Updates

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for the GlueX Collaboration

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Selection critiria

Two clusters in Forward Calorimeter:

- $E_{cluster} \geq 500$ MeV
- $|t_{cluster} - t_{RF}| \leq$ 2 ns
- $|t^1_{cluster} - t^2_{cluster}| \leq$ 5 ns

Veto applied:

- Barrel Calorimeter used to veto hadronic backgrounds
  - No cluster in coincidence with RF
  - Coincidence if $|t^{BCAL}_{cluster} - t_{RF}| \leq$ 5 ns
- Time-Of-Flight wall used to veto charged particles
  - No matching hit between TOF and FCAL

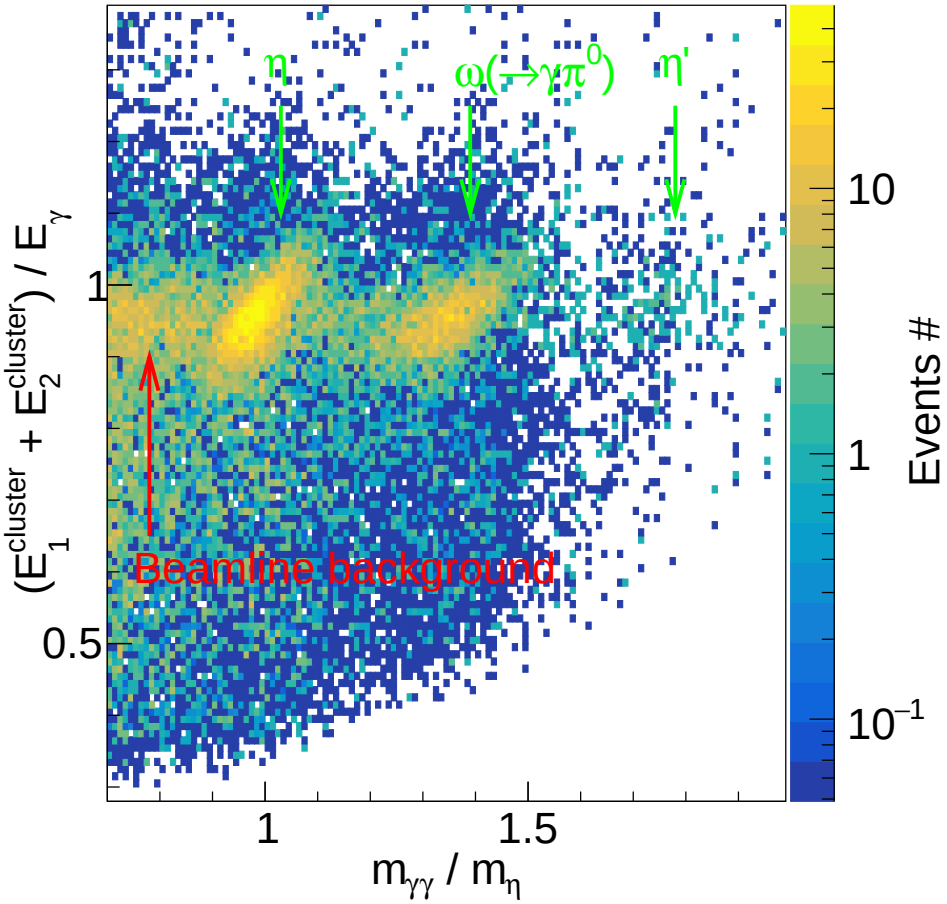
Coincidental and accidental tagger (hadoscope & microscope) hits:

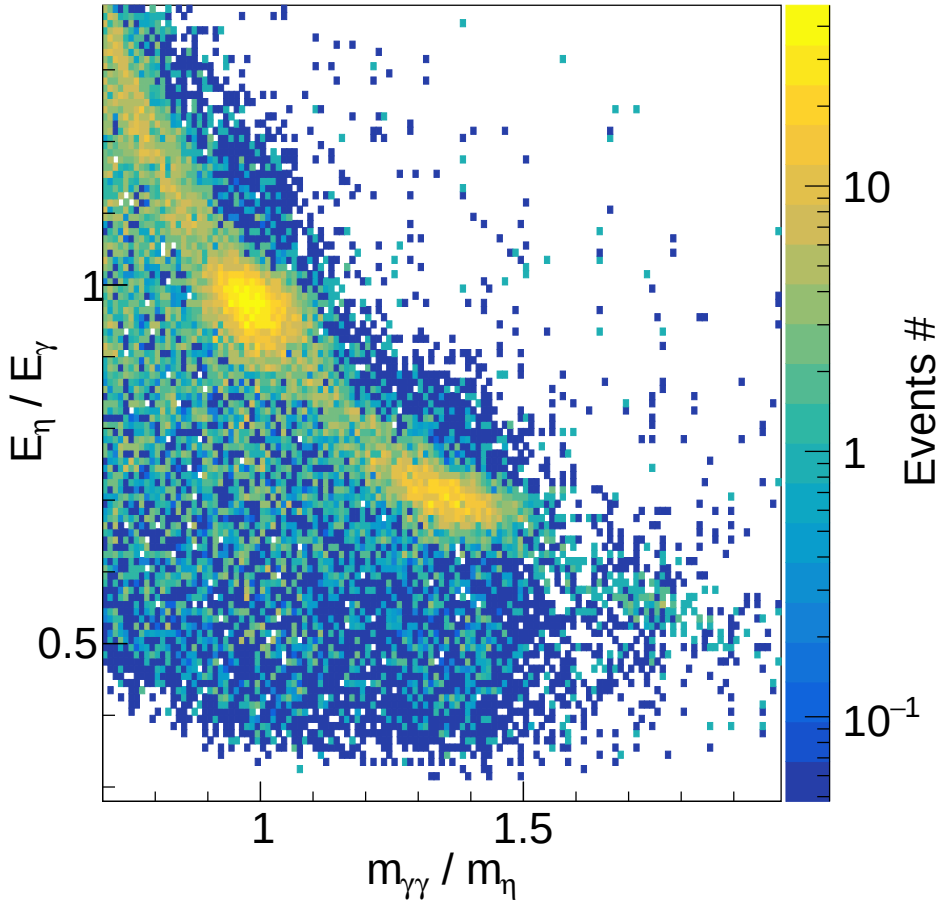
- Coincidental: $|t_{tagger} - t_{RF}| \leq 2$ ns
- Accidental: 10 neighboring bunches, 5 consecutive positive and 5 consevutive negative, scaling factor of -0.1
- $E_\gamma \geq 8$ GeV
- Elasticity required

Elasticity for 200 nA He fill 2021 data set no B-field

Is defined in this analysis in two different ways:

- E_γ - E_1^{cluster} - E_1^{cluster} (elasticity measured)
- E_γ - E_η where photon momenta corrected by $\frac{m_\eta^{\text{theory}}}{m_\eta^{\text{measured}}}$ (elasticity corrected)



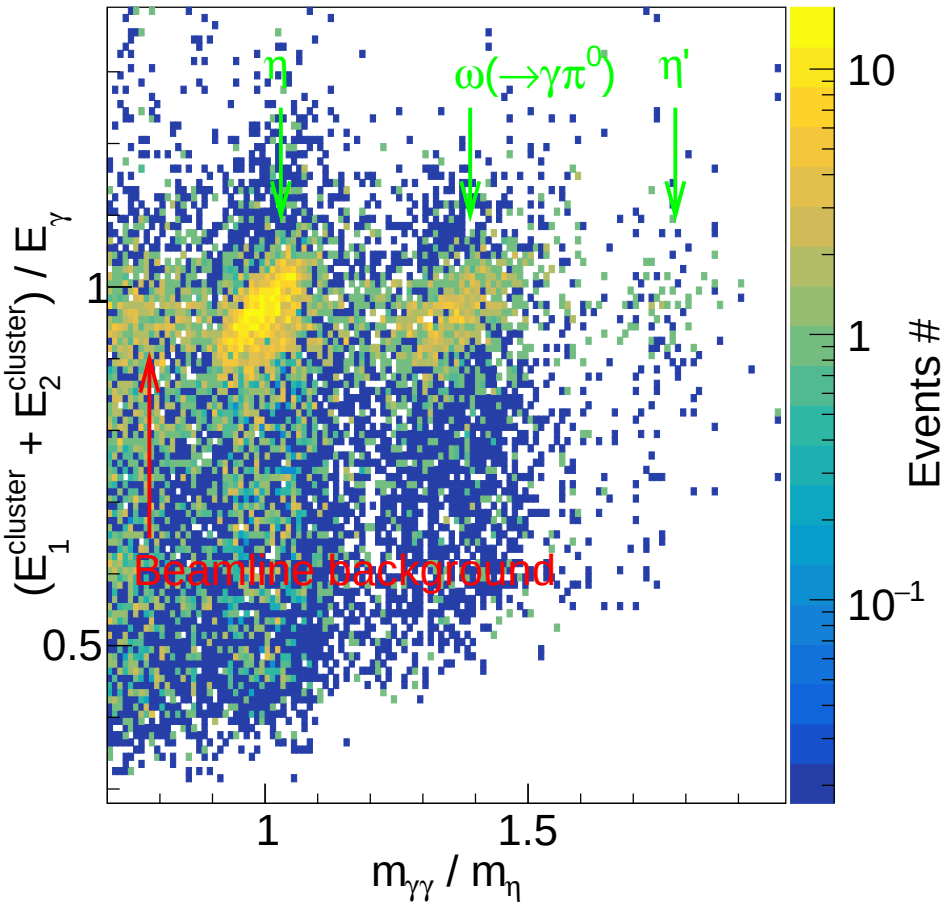


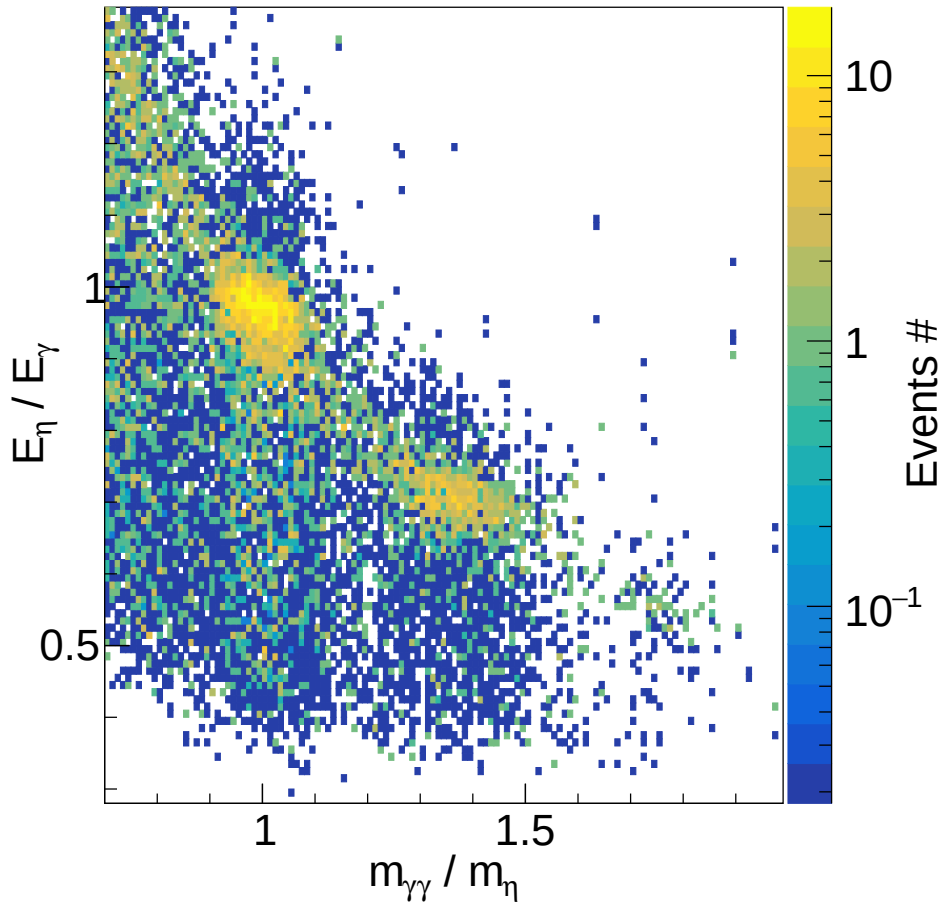
- $|E_\gamma$ - E_1^{cluster} - $E_1^{\text{cluster}}| \leq$ 1.5 GeV and $|E_\gamma$ - $E_\eta| \leq$ 1.5 GeV

Elasticity for 200 nA He fill 2021 data set with B-field

Is defined in this analysis in two different ways:

- E_γ - E_1^{cluster} - E_1^{cluster} (elasticity measured)
- E_γ - E_η where photon momenta corrected by $\frac{m_\eta^{\text{theory}}}{m_\eta^{\text{measured}}}$ (elasticity corrected)





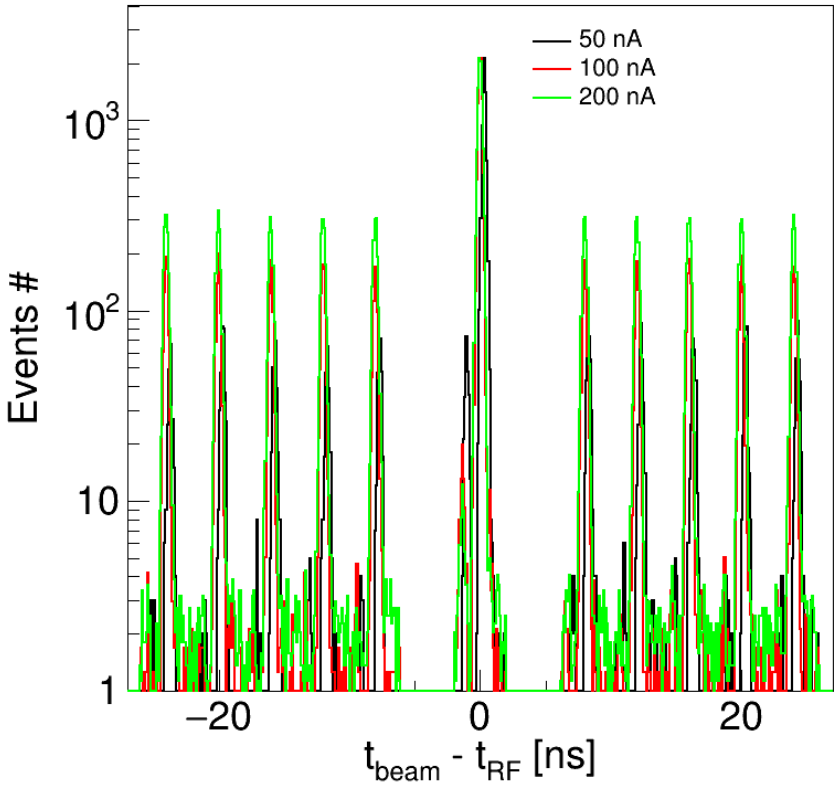
- $|E_\gamma - E_1^{\text{cluster}} - E_1^{\text{cluster}}| \leq 1.5$ GeV and $|E_\gamma - E_\eta| \leq 1.5$ GeV

Coincidental vs. accidental

Look at Be runs: 50, 100, and 200 nA

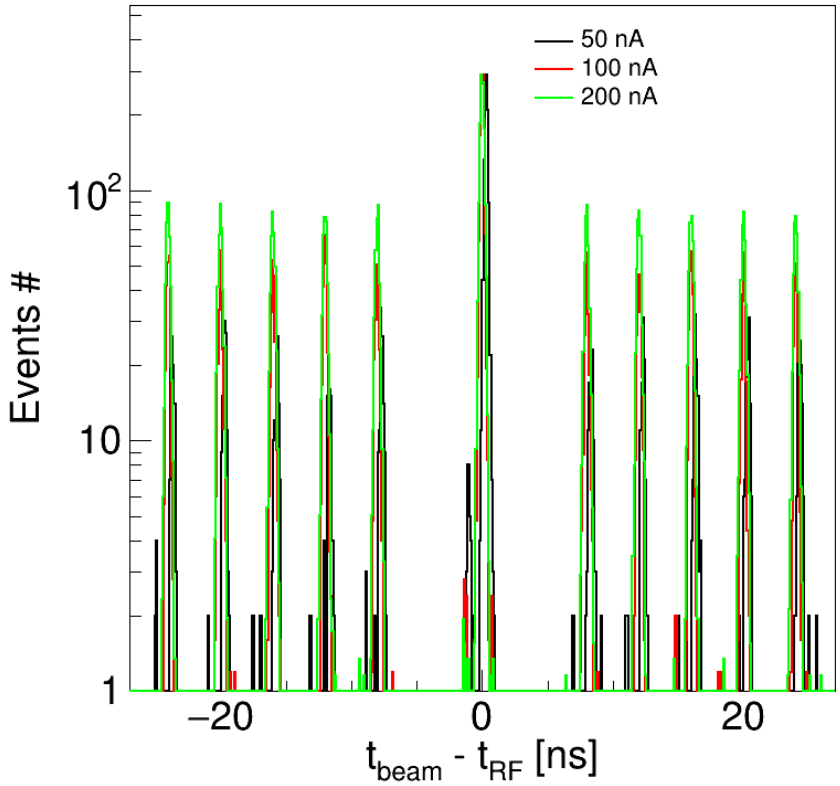
- Measured elasticity

I [nA]	Accidental fraction [%]
50	4
100	8.9
200	15.4



- Corrected elasticity

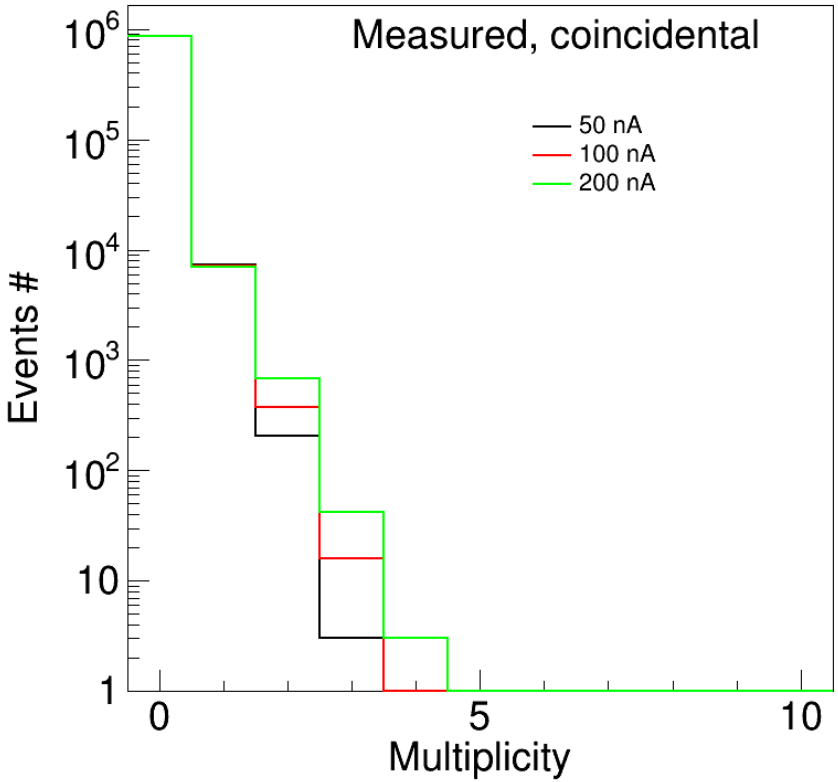
I [nA]	Accidental fraction [%]
50	9.6
100	18.8
200	30.5



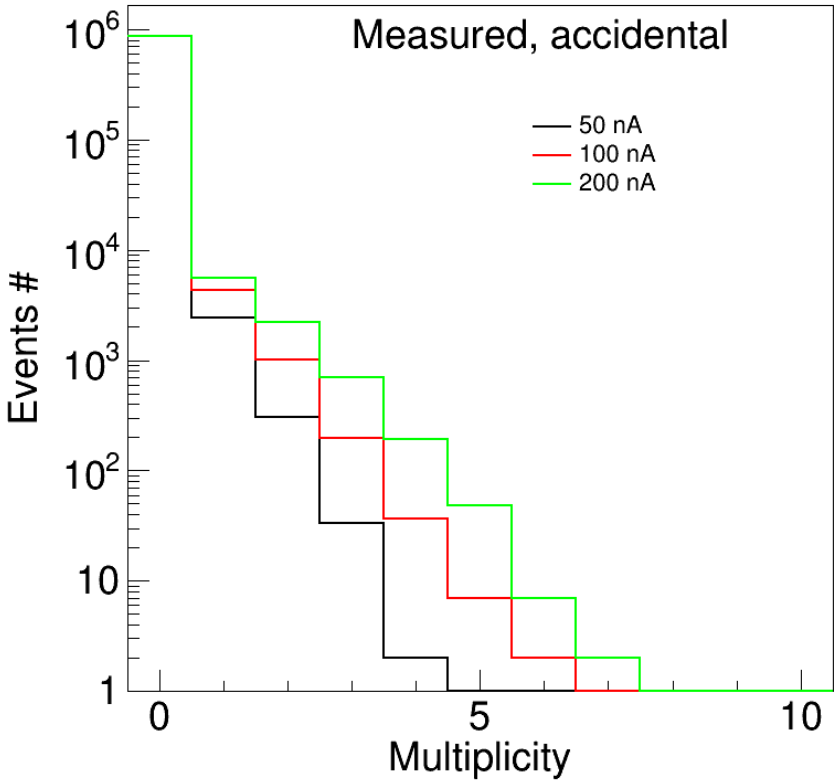
Coincidental vs. accidental

Look at Be runs: 50, 100, and 200 nA, multiplicity for measured elasticity

- Coincidental



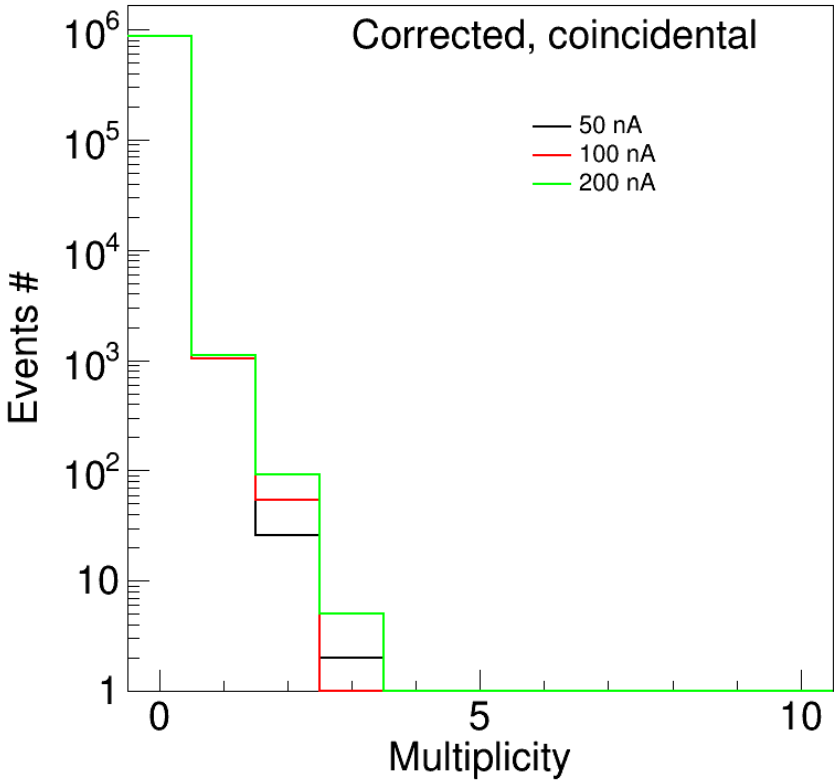
- Accidental



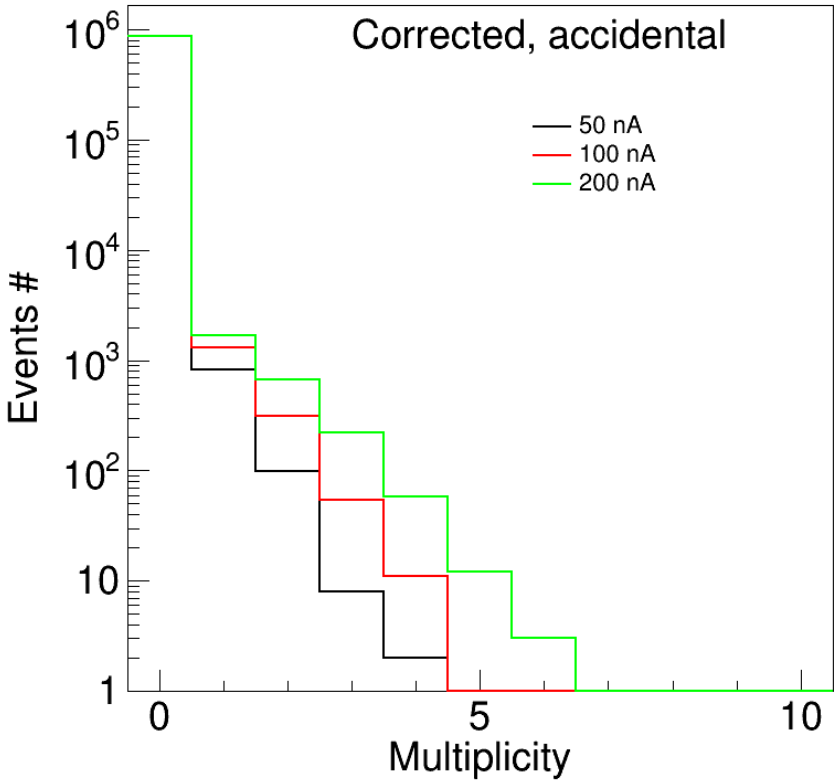
Coincidental vs. accidental

Look at Be runs: 50, 100, and 200 nA, multiplicity for corrected elasticity

- Coincidental



- Accidental

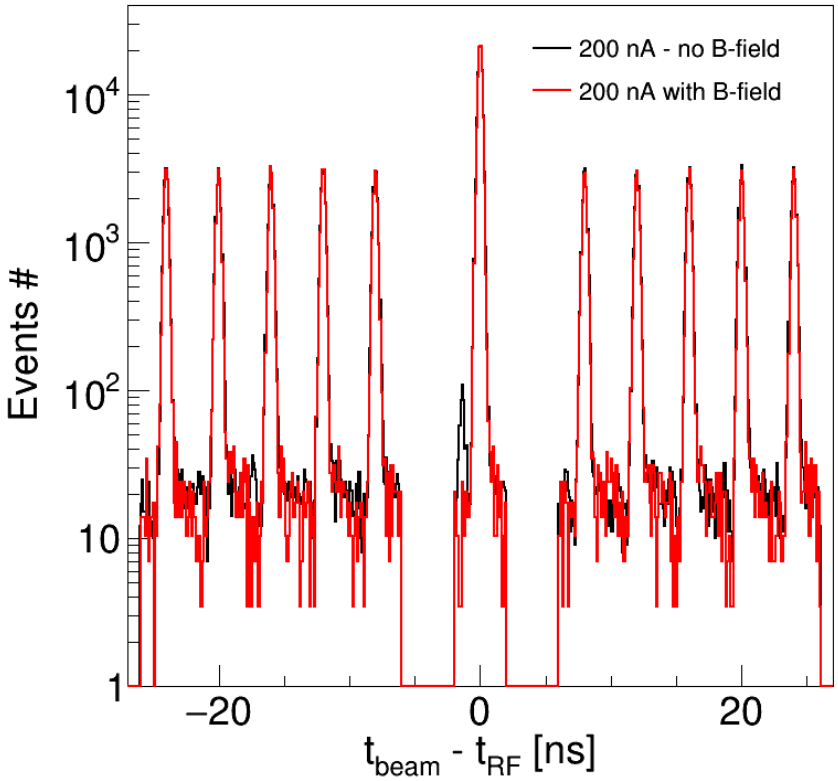


Coincidental vs. accidental

Look at He runs: 200 nA with and without B-field

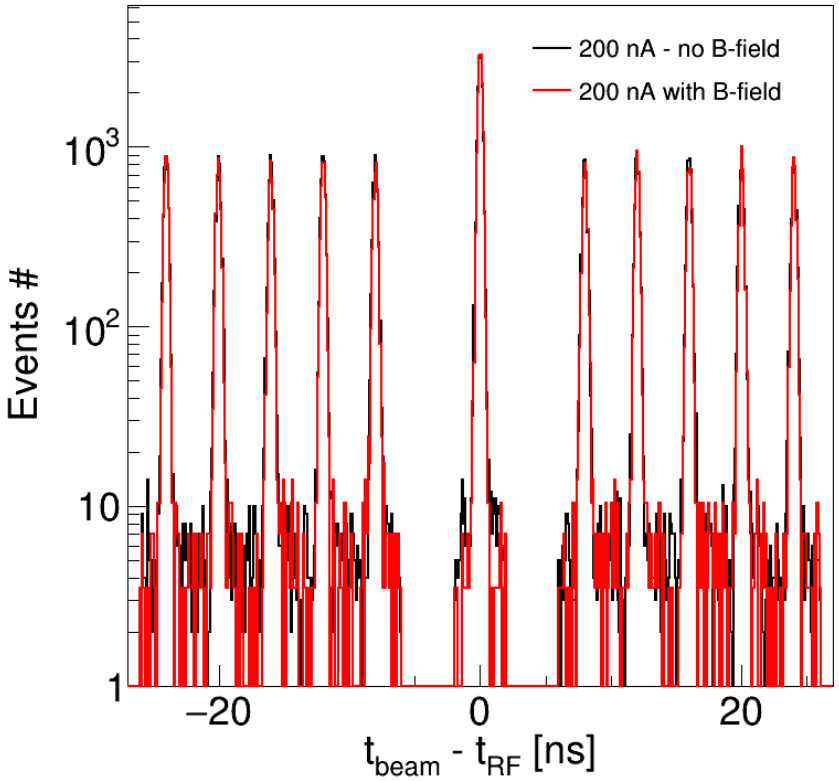
- Measured elasticity

B-field [T]	Accidental fraction [%]
0	15.3
1.4	15.1



- Corrected elasticity

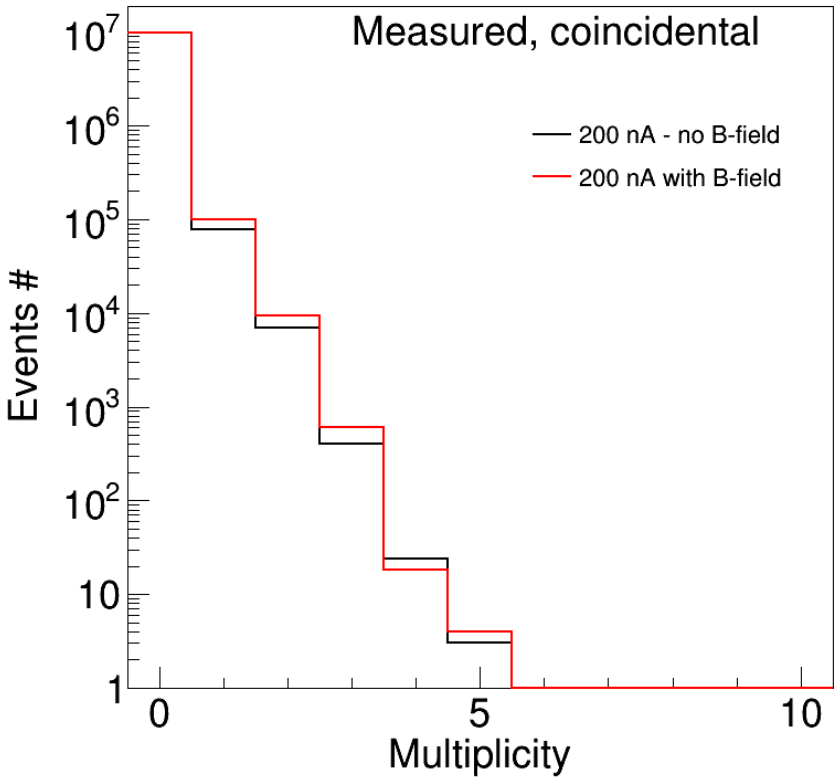
B-field [T]	Accidental fraction [%]
0	28.1
1.4	26.3



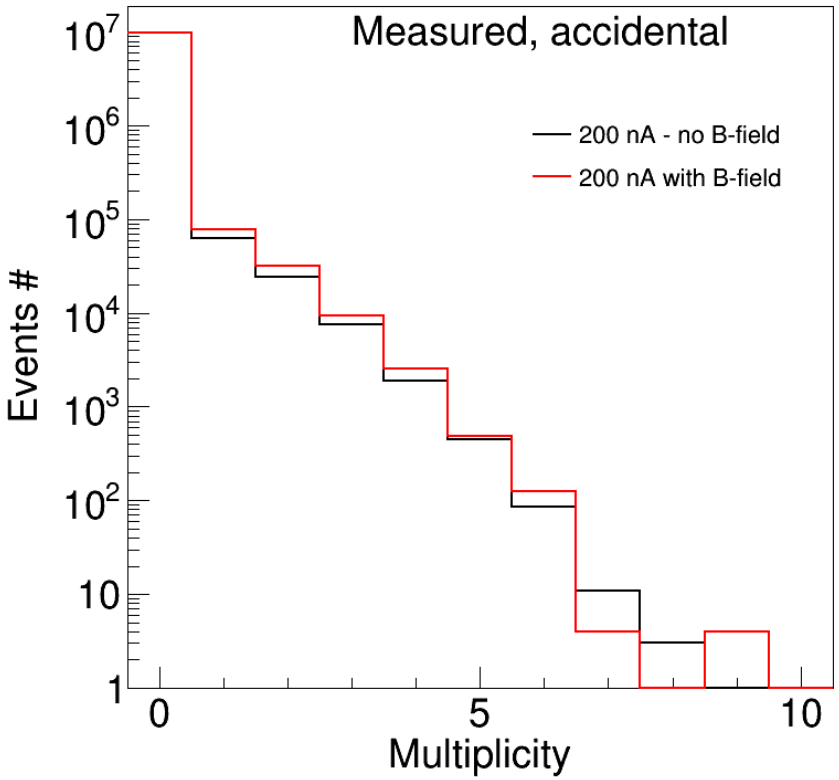
Coincidental vs. accidental

Look at He runs: 200 nA with and without B-field, multiplicity for measured elasticity

- Coincidental



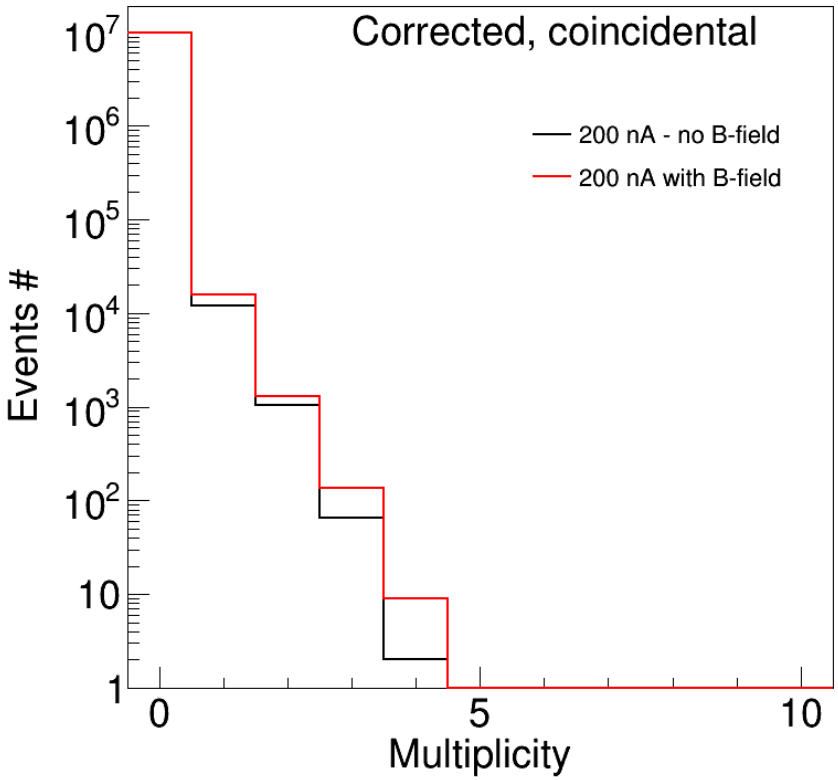
- Accidental



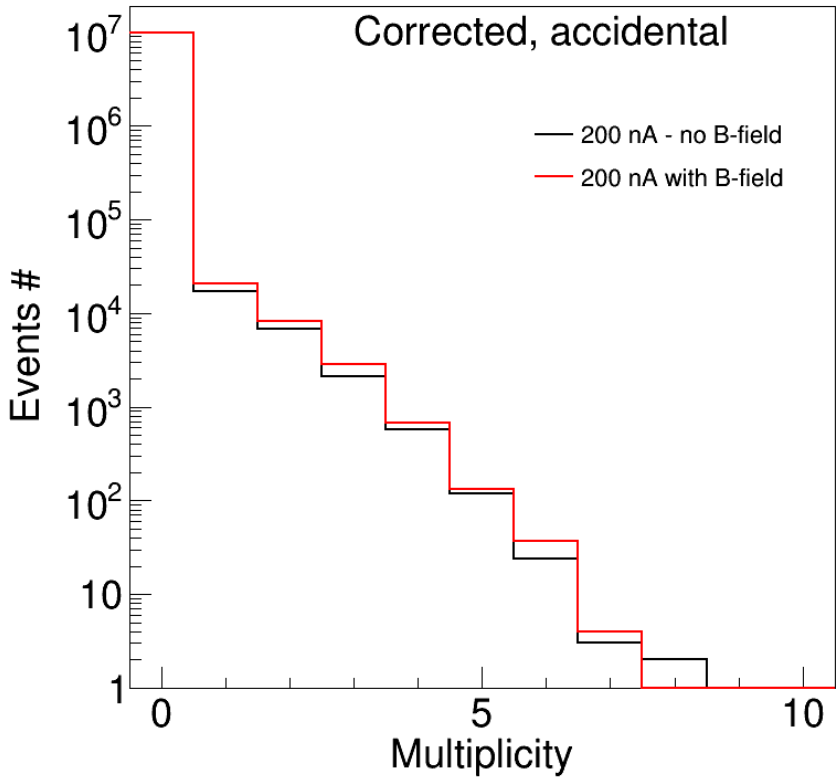
Coincidental vs. accidental

Look at He runs: 200 nA with and without B-field, multiplicity for corrected elasticity

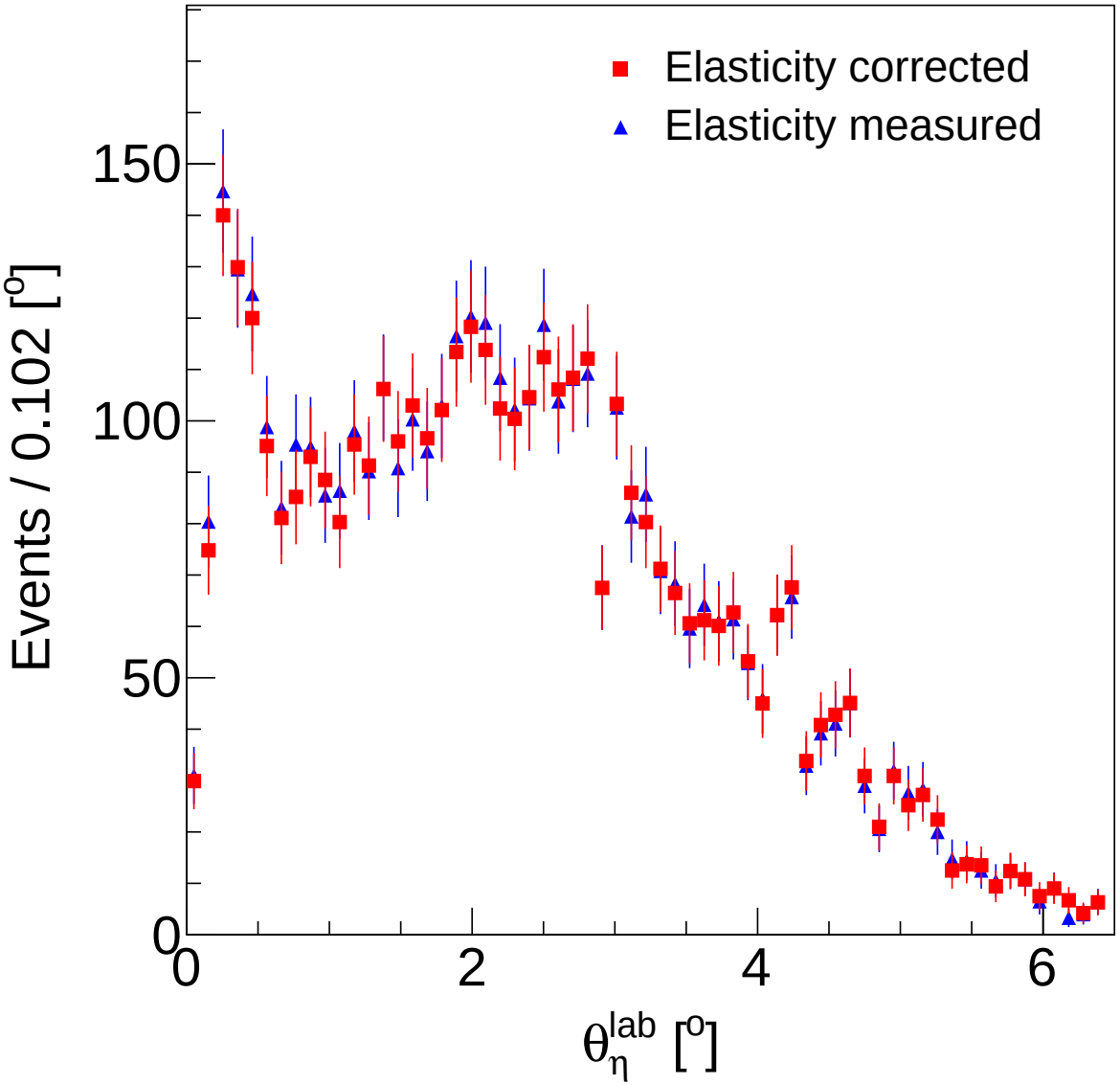
- Coincidental



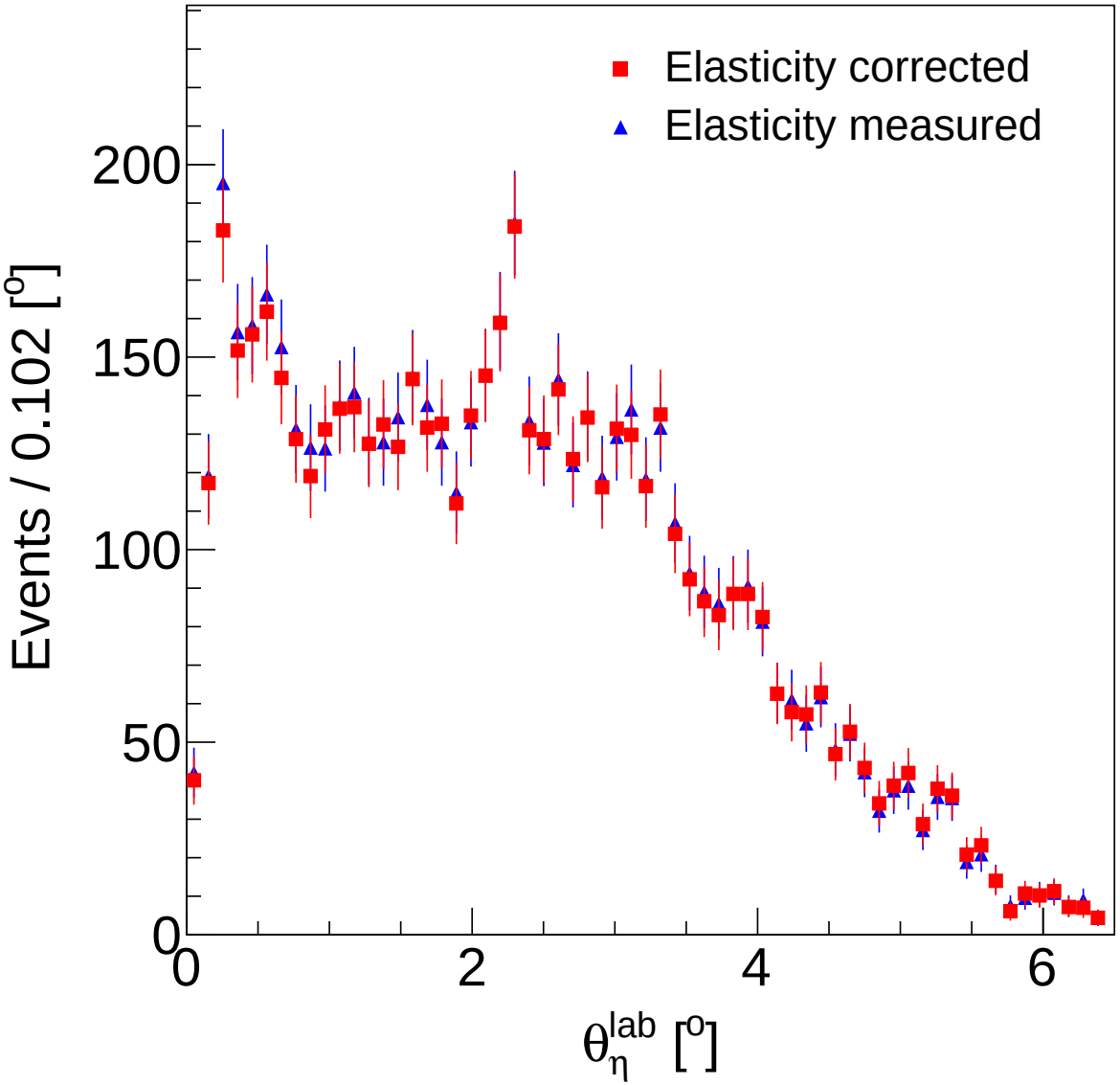
- Accidental



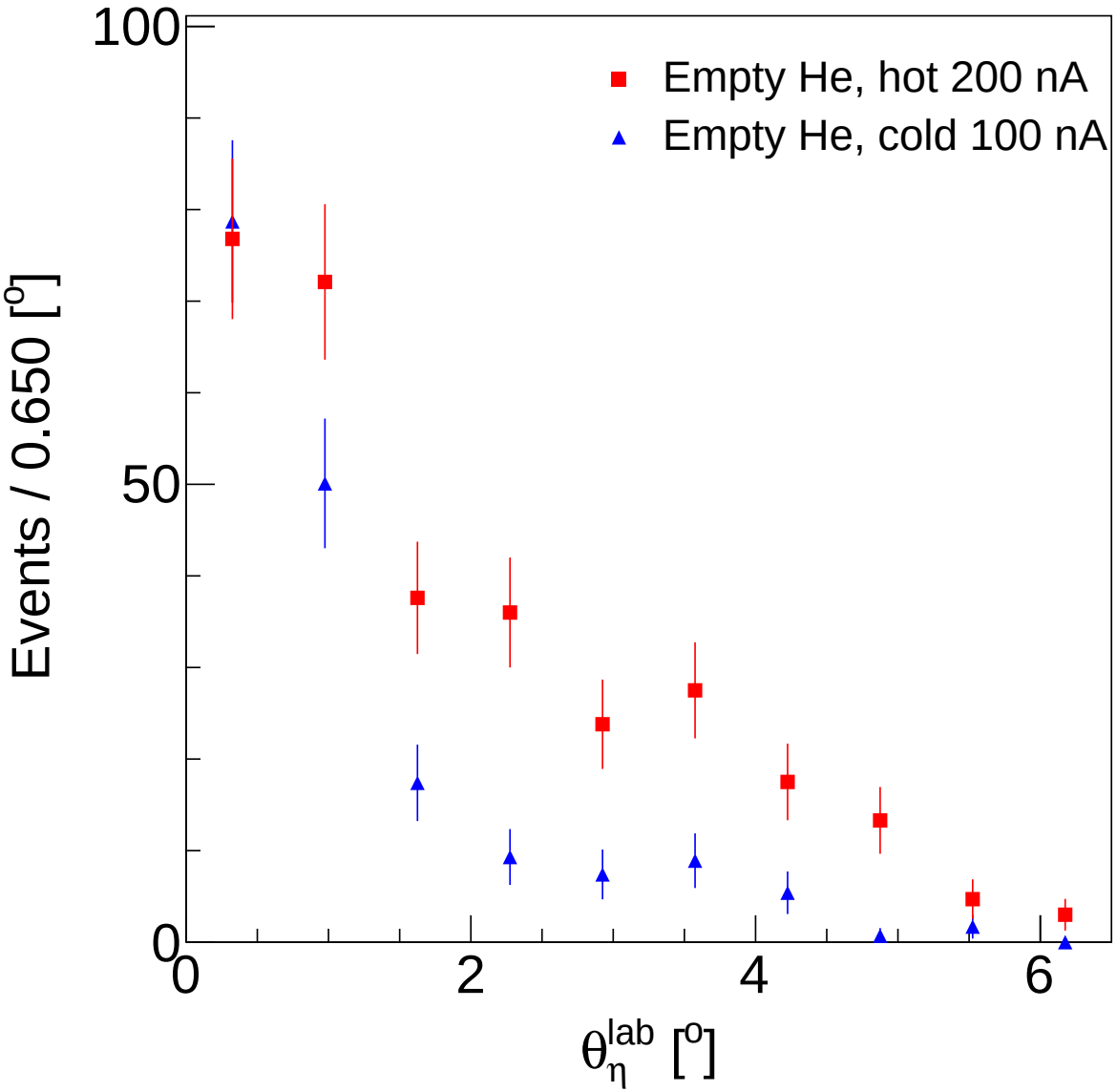
Angular distribution, He 200 nA no B-field part I



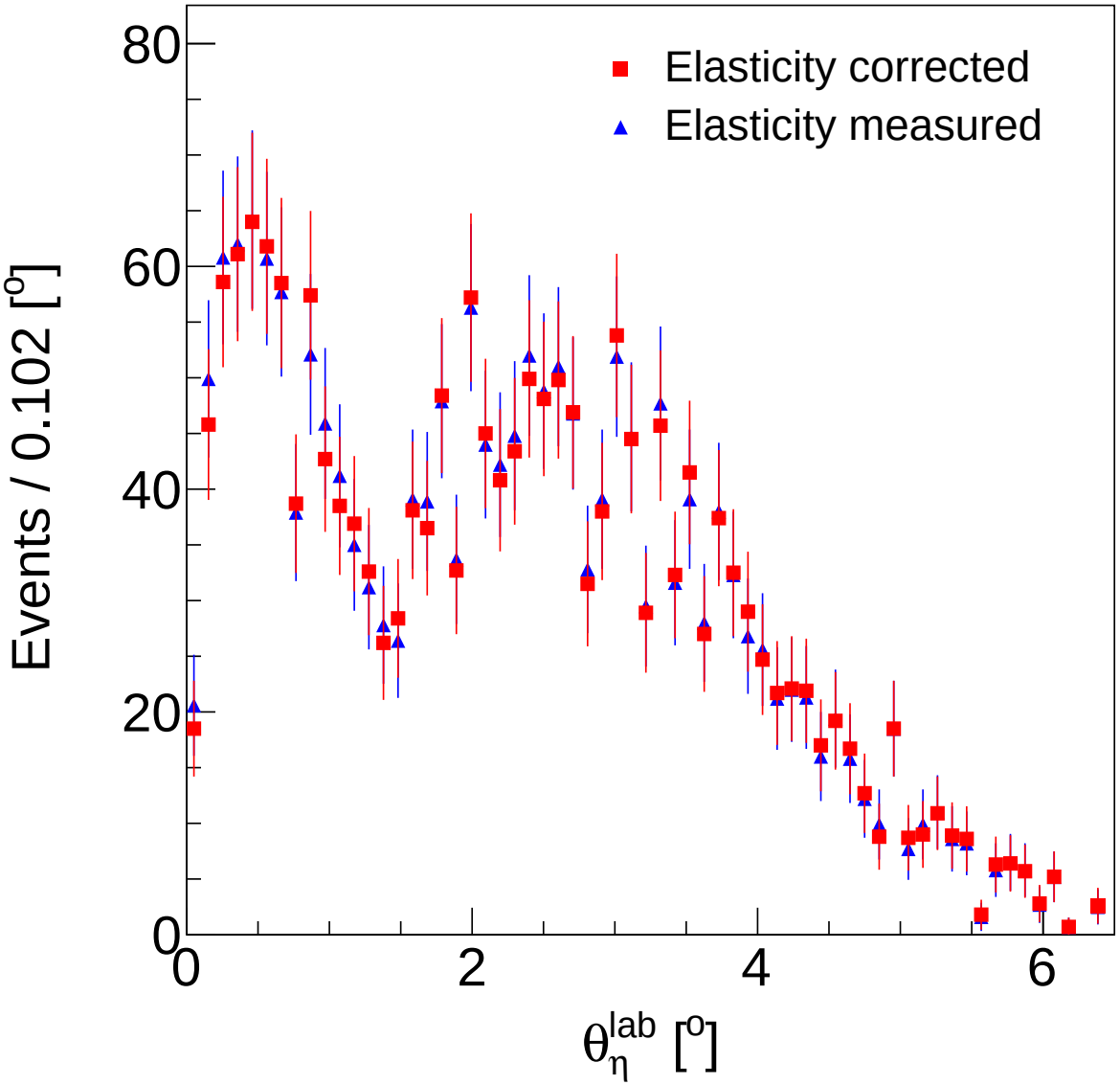
Angular distribution, He 200 nA no B-field part II



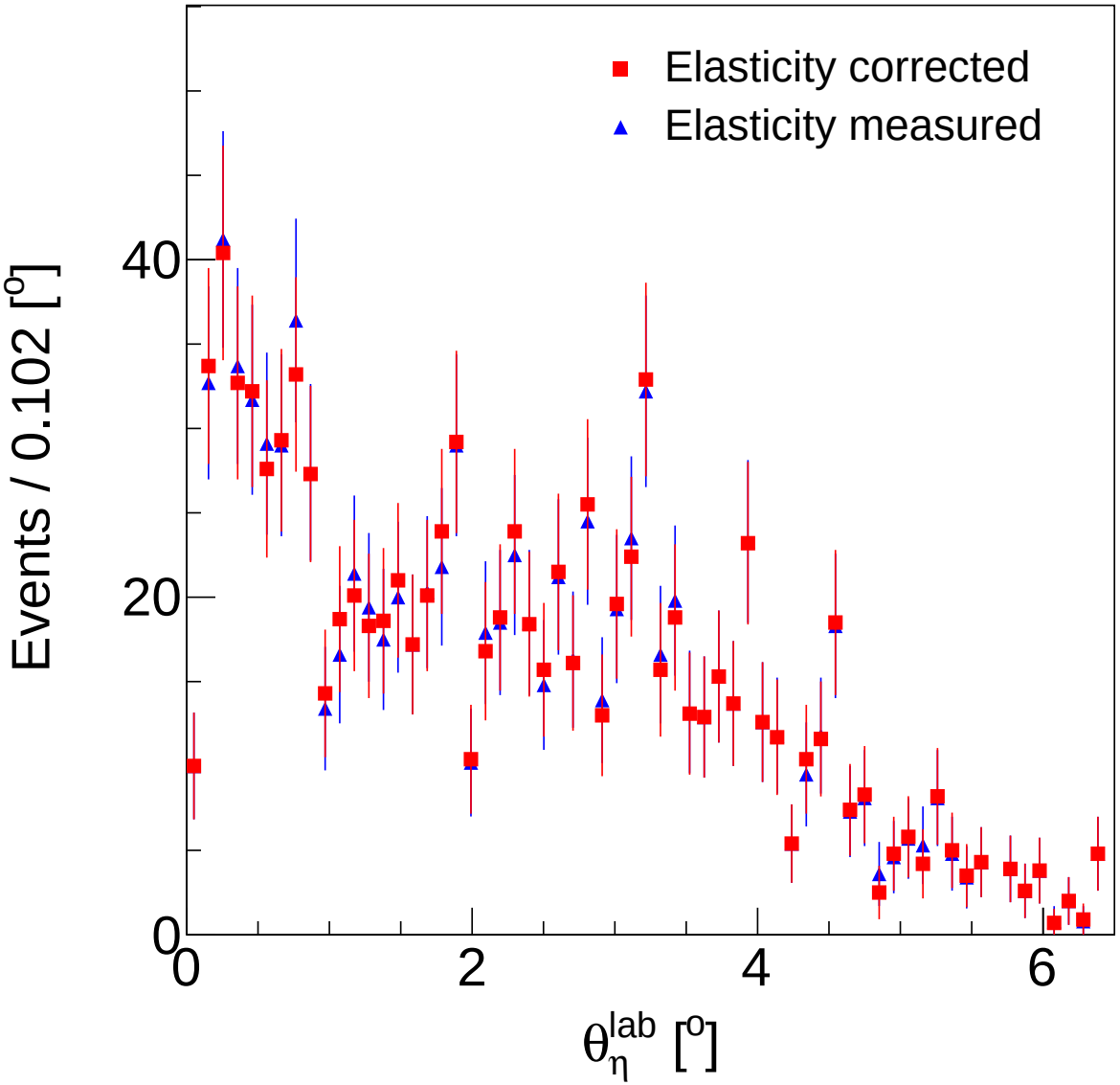
Angular distribution, empty He cell target



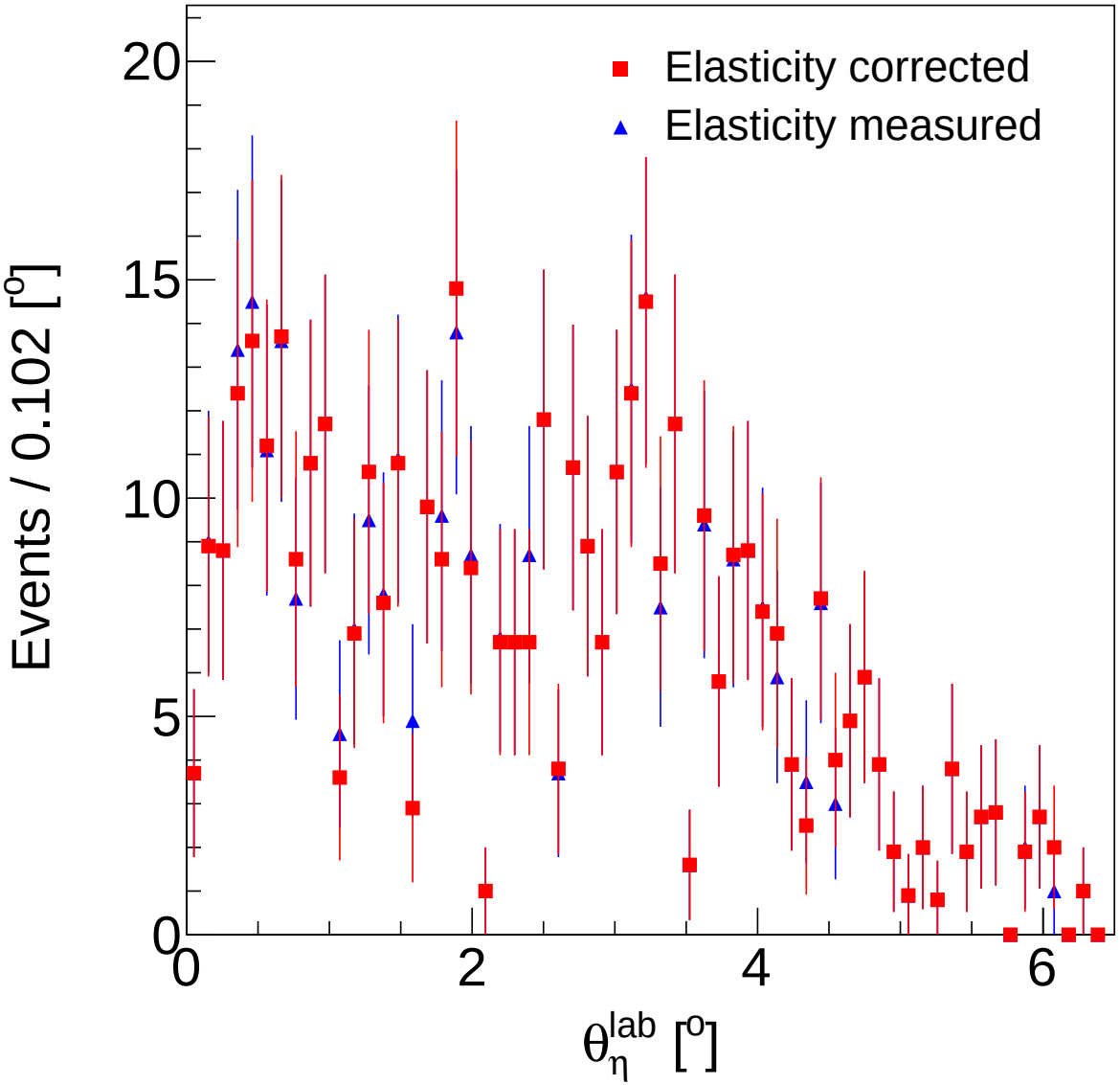
Angular distribution, Be 200 nA no B-field



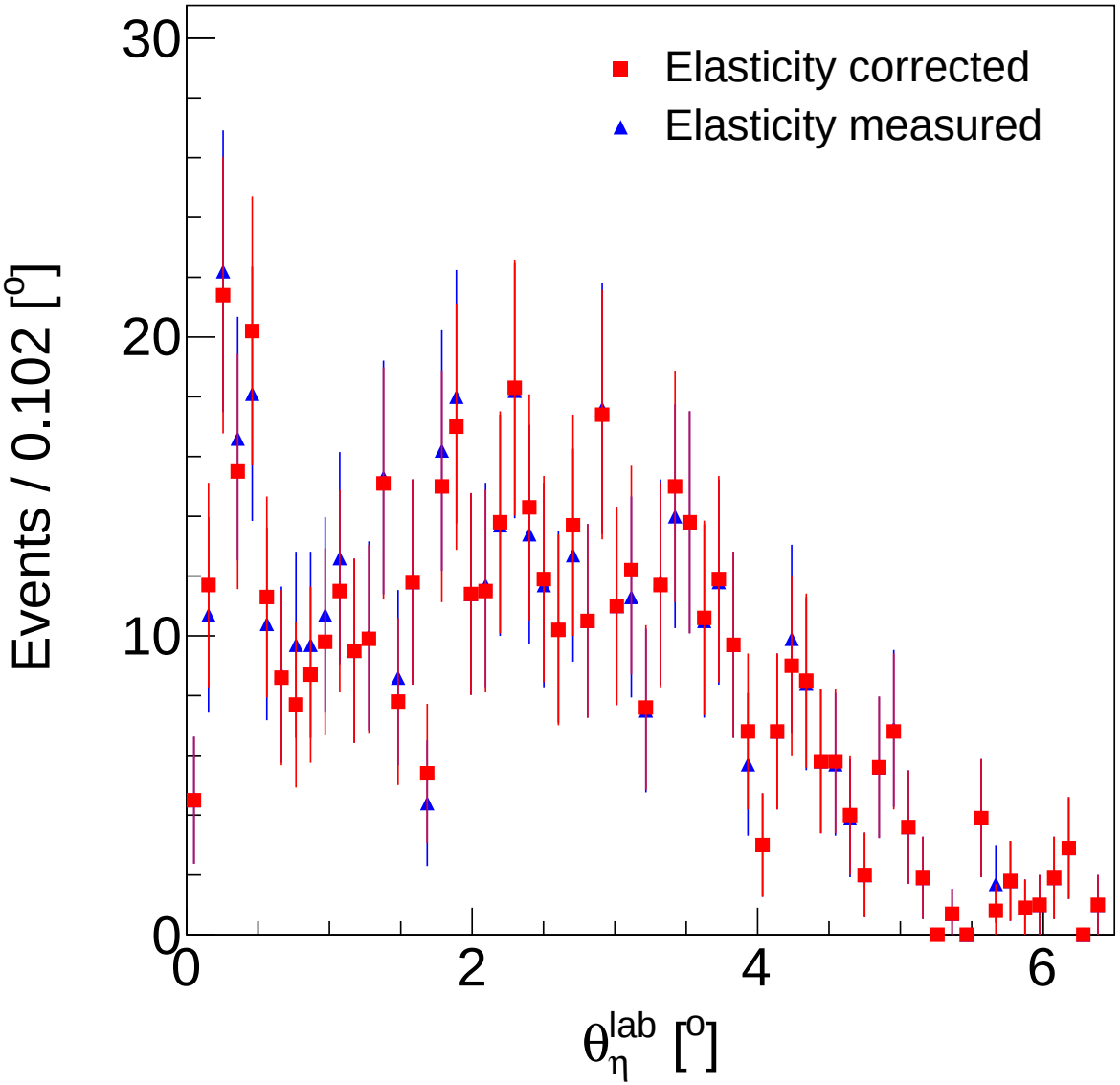
Angular distribution, Be 100 nA no B-field



Angular distribution, Be 50 nA no B-field part I

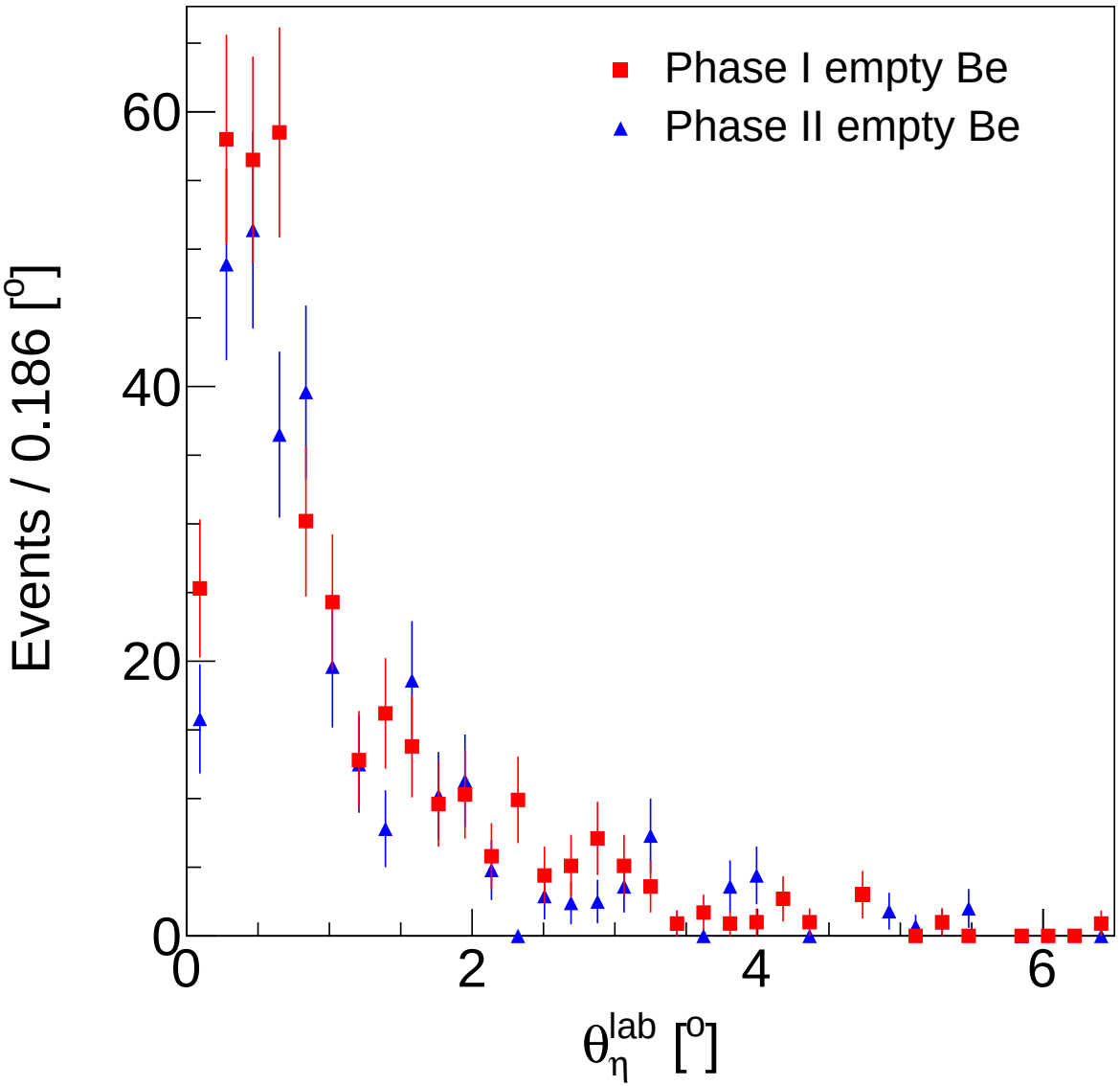


Angular distribution, Be 50 nA no B-field part II



Empty Be data sets, 2019 (phase I) vs. 2021 (phase II)

No B-field



Angular distribution, He 200 nA with B-field