistics:

0.077 Mhz/uA (all octants) X 100 uA = 7.7 MHz

Translates to a 5700 ppm asymmetry width

24 hours @ 100% efficiency: dA = 1.25 ppm

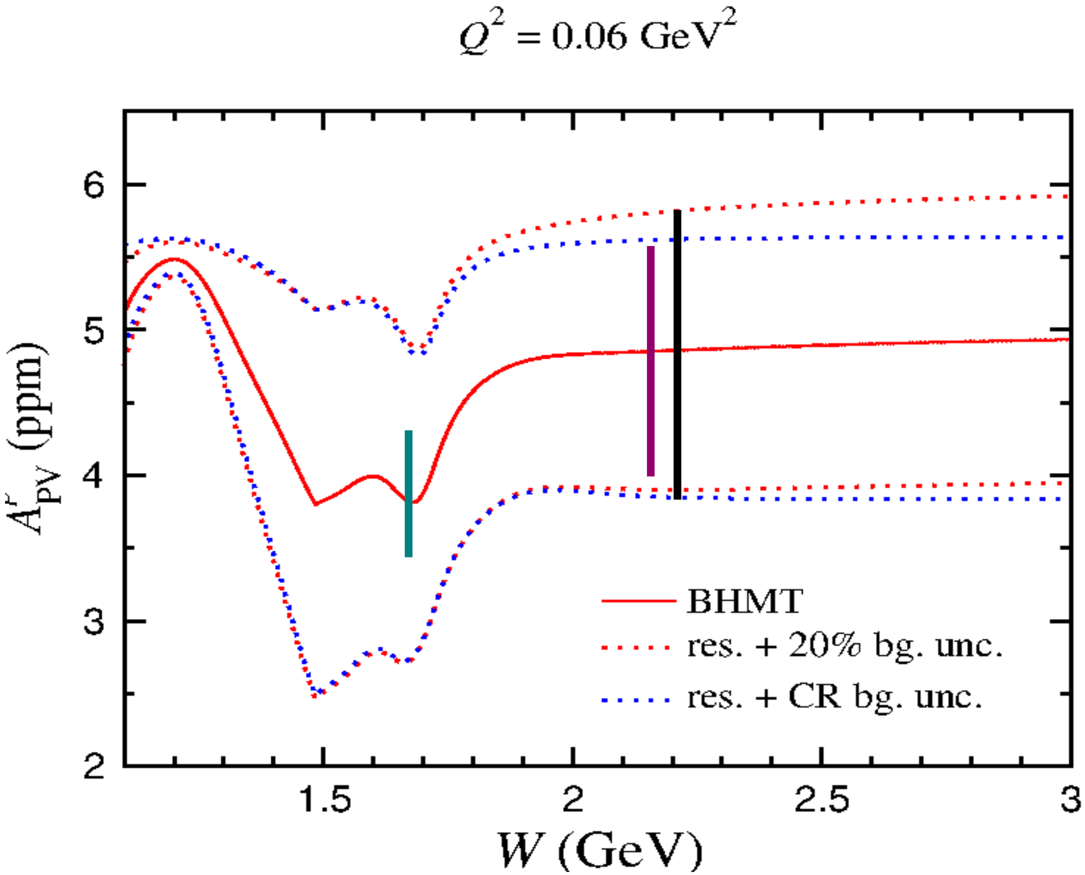
But! P = 0.6, f_ep = 0.5!!

This results in a 4.2 ppm measurement/24 hours

Does NOT include dilution for soft backgrounds, pions, etc...

Updated Error Table:

Energy (MeV)	QTOR (Amps)	Wpeak (MeV)	Rate/octant (Mhz/uA)	(100 uA) Width (ppm)	f_ep	Pol	FOM (@100%)
3366.7	9000	2232	0.0096	5700	0.5	0.6	4.2 ppm/day
2253.7	9000	1700	0.029	3280	0.5	0.8	1.8 ppm/day

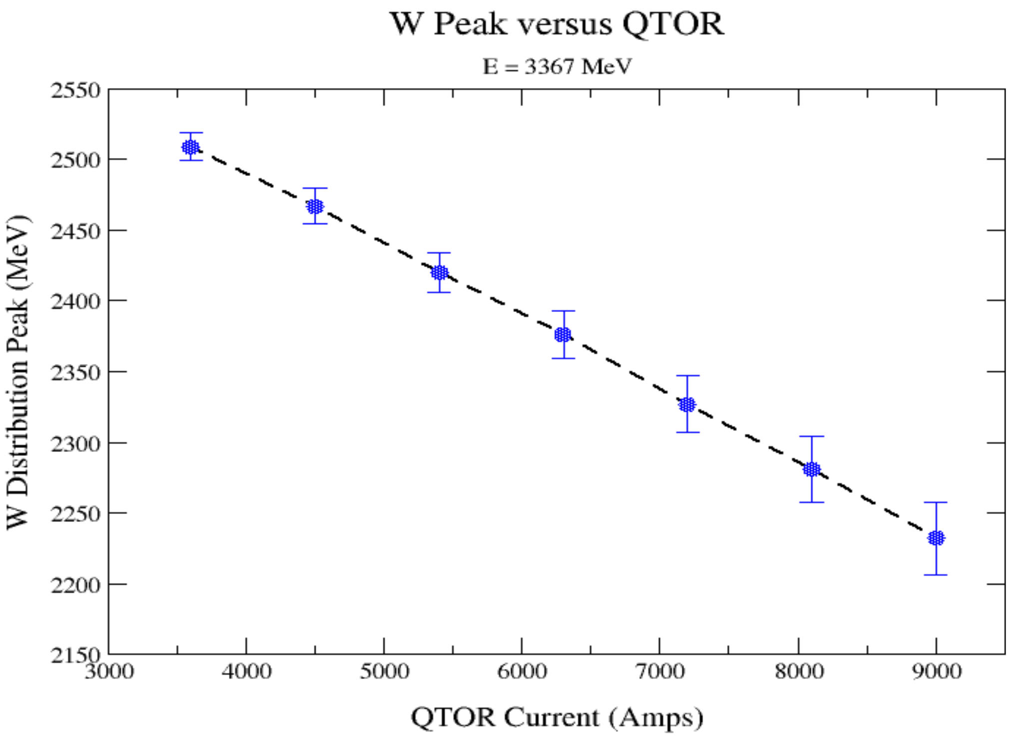


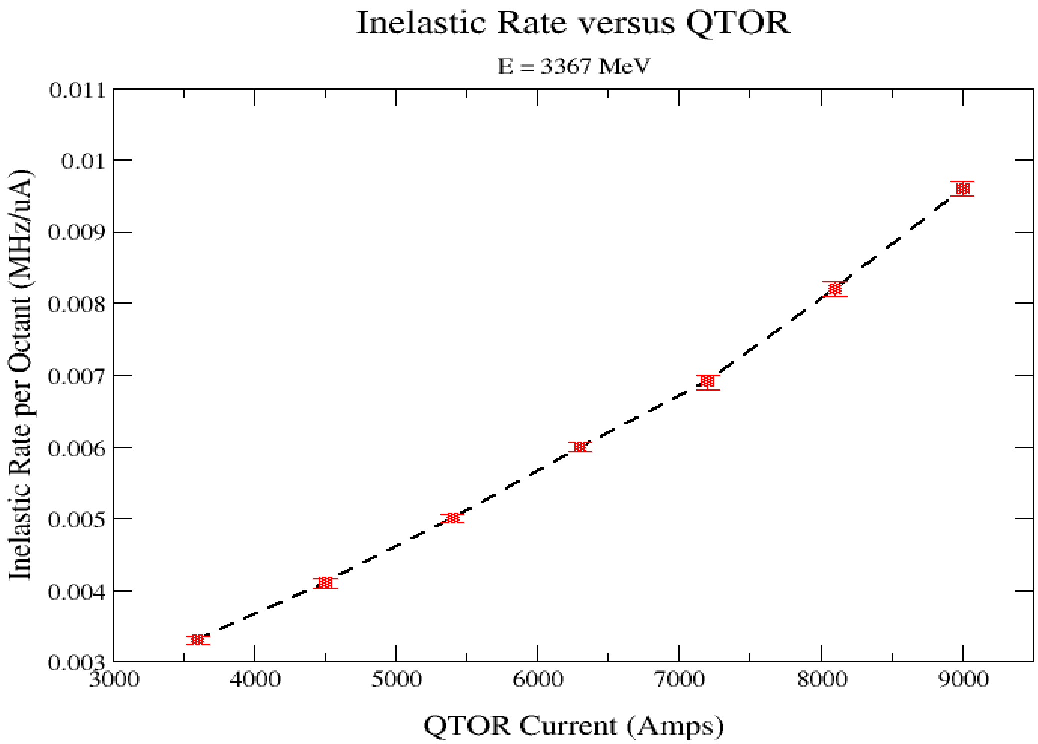
Points show 4 days @ 100%

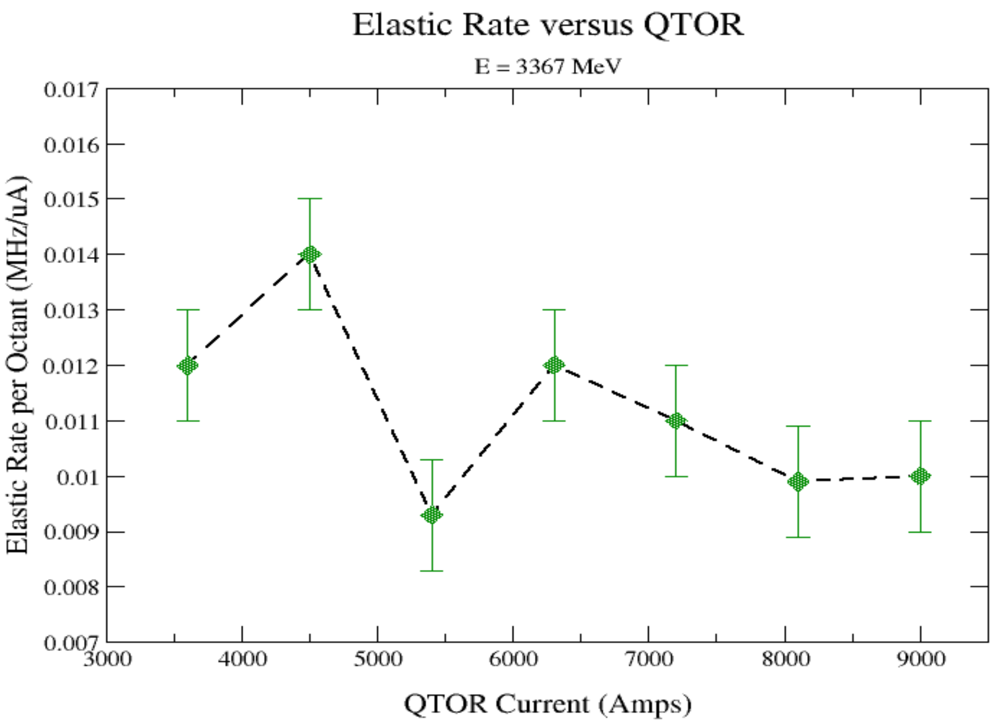
→ E = 3367 MeV
At end of run, will have
E = 3350 MeV with P = 0.76

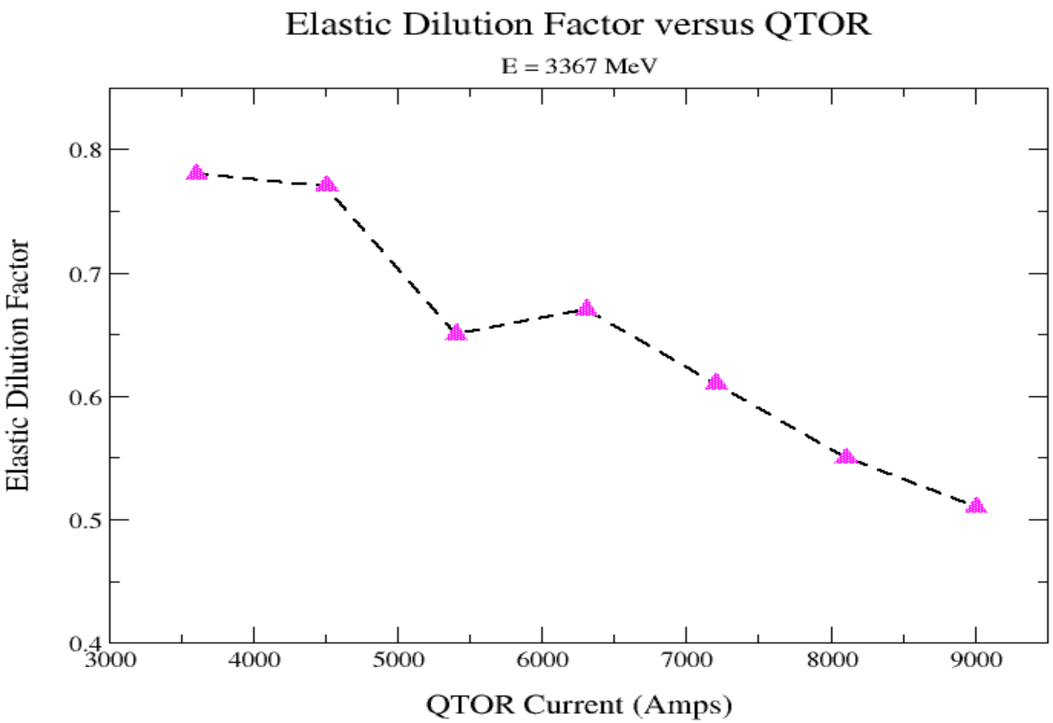
→ 3.3 ppm/day
→ 1.7 ppm in 4 days

E = 3367 MeV:


W Peak versus QTOR
E = 3367 MeV
W Distribution Peak (MeV)
QTOR Current (Amps)


Inelastic Rate versus QTOR
E = 3367 MeV
Inelastic Rate per Octant (MHz/uA)
QTOR Current (Amps)


Elastic Rate versus QTOR
E = 3367 MeV
Elastic Rate per Octant (MHz/uA)
QTOR Current (Amps)

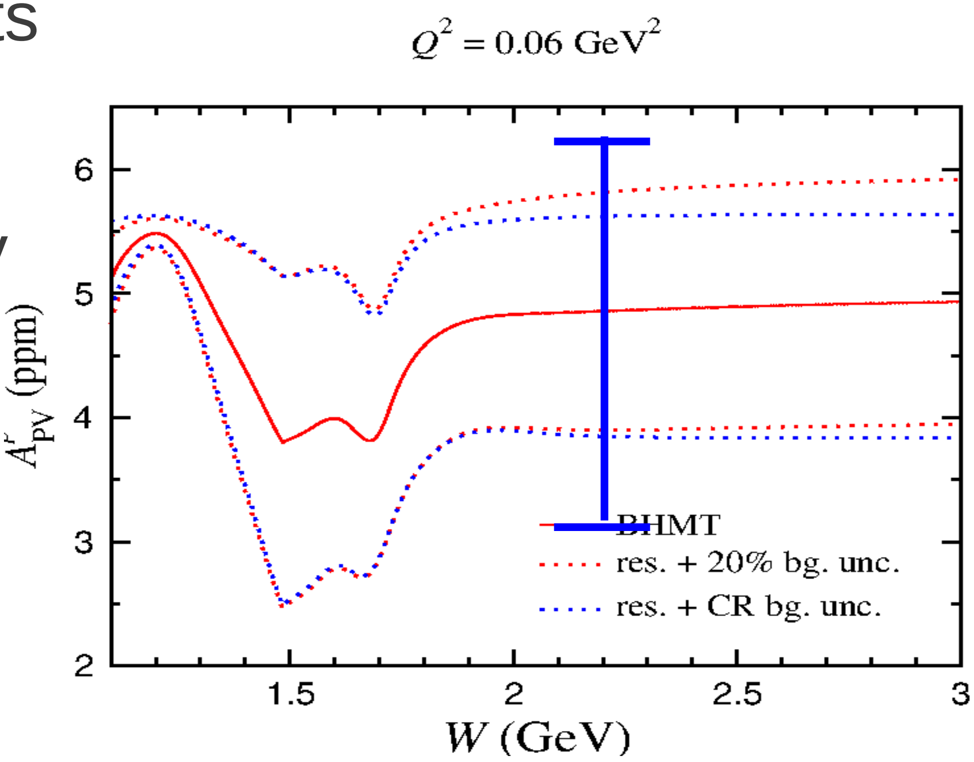

Elastic Dilution Factor versus QTOR
E = 3367 MeV
Elastic Dilution Factor
QTOR Current (Amps)

E = 3367 MeV:

What can we do? Assume 8 shifts

All production:

- +/- 2.6 ppm at 100% efficiency
- +/- 3.3 ppm at 60% efficiency
- → Not completely useful



Systematic tests needed:

- Tracking mode background measurement - ~1.5 shifts (w/ setup)
- Aluminum asymmetry measurement - ~ 0.5 shift
- Aluminum "dilution" - runs on dummy targets – ~0.5 shift
- Tungsten shutter test – ~0.5 shift
- QTOR scan - ~0.5-1 shift

End of run: Assume 6 days, 18 shifts

E = 2254 MeV: we would get 1.8 ppm/24 hours @ 100% efficiency (100 uA)
- → Spend 2 days, or 6 shifts taking data at this energy
- → Add 2 shifts for systematics at this energy
- → Total 8 shifts

E = 3350 MeV: (~ with 3367 MeV simulation)
- → 2 shifts for systematics at this energy
- → This leaves 8 shifts for taking data – exactly the same boat we were in on the last slide

Take 2:

E = 2254 MeV: goal 2 ppm, 140 uA?? → 15 hours @ 50% → 2 shifts
- → + 2 shifts systematics, Total = 4 shifts

E = 3350 MeV
- → 2 shifts systematics, 12 shifts data taking
- → 2.3 ppm @ 50% efficiency, still not great

- → If we take all shifts here, 1.9 ppm measurement @ 50%