

VMM3 simulation summary

Jinlong Zhang

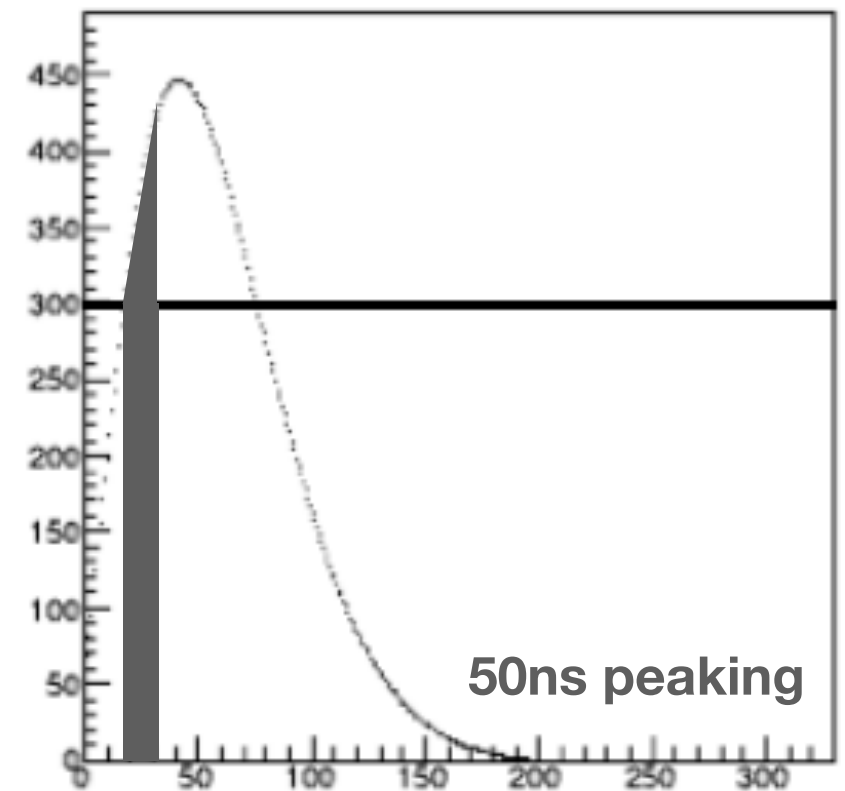
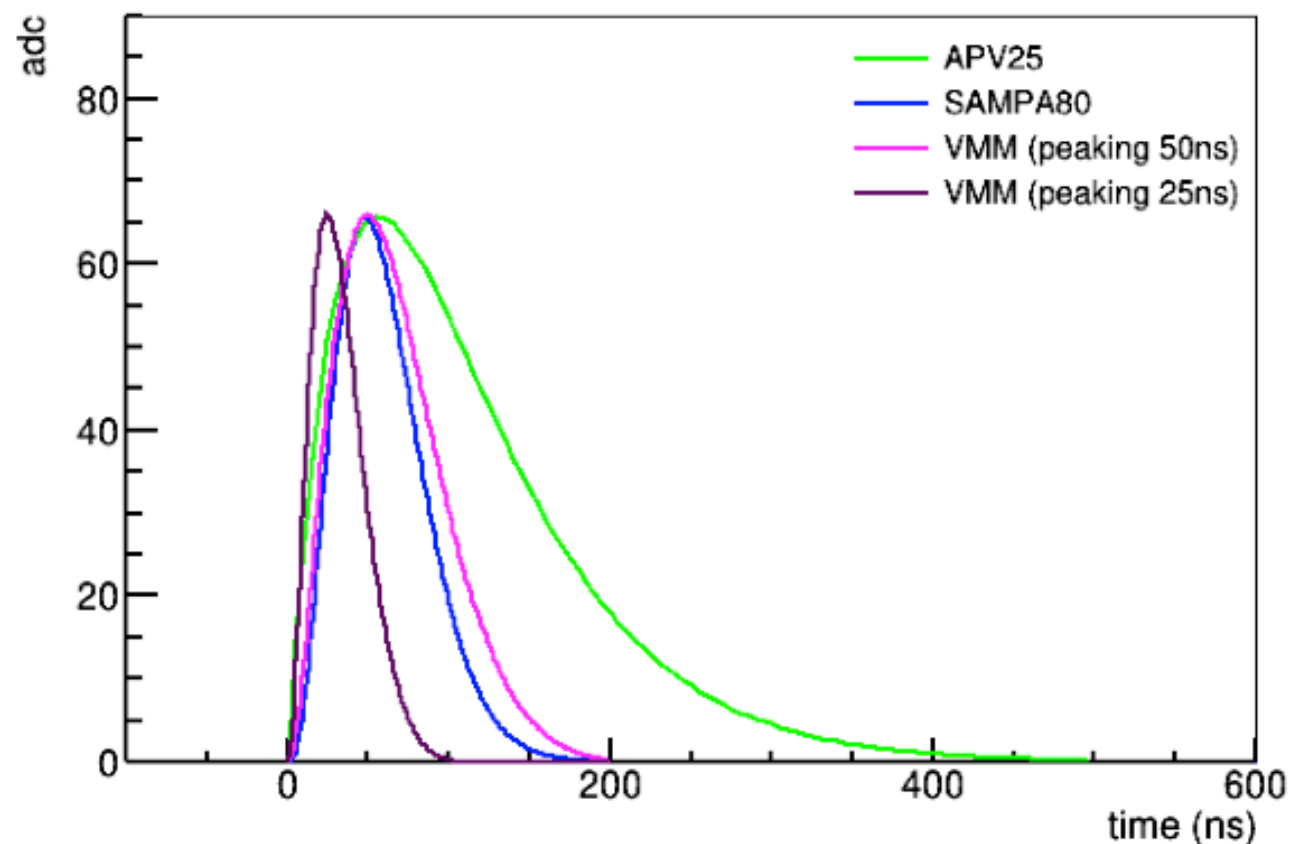
September 9, 2020

VMM3

Multi-channel digital output

- Instead of sampling shape, VMM analyzes pulse on the fly:
- a) seeking peak;
- b) recording time over threshold; Or, integrating in a time window (20ns).
- c) Low resolution (peak or integration) ADC: 6-bits
- 5) Peaking time **25ns, 50ns**, 100ns, 200ns

Pulse Shape



Input files

- PVDIS

Signal: /w/halla-scifs17exp/solid/xiongw/digitization/PVDISWork/signal/
background_solid_PVDIS_LD2_dirty_weighted_eDIS_filenum100_1e6.root

Background: /w/halla-scifs17exp/solid/xiongw/digitization/PVDISWork/background_run/
bg_solid_PVDIS_LH2_02102017_xxx.root

Entry out of N beam on target events: 5.22438e7/1.e9

- SIDIS

Signal: /w/halla-scifs17exp/solid/xiongw/digitization/SIDISWork/signal/
background_solid_SIDIS_He3_dirty_weighted_eDIS_filenum50_0.5e6.root

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bg_solid_SIDIS_He3_11242016_xxx.root

Entry out of N beam on target events: 7014199/0.999e10

- JPSI

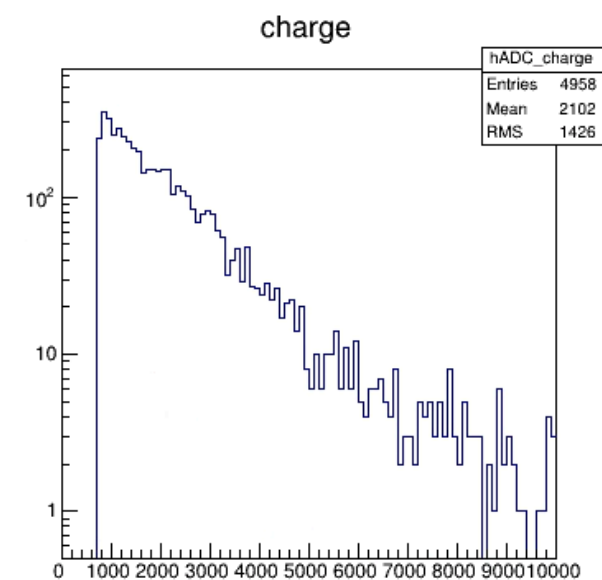
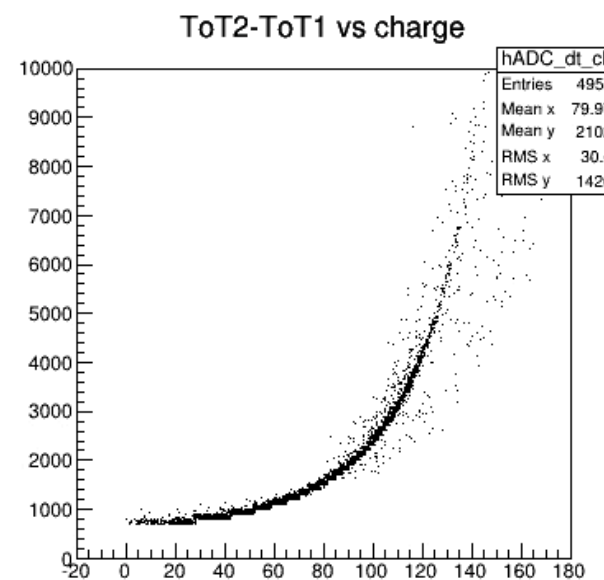
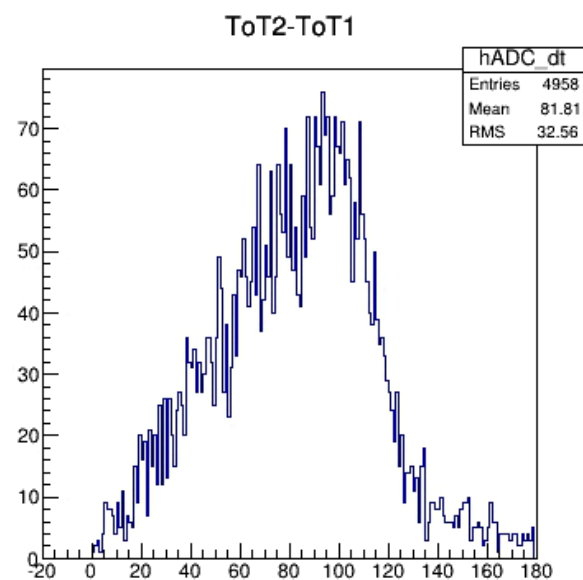
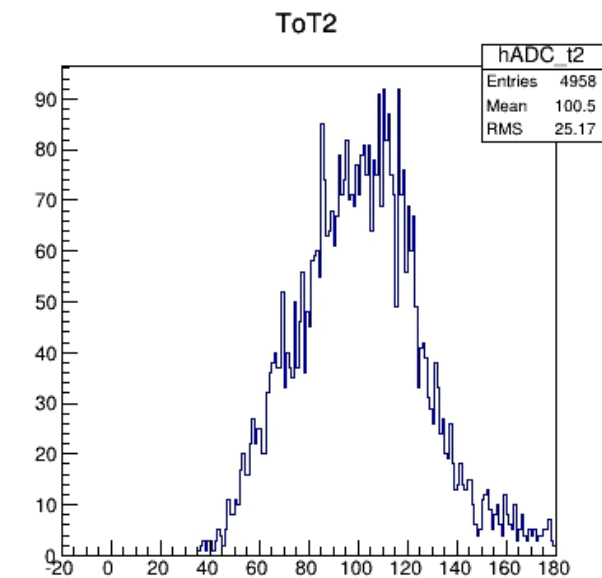
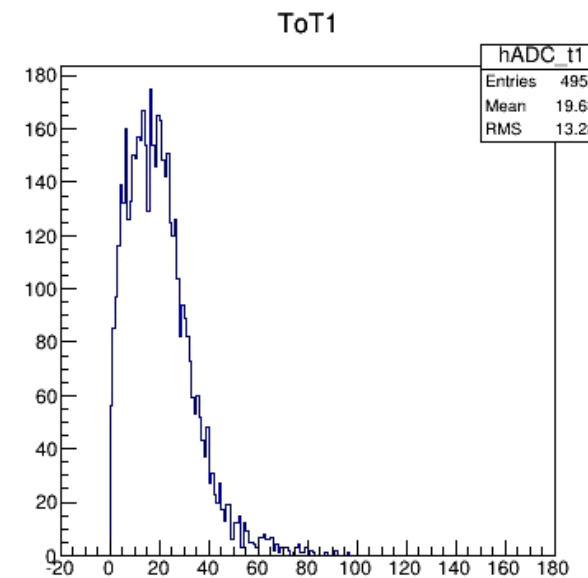
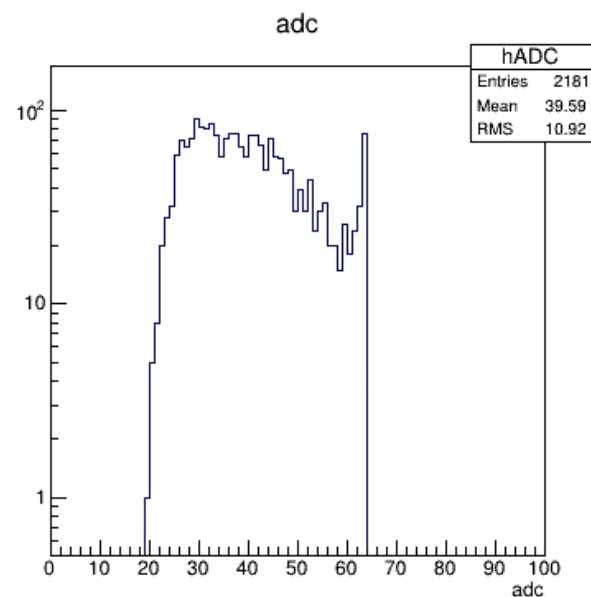
Signal: /cache/halla/solid/sim/solid_gemc/JPsi_LH2_JLAB_VERSION_1.3/pass5/
background_solid_JPsi_LH2_dirty_weighted_eDIS_filenum50_0.5e6.root

Background: /w/halla-scifs17exp/solid/xiongw/digitization/JPsi_bg/
bg_solid_JPsi_LH2_03012017_xxx.root

Entry out of N beam on target events: 20633591/1e9

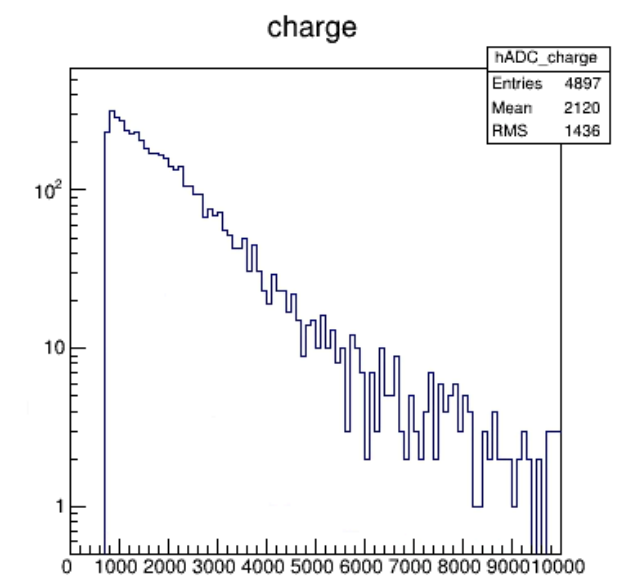
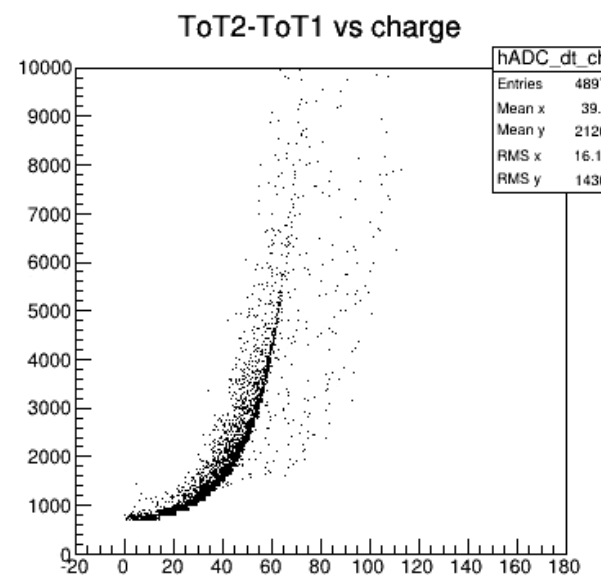
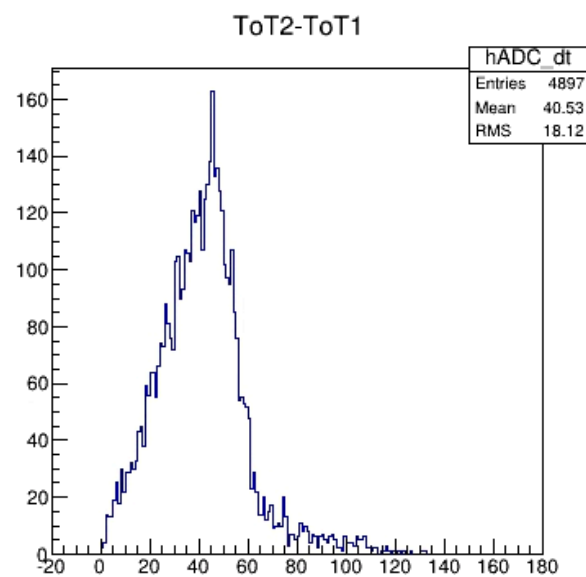
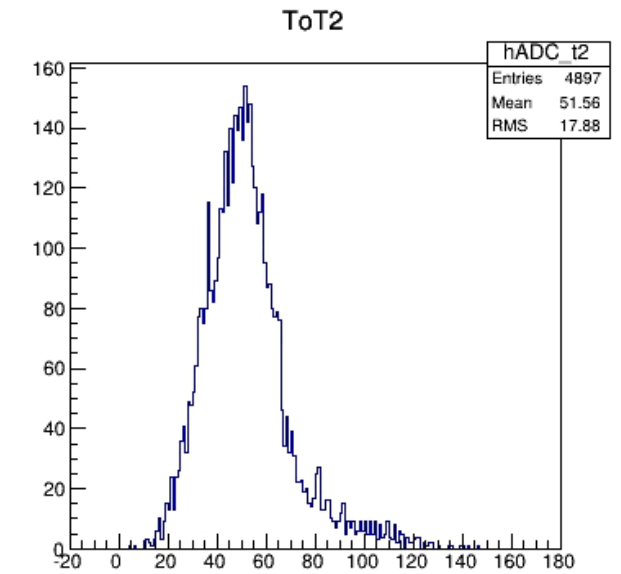
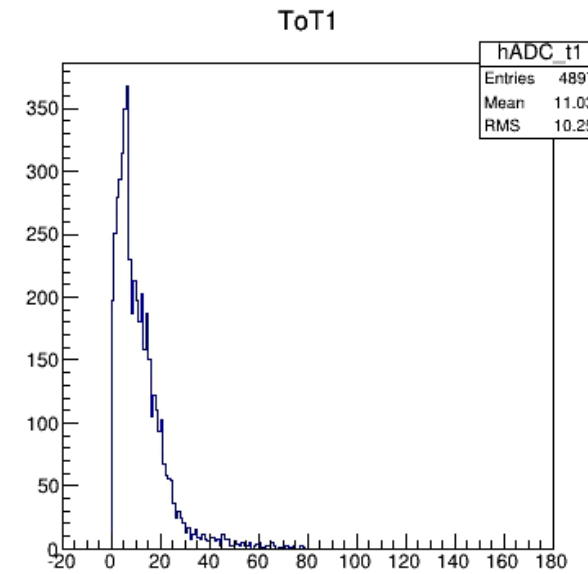
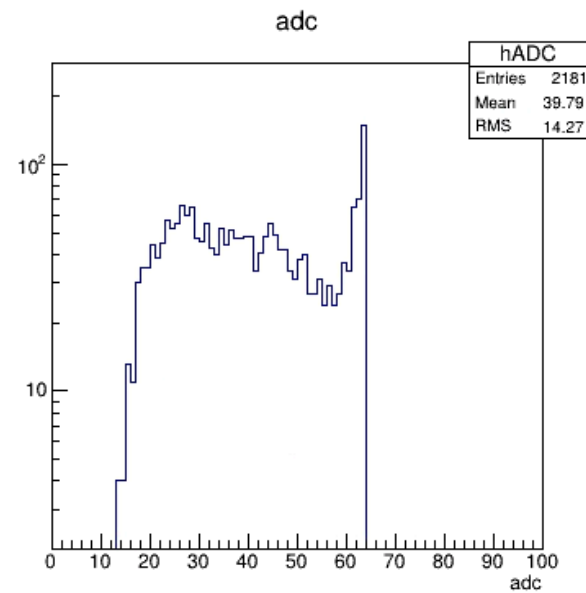
PVDIS 50ns peaking

ave_gain: 2.
 Peaking time: 50ns
 Pulse threshold: 300
 Adc gain: 250
 Trigger jitter: 7ns
 Bkgd window: 275 ns
 Ped width: 2



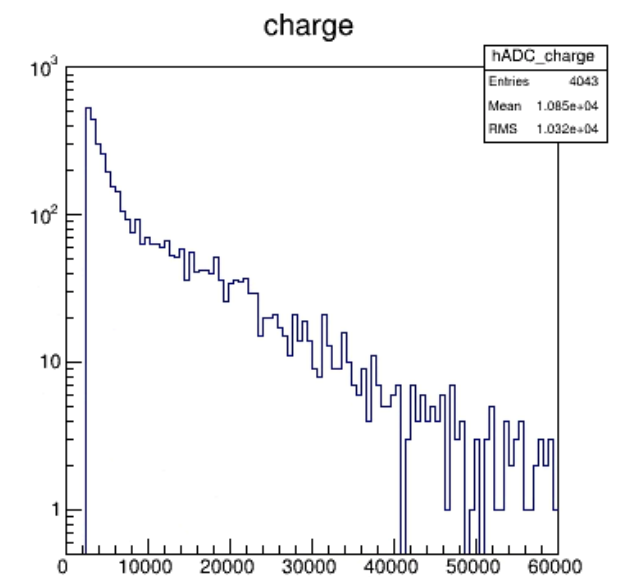
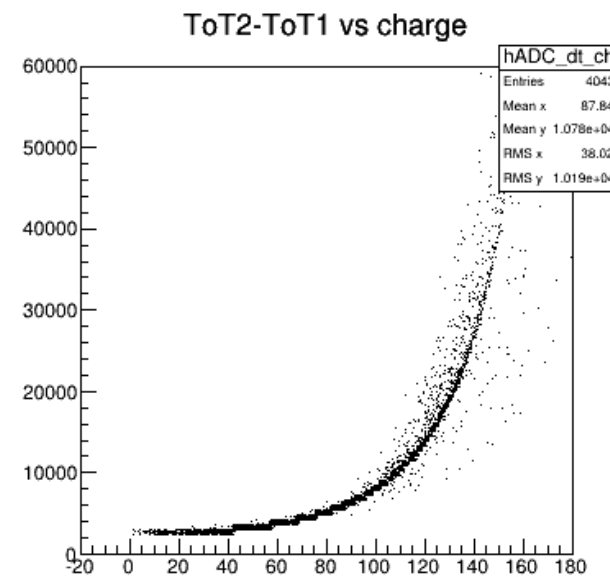
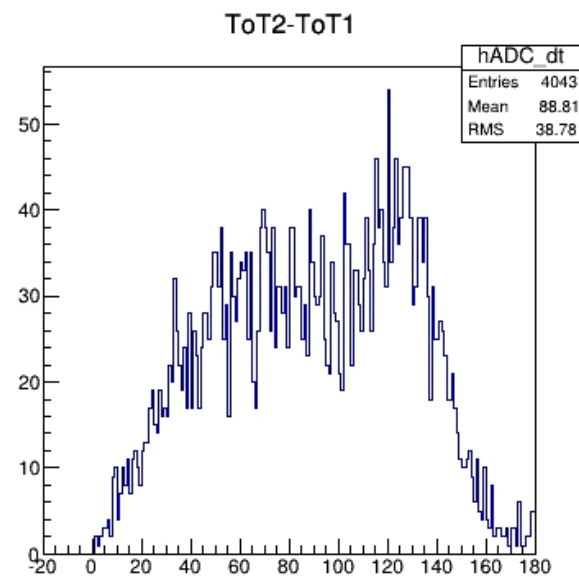
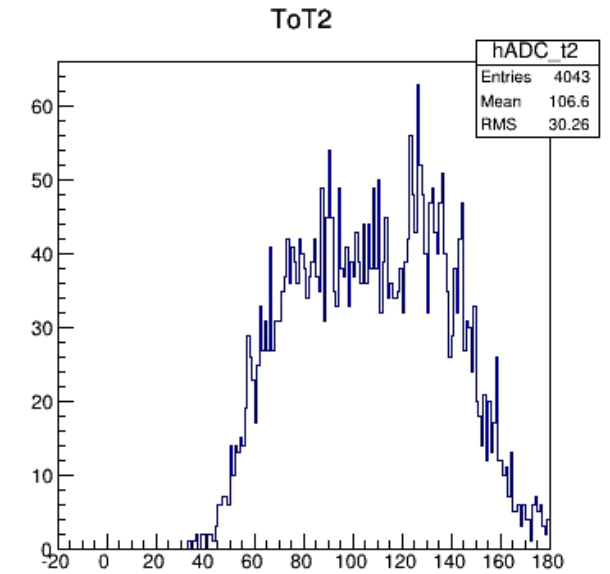
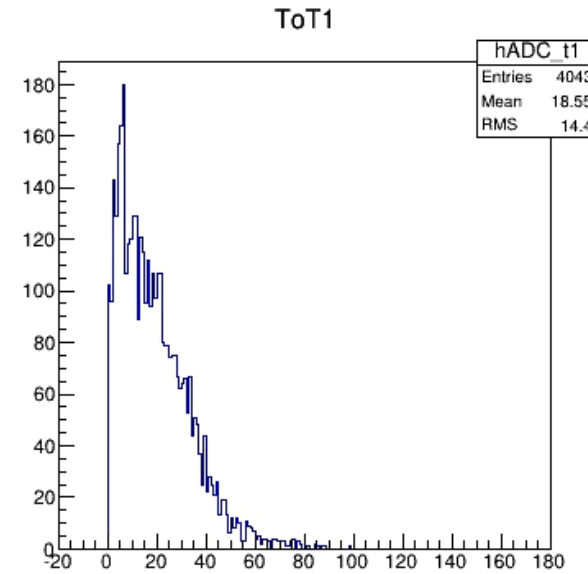
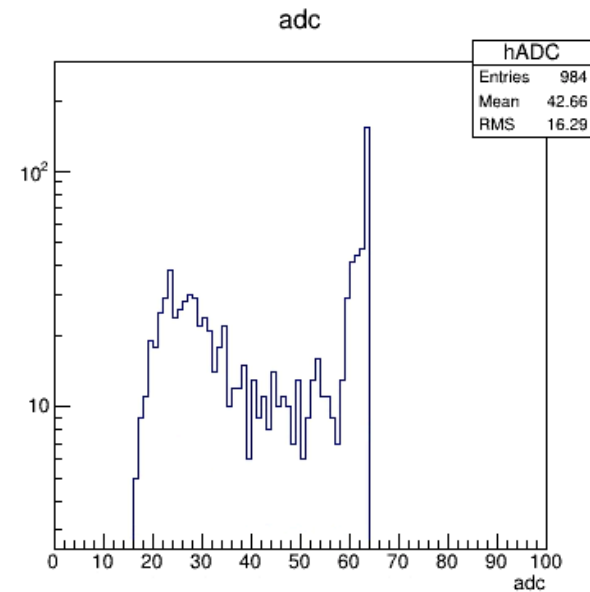
PVDIS 25ns peaking

ave_gain: 2.
Peaking time: 25ns
Pulse threshold: 300
Adc gain: 300
Trigger jitter: 7ns
Bkgd window: 275 ns
Ped width: 2



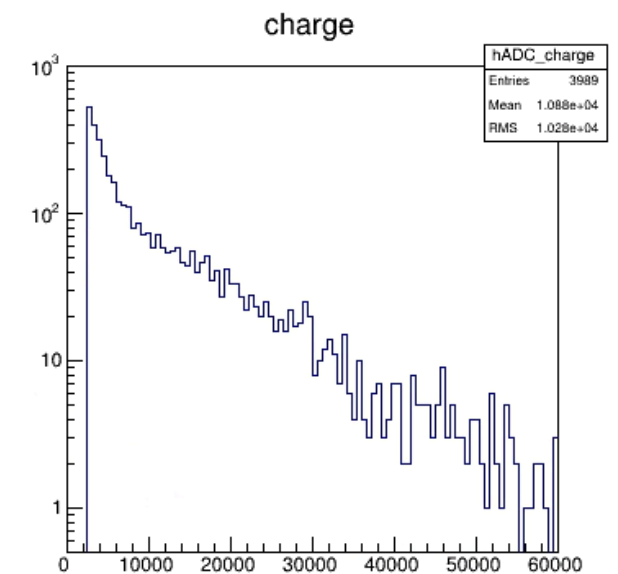
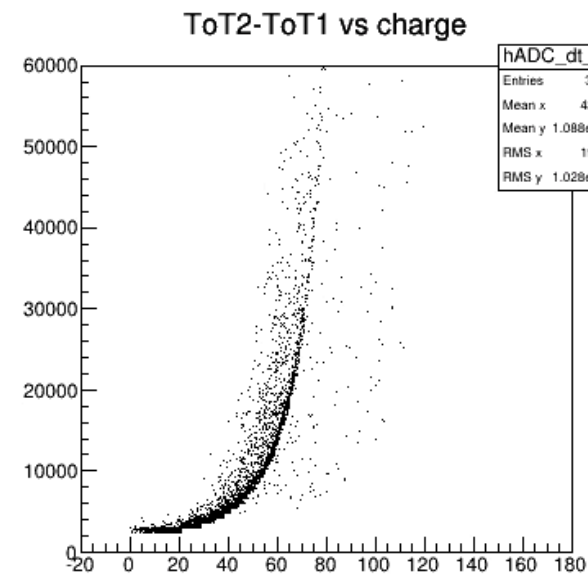
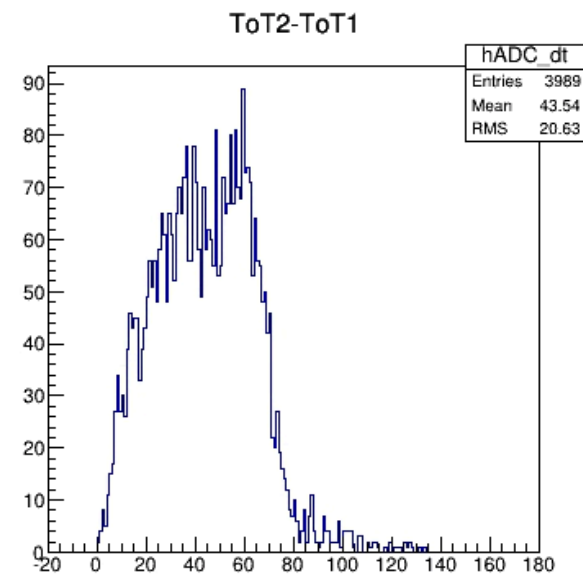
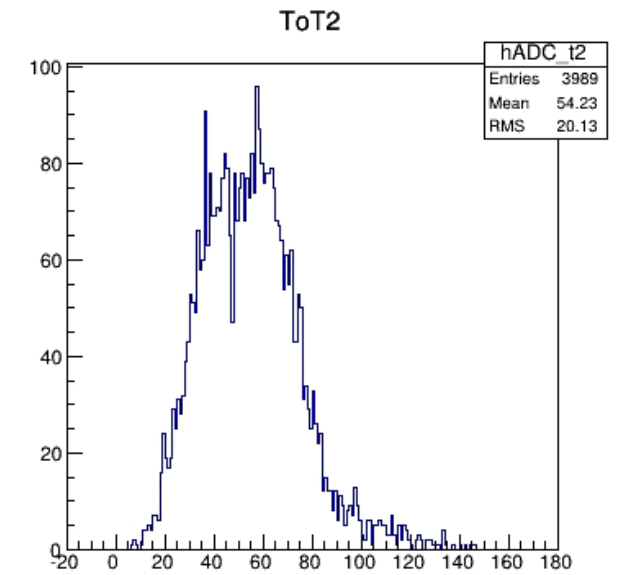
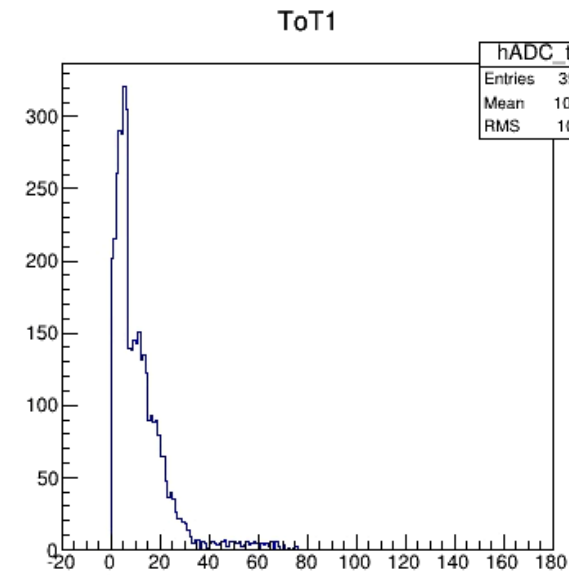
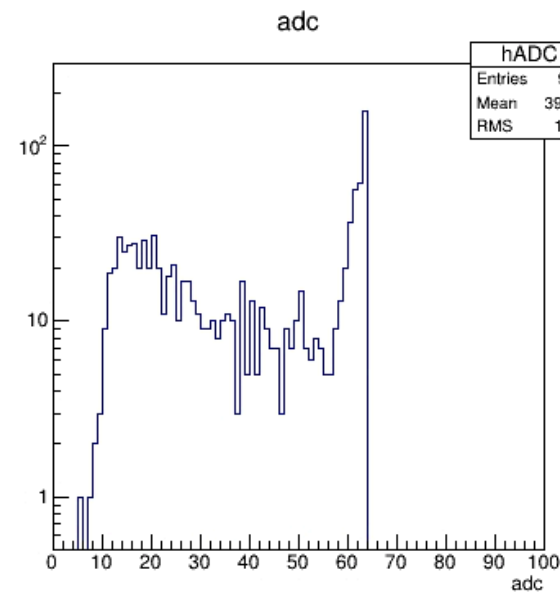
SIDIS He3 50ns peaking

ave_gain: 36.
Peaking time: 50ns
Pulse threshold: 1000
Adc gain: 1000
Trigger jitter: 7ns
Bkgd window: 275 ns
Ped width: 2



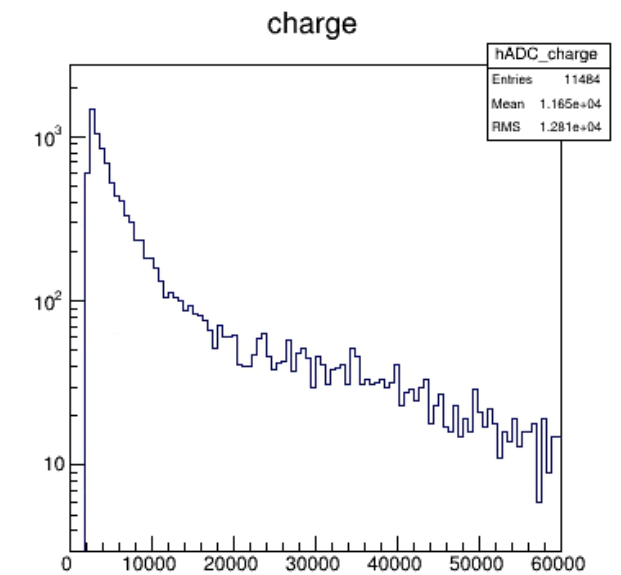
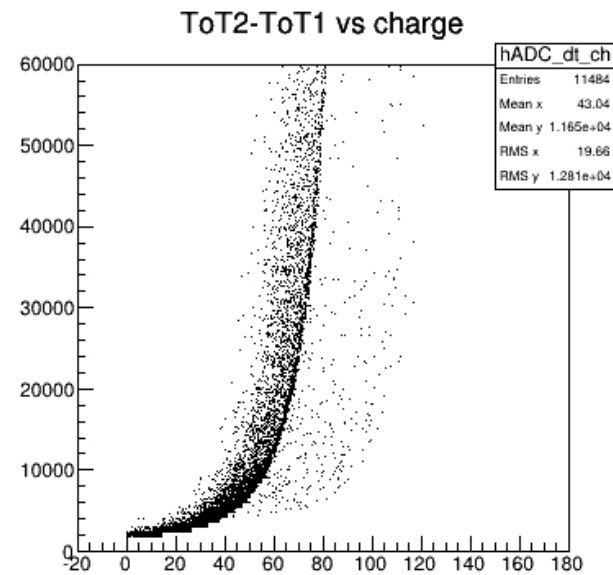
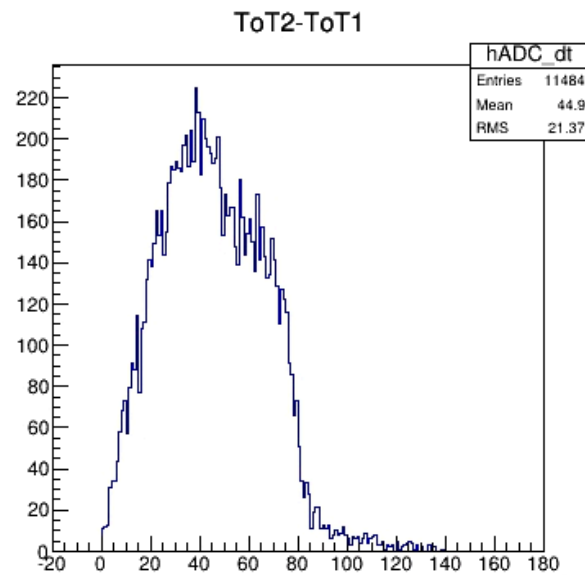
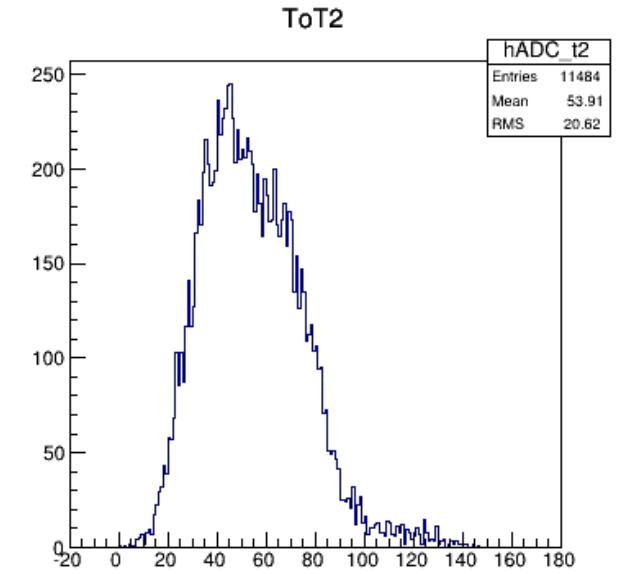
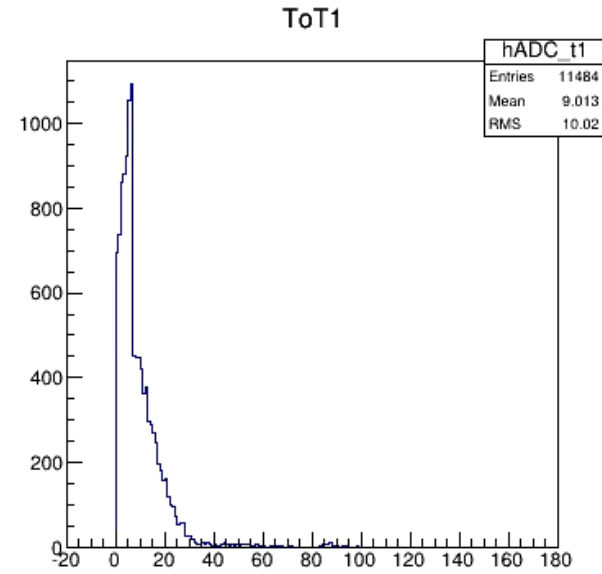
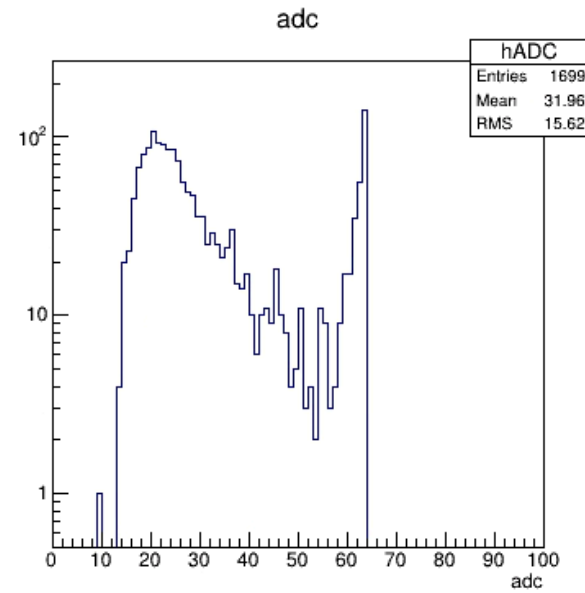
SIDIS He3 25ns peaking

ave_gain: 36.
 Peaking time: 25ns
 Pulse threshold: 1500
 Adc gain: 1000
 Trigger jitter: 7ns
 Bkgd window: 275 ns
 Ped width: 2



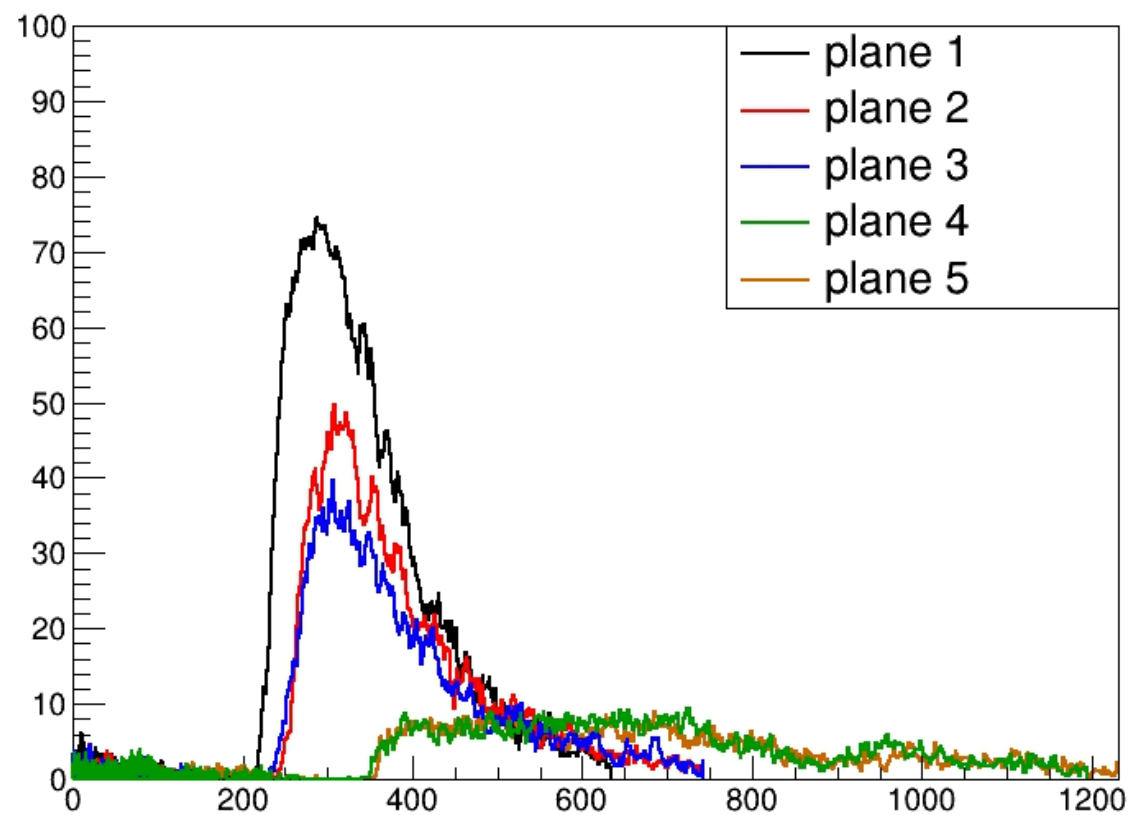
J/Psi 25ns peaking

ave_gain: 36.
Peaking time: 25ns
Pulse threshold: 1500
Adc gain: 1000
Trigger jitter: 7ns
Bkgd window: 275 ns
Ped width: 2

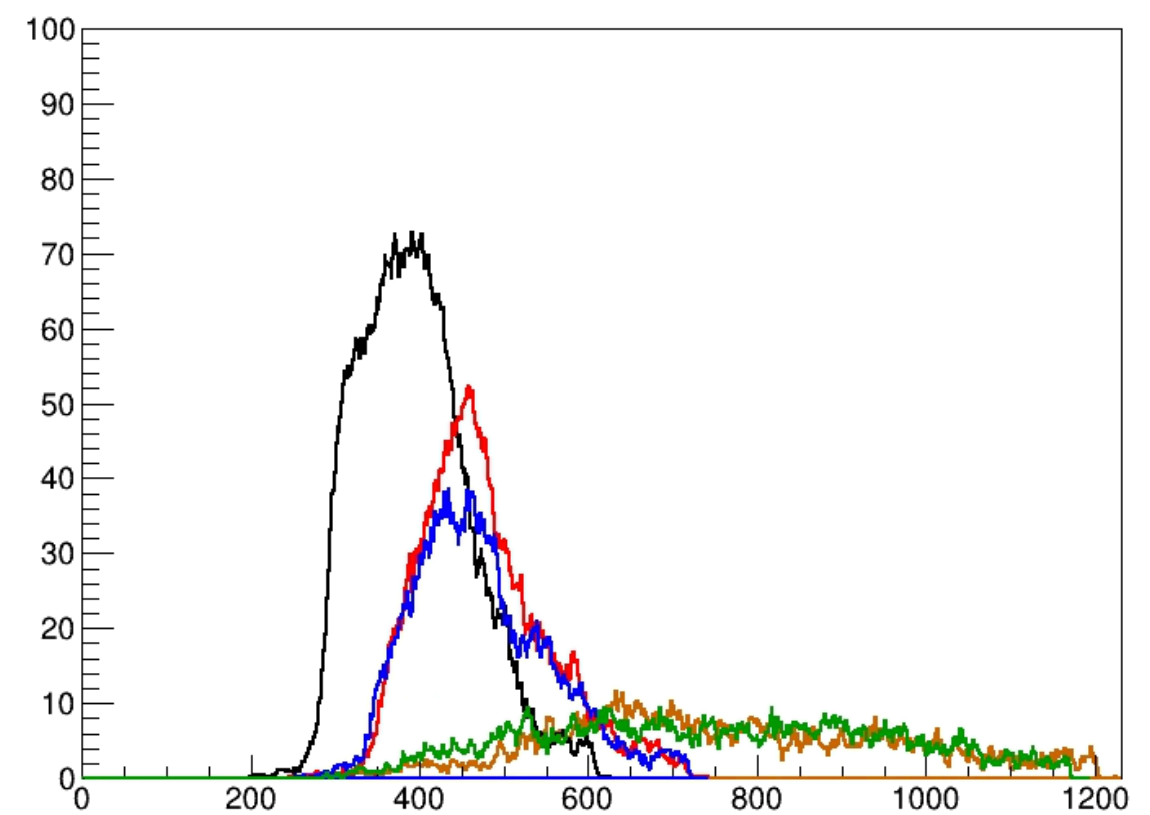


PVDIS 50ns Occupancy

U plane



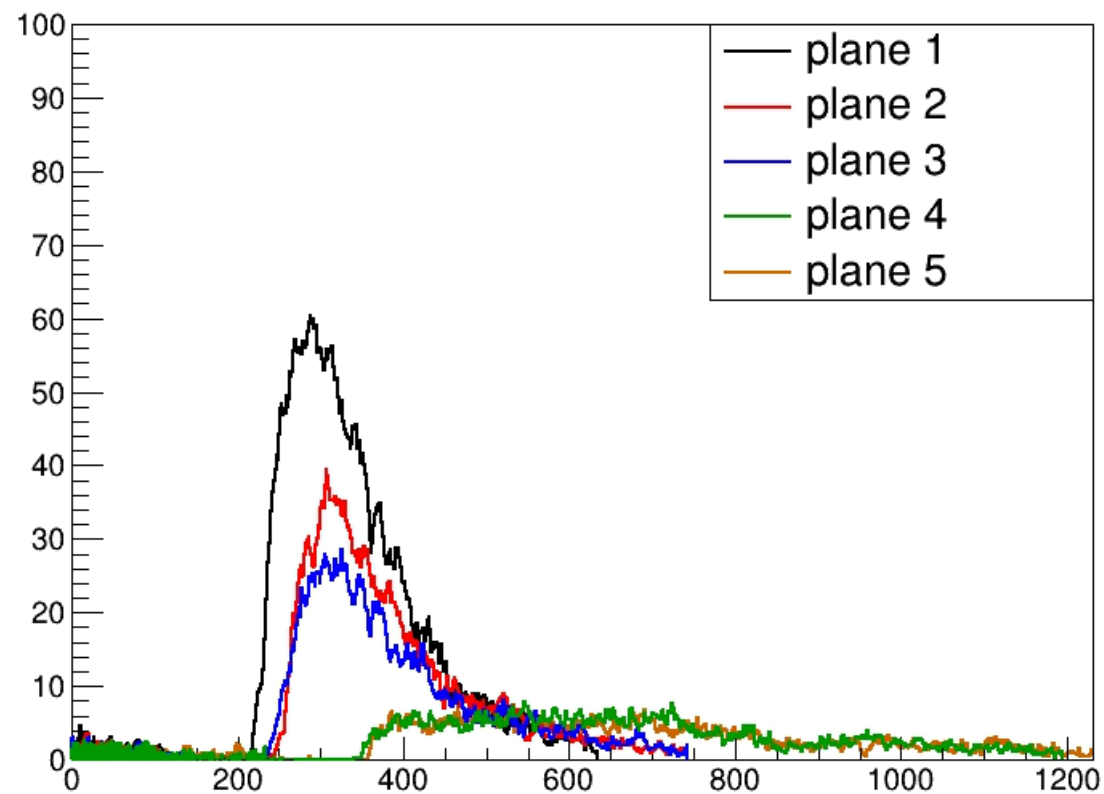
V plane



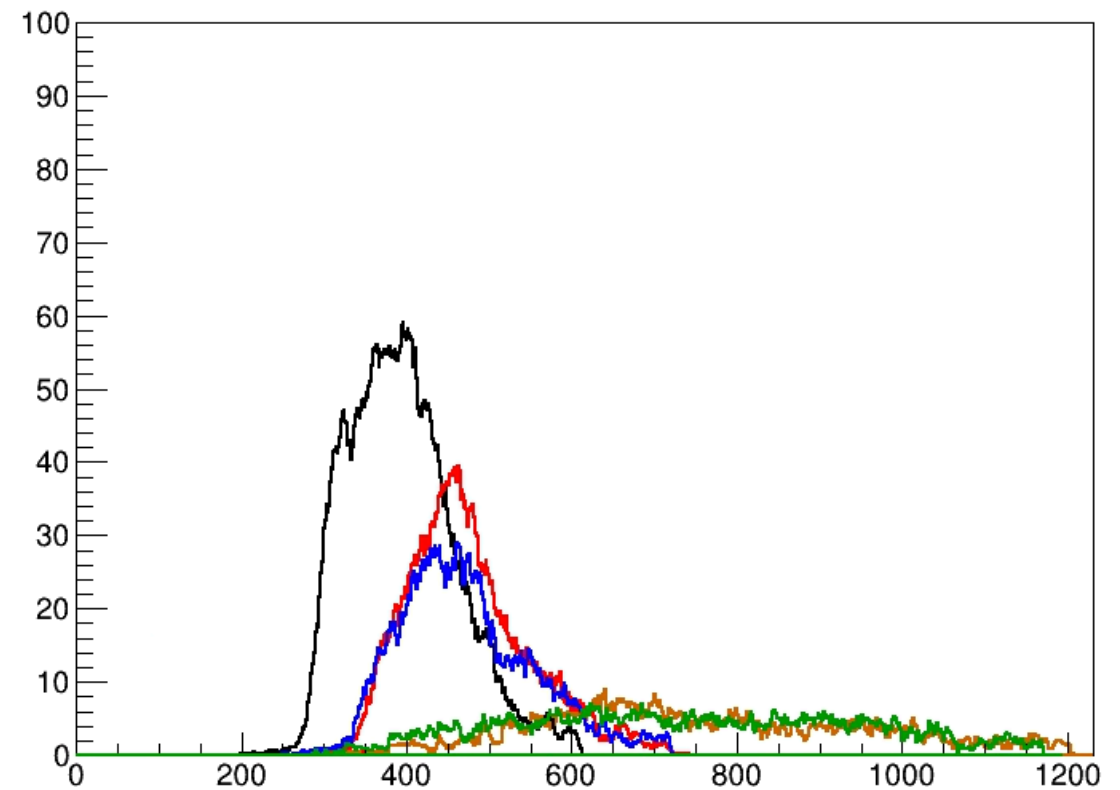
adc > 10

PVDIS 25ns Occupancy

U plane



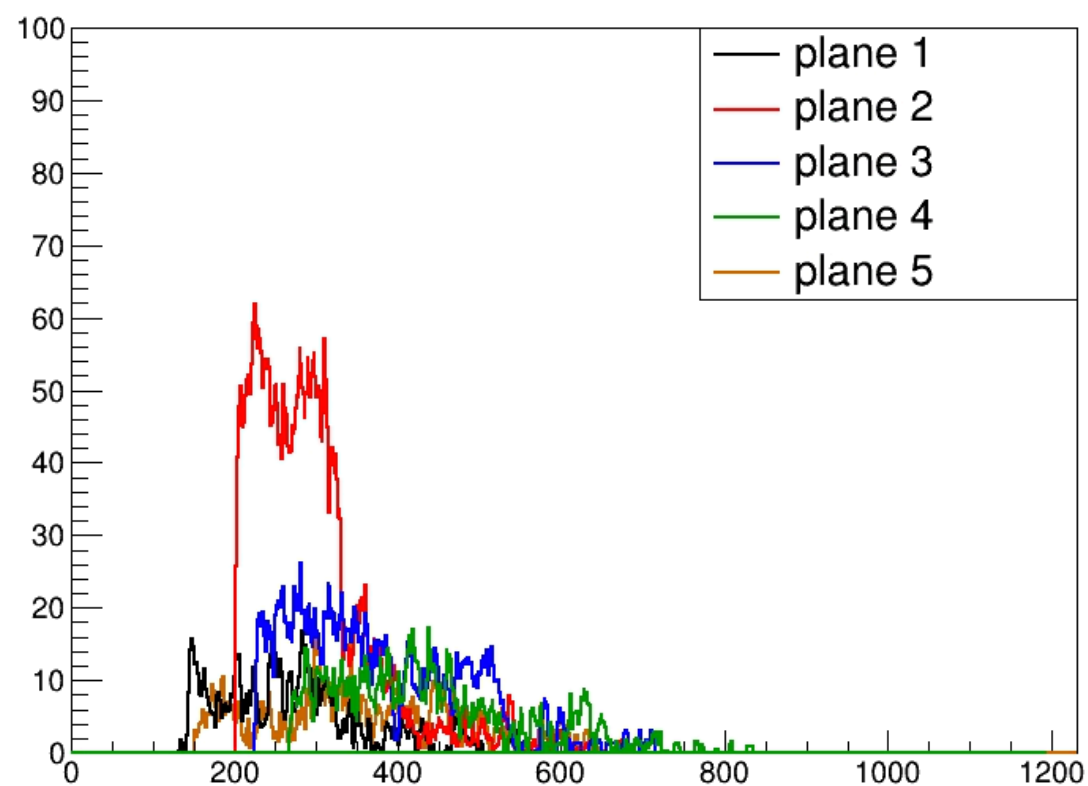
V plane



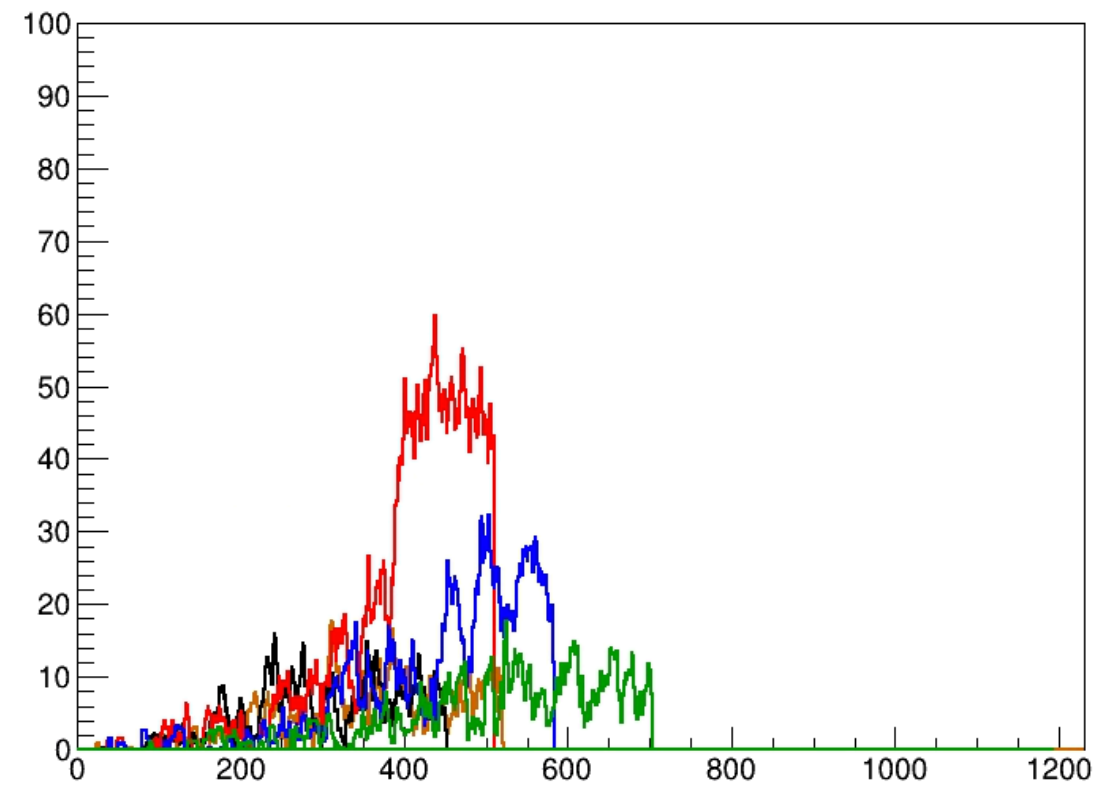
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SIDIS 50ns Occupancy

U plane



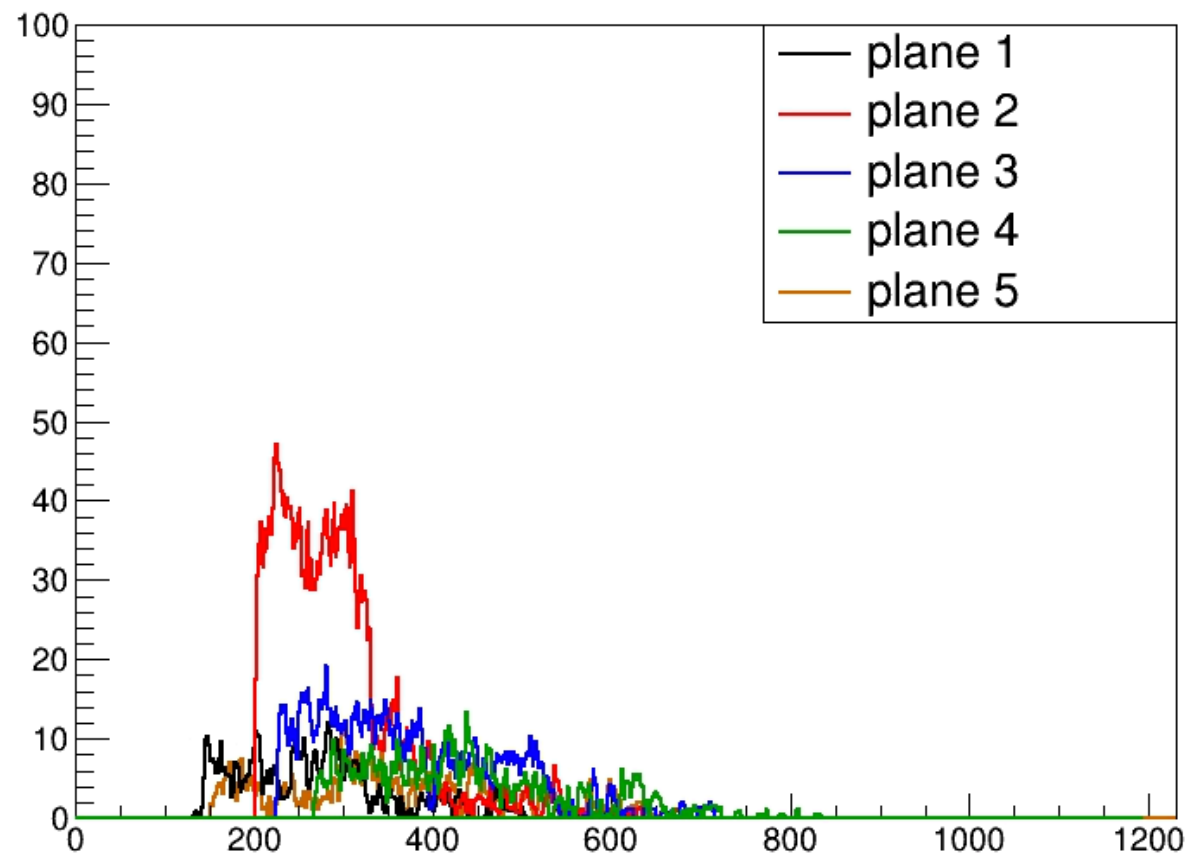
V plane



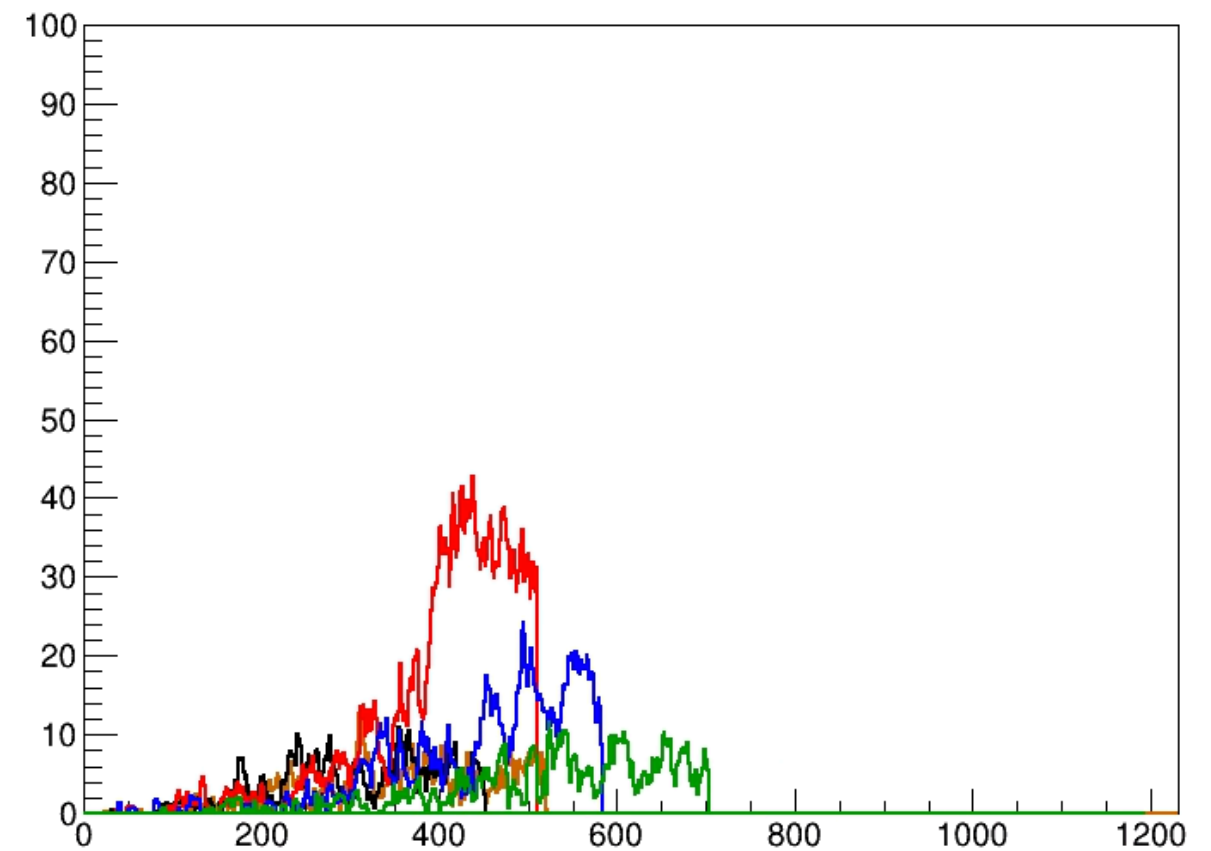
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SIDIS 25ns Occupancy

U plane



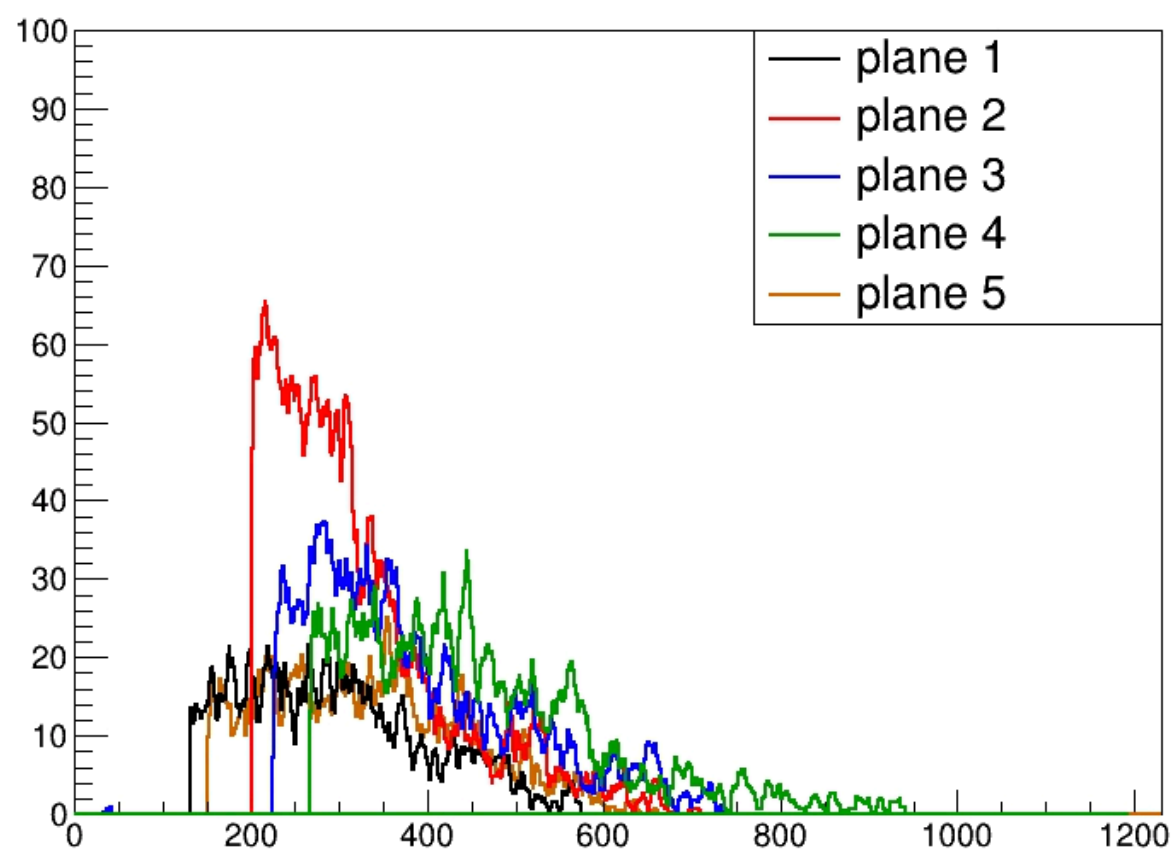
V plane



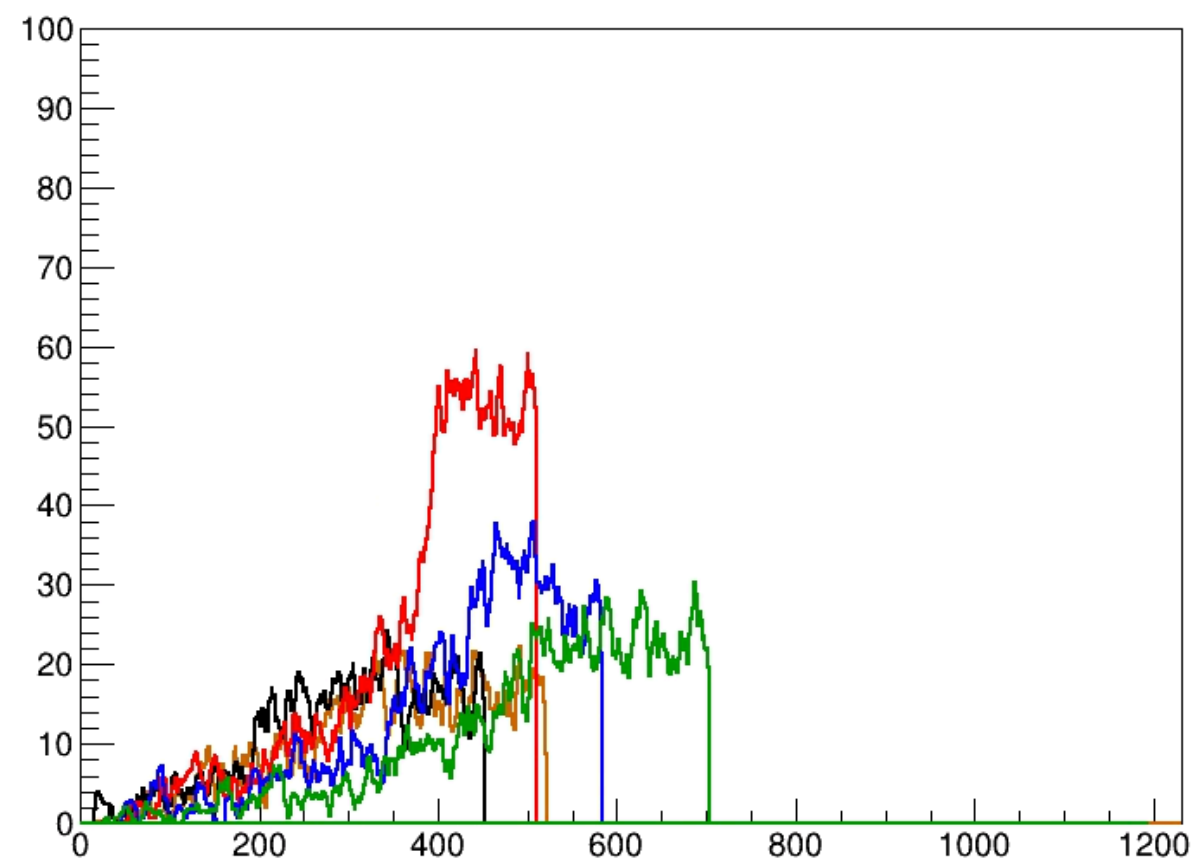
adc > 10

J/Psi 25ns Occupancy

U plane

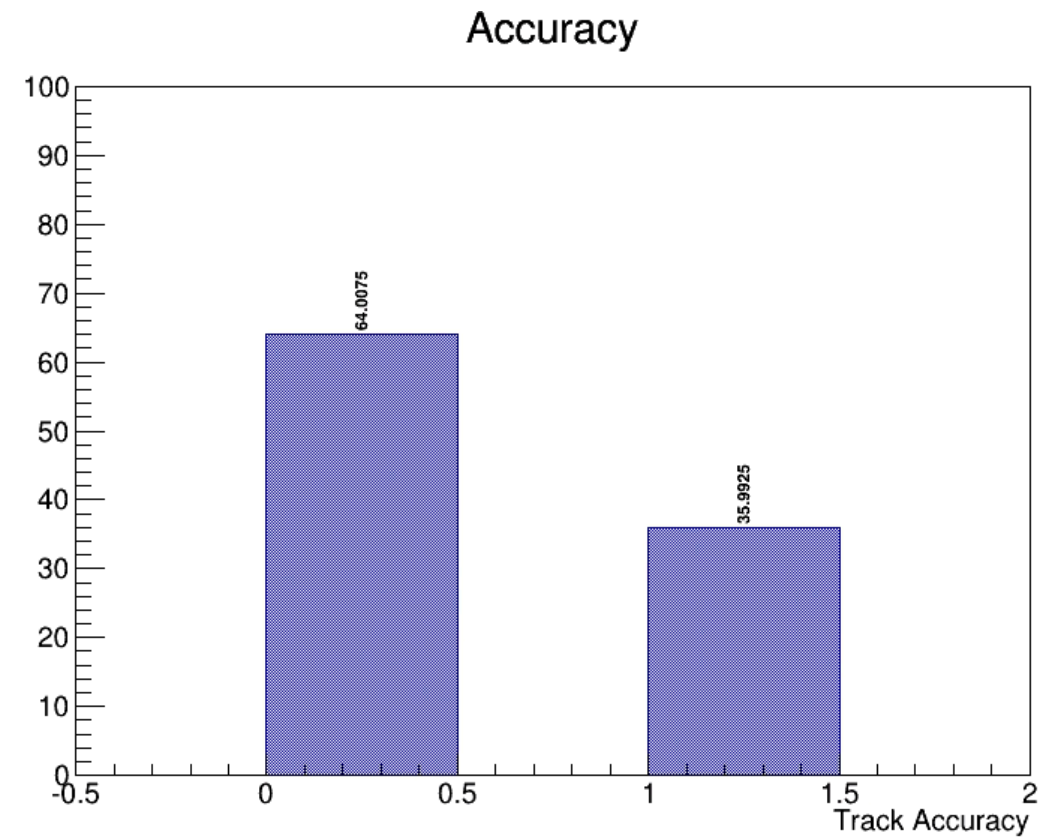
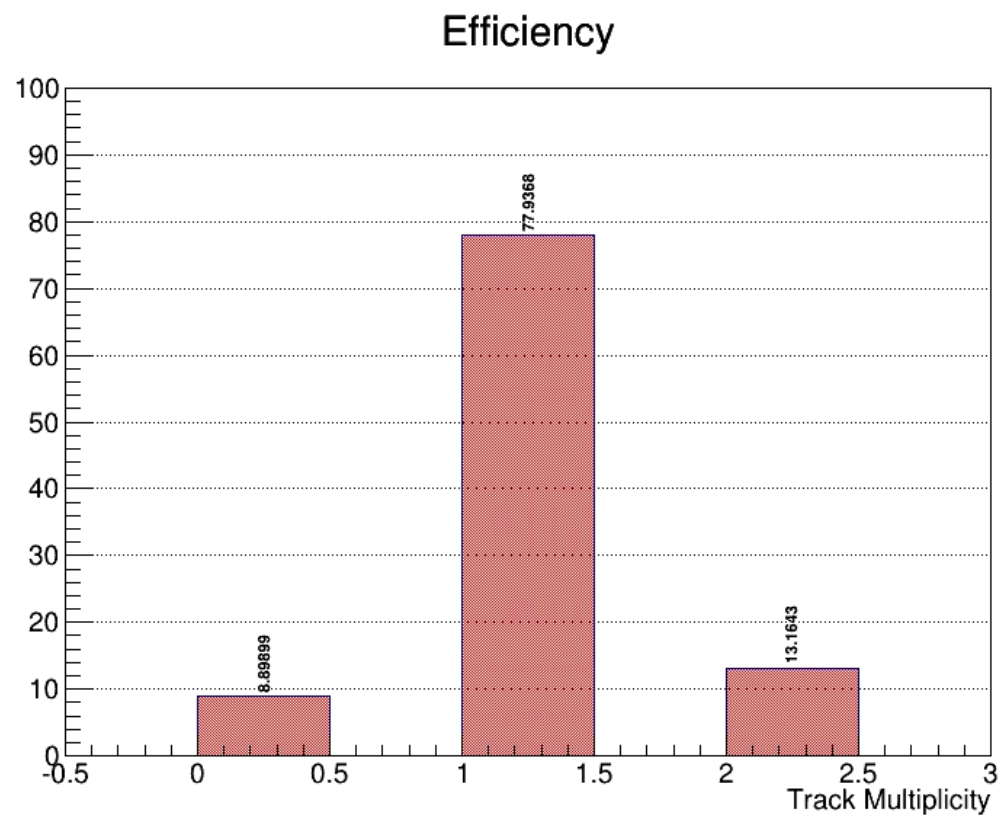


V plane

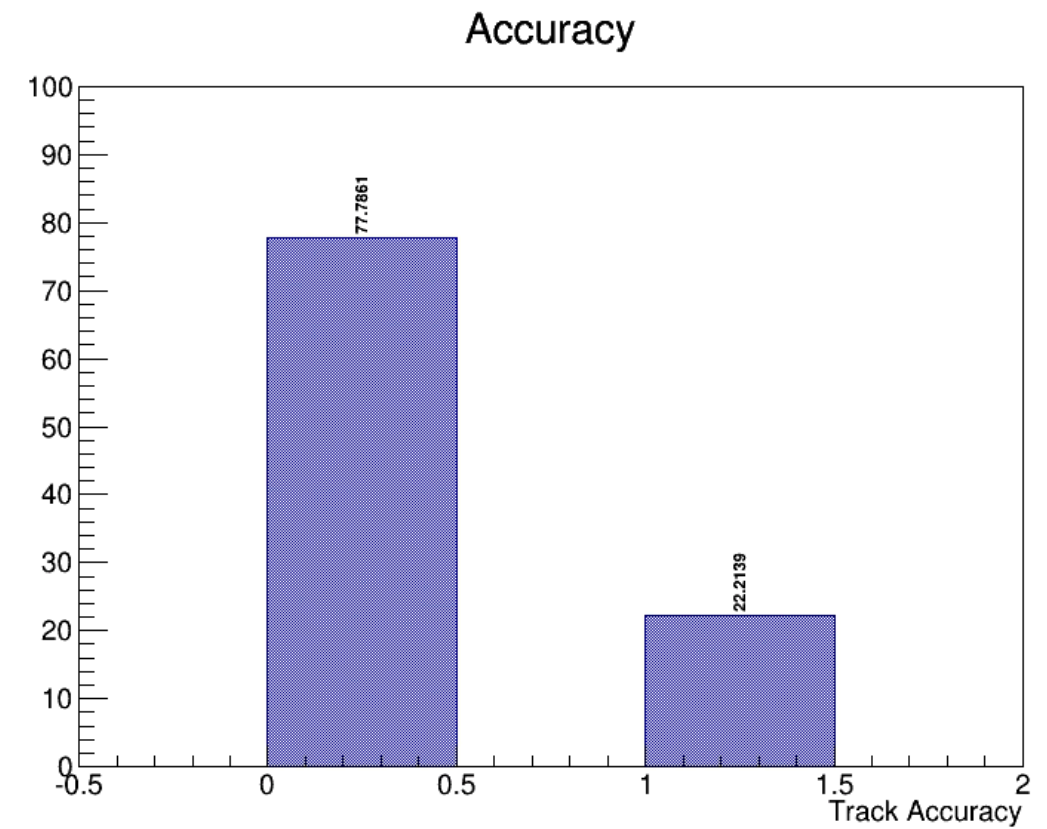
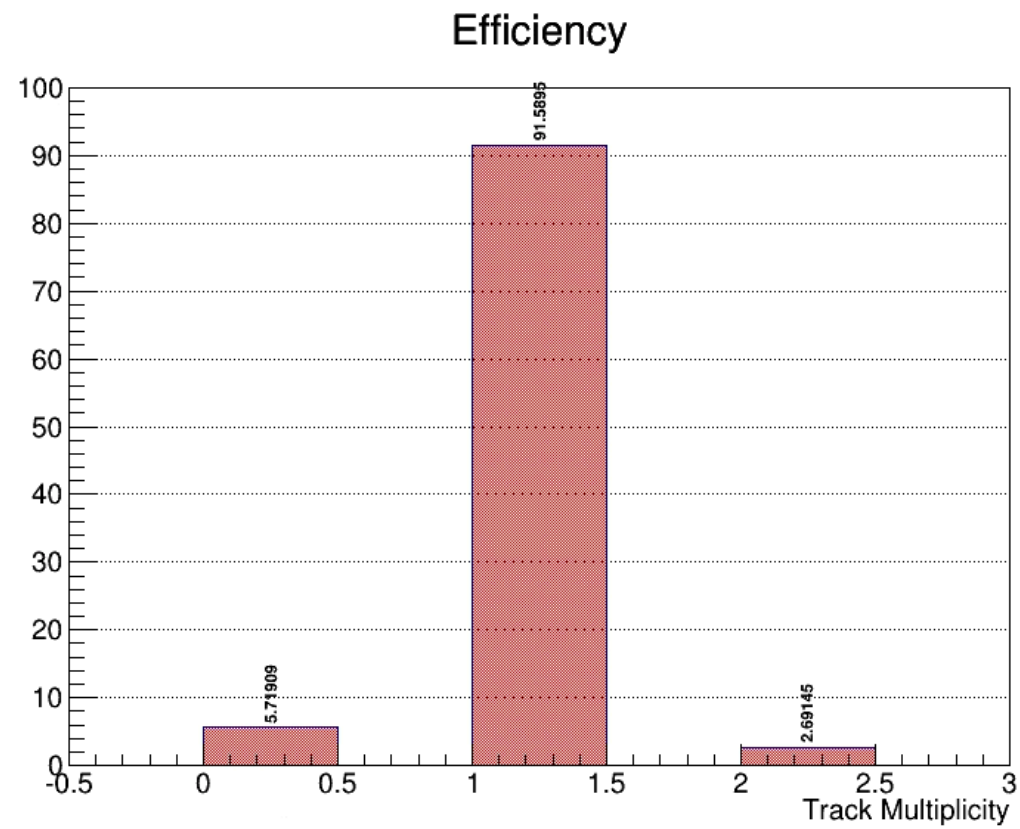


adc > 10

PVDIS 50ns Efficiency

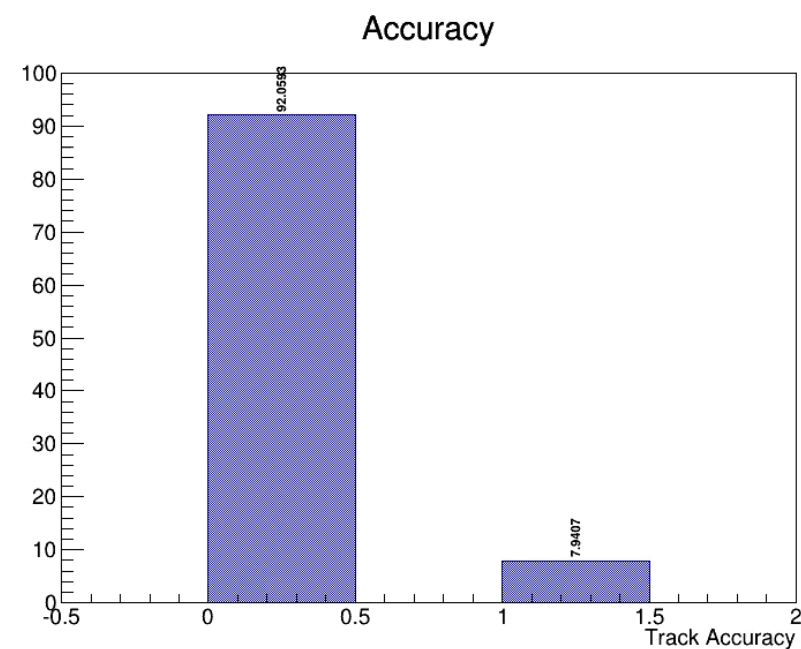
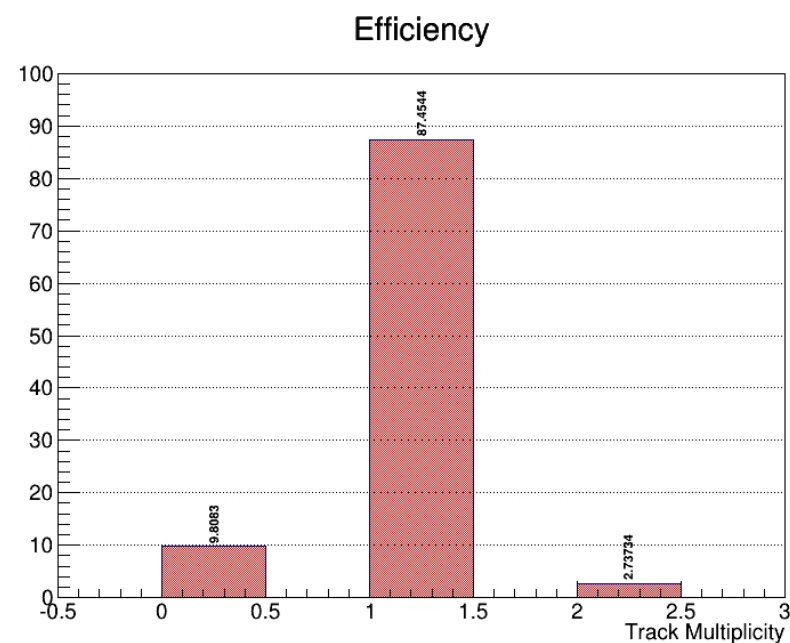


PVDIS 25ns Efficiency

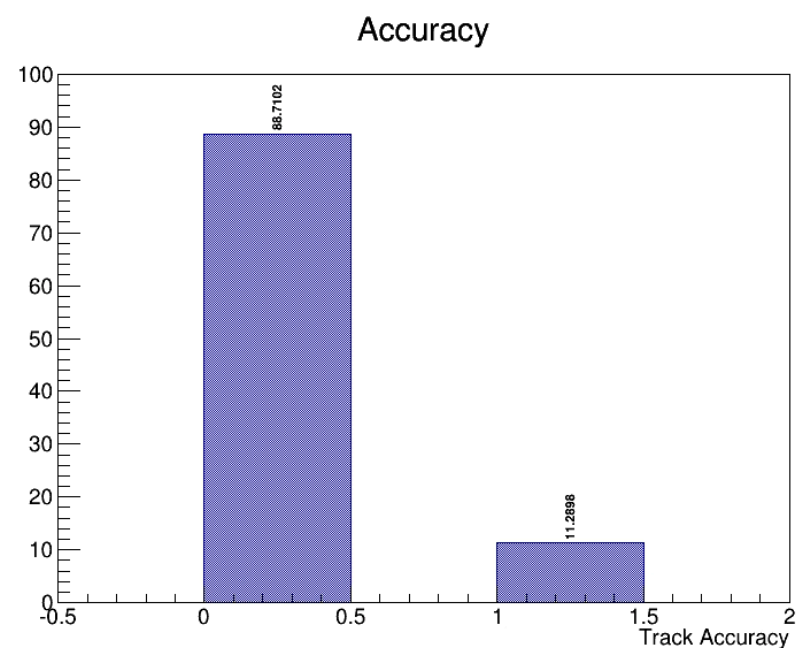
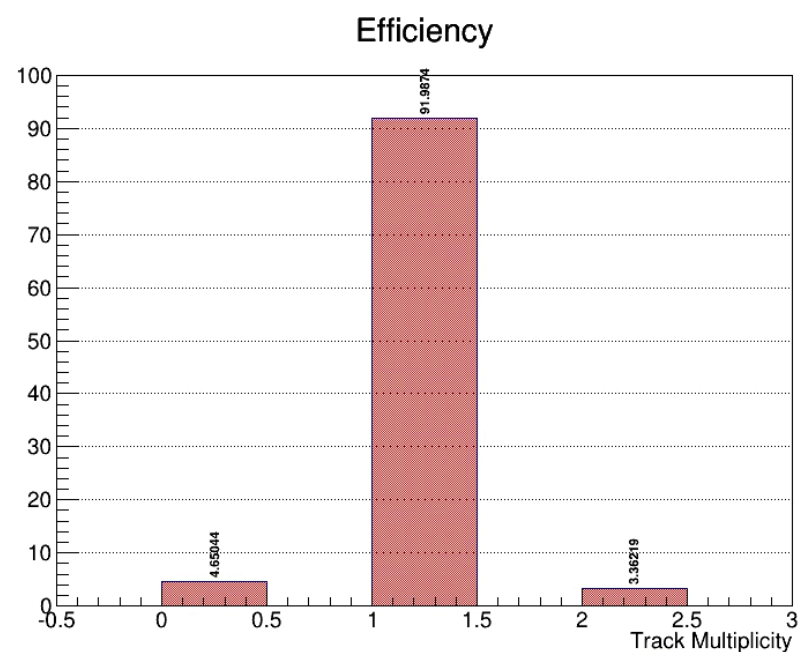


SIDIS 50ns Efficiency

100% BG



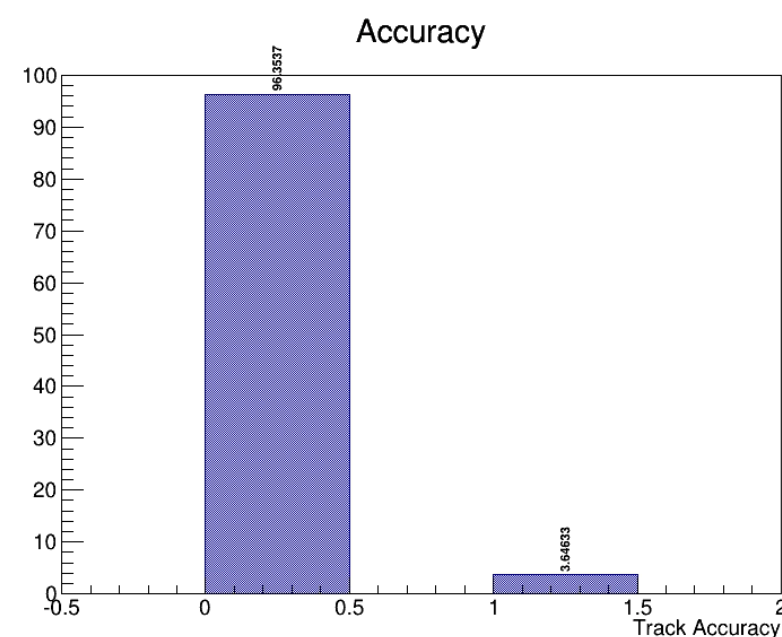
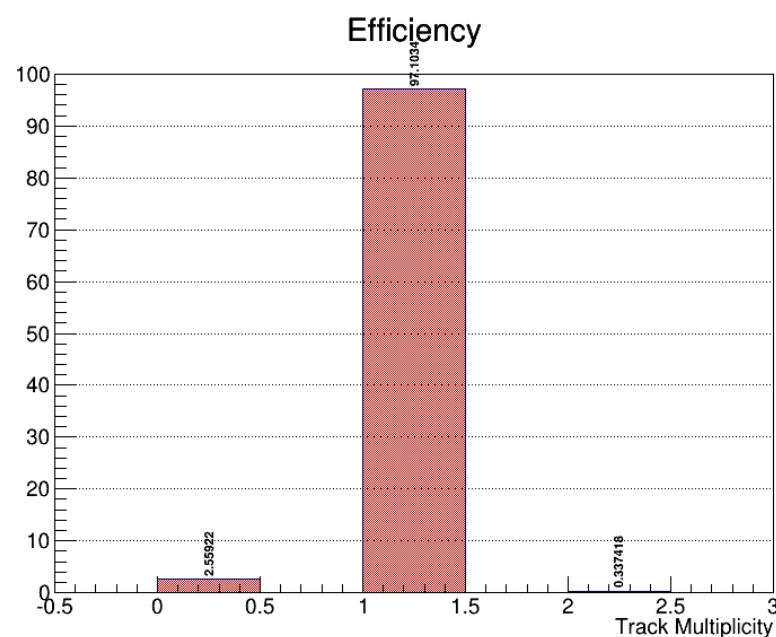
Large Angle



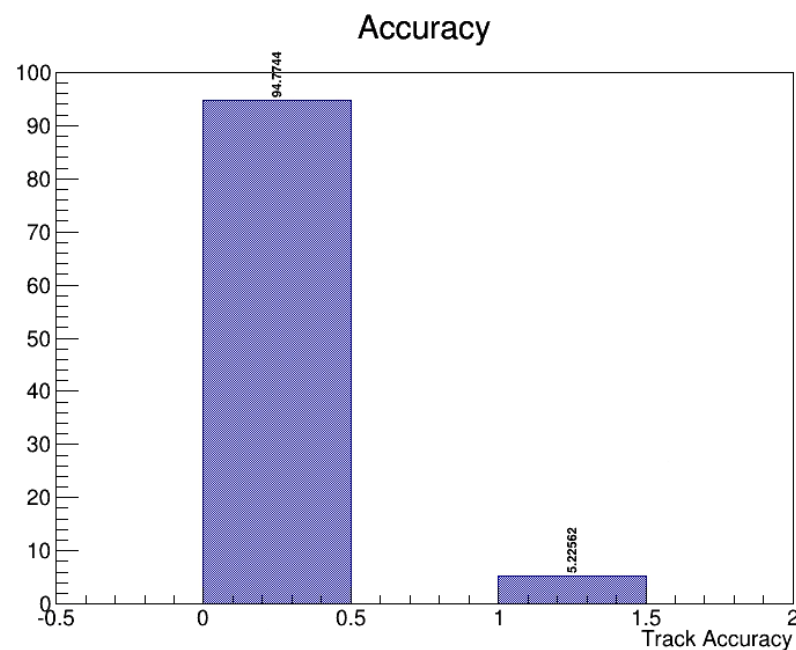
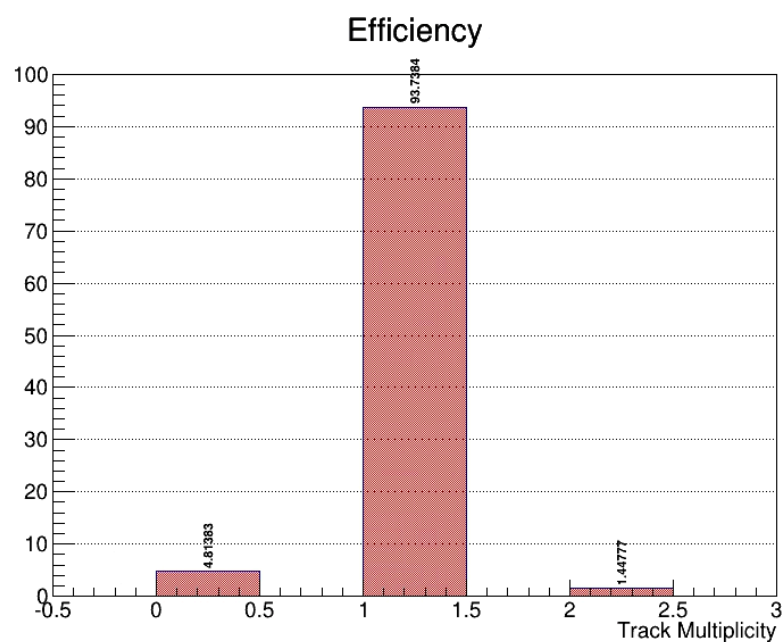
Forward Angle

SIDIS 25ns Efficiency

100% BG



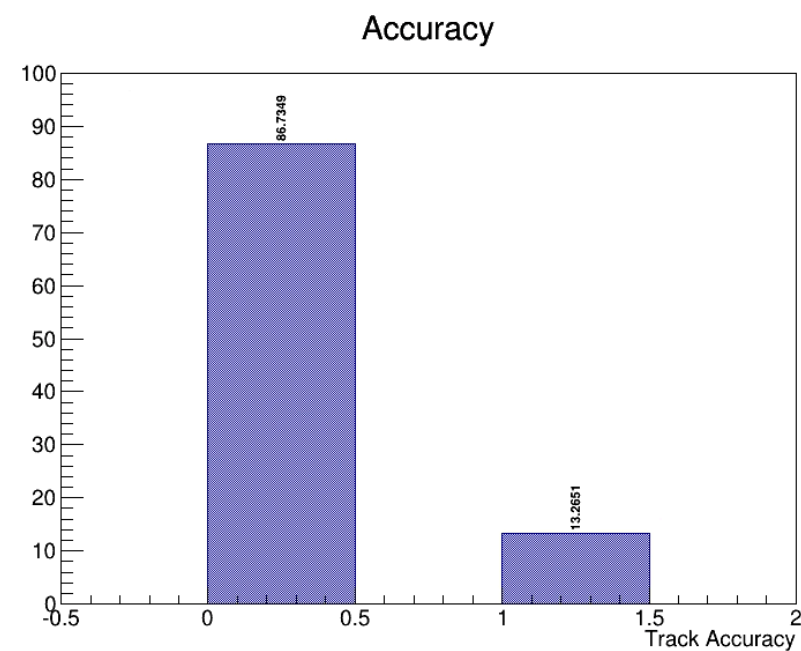
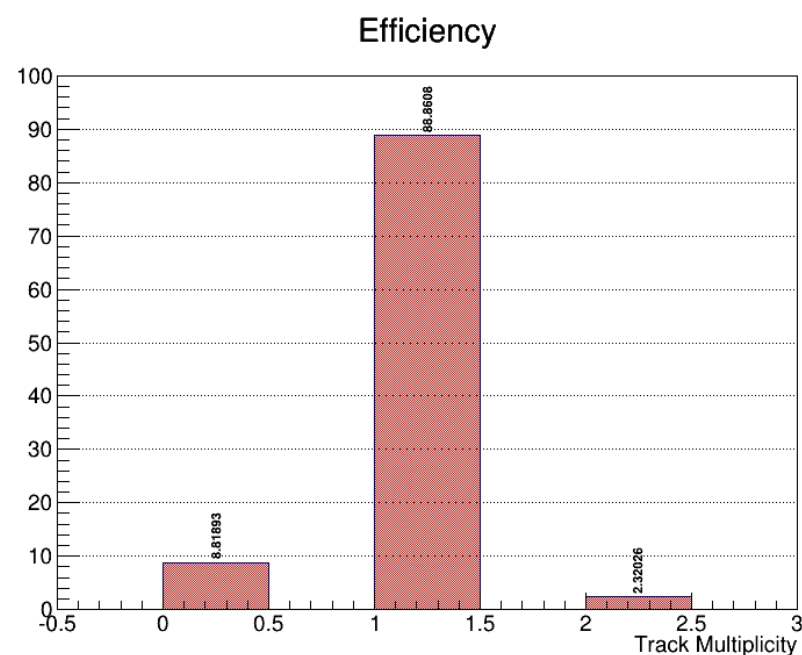
Large Angle



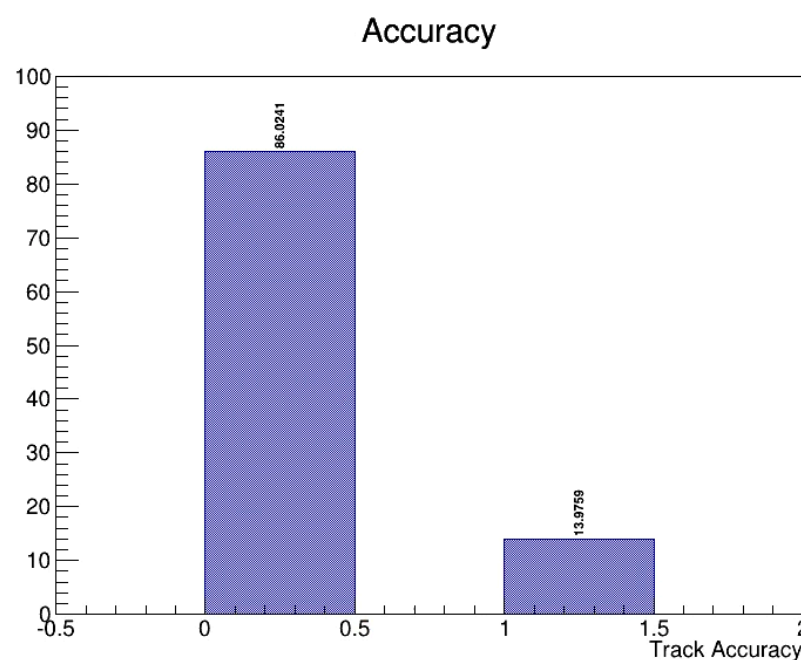
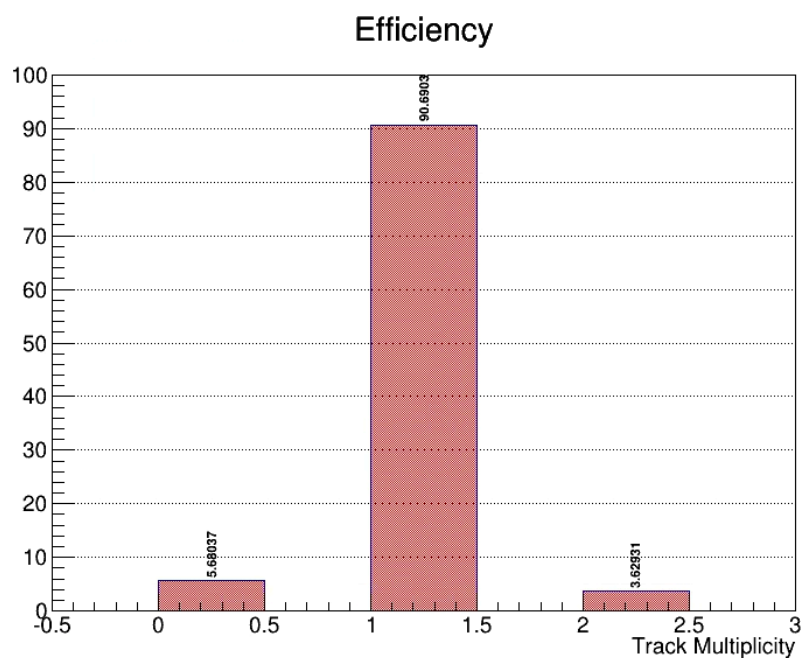
Forward Angle

J/Psi 25ns Efficiency

100% BG



Large Angle



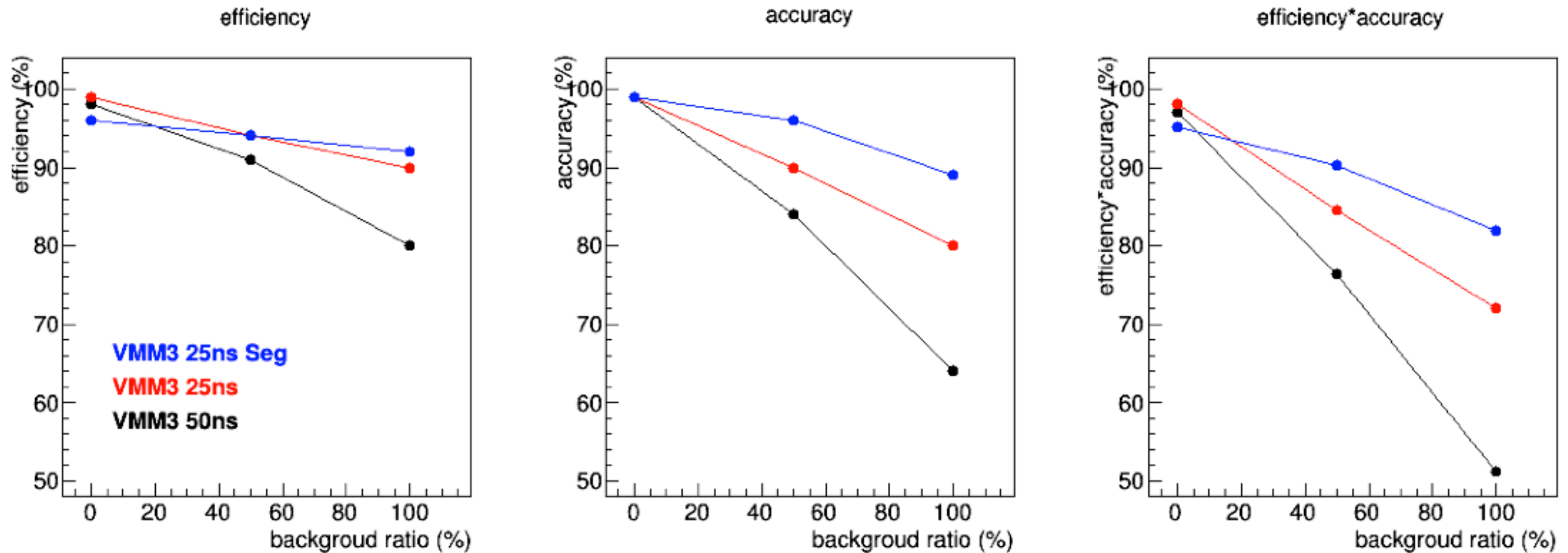
Forward Angle

Efficiency | Accuracy

Peaking time	50ns				25ns				APV25 (Weizhi's note)	
background ratio	0%		100%		0%		100%		100%	
PVDIS	98.6	98.9	77.9	64.0	97.9	99.3	91.6	77.8	~85	~82
SIDIS Large Angle	97.0	99.3	87.5	92.1	99.6	99.4	93.7	94.8	~92	~96
SIDIS Forward Angle	99.4	98.9	92.0	88.7	99.4	99.3	97.1	96.4	~96	~93
J/Psi Large Angle	--				96.5	98.7	88.9	86.9	~86	~85
J/Psi Forward Angle					98.4	98.9	90.7	86.0	~89	~81

%

Strip segmentation



~10% improvement with strip segmentation.

To-do: Tracking with Time-over-threshold

