

Two particle tracking for SIDIS He3

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General info

- Previously we only look at single particle tracking (single electron or single pion, mixed with bg)
- Right now we are having two particles (one electron + one pion) for each event at the same time, and mixed with bg
- Electron track recon still starts from EC, and pion track recon starts from SPD
- Current strategy: perform electron track recon first, set all selected hits as “used”, and then perform the pion recon. “Used” hits will be skipped in reconstruction
 - Will get longer execution time this way, in principle the two reconstructions can be done at the same time

Tracking with no beam bg

	Zero [%]	Single [%]	Multi [%]
Electron track efficiency	0.5	99.4	0.1

	Accurate track [%]	Inaccurate track [%]
Electron track accuracy	99.9	0.1

	Zero [%]	Single [%]	Multi [%]
Pion track efficiency	3.9	96.1	0.0

	Accurate track [%]	Inaccurate track [%]
Pion track accuracy	99.9	0.1

	Zero [%]	Single [%]	Multi [%]
Double track efficiency	4.4	95.6	0.0

	Accurate track [%]	Inaccurate track [%]
Double track accuracy	99.7	0.3

- For the double track efficiency, “zero track” mean no track is found for either the electron or pion, “single track” mean each electron and pion has exactly one track found, “multi track” mean at least one of the two particles has multi tracks found

Tracking with beam bg

	Zero [%]	Single [%]	Multi [%]
Electron track efficiency	2.1	97.2	0.7

	Accurate track [%]	Inaccurate track [%]
Electron track accuracy	93.9	6.1

	Zero [%]	Single [%]	Multi [%]
Pion track efficiency	5.4	89.3	5.2

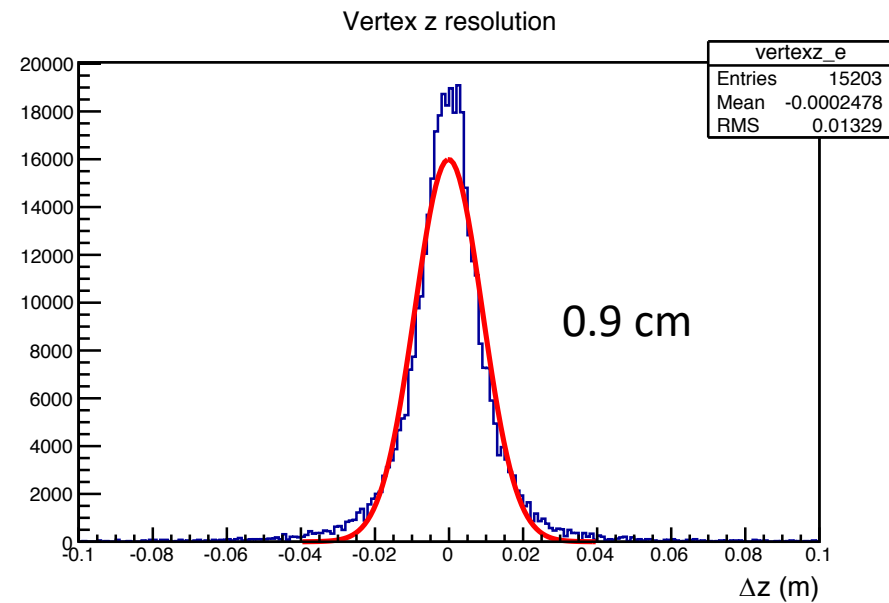
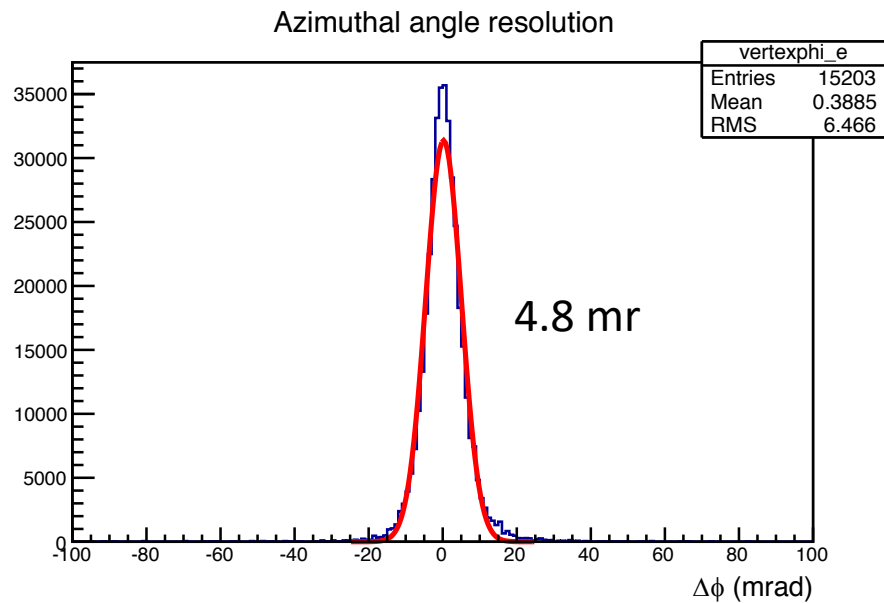
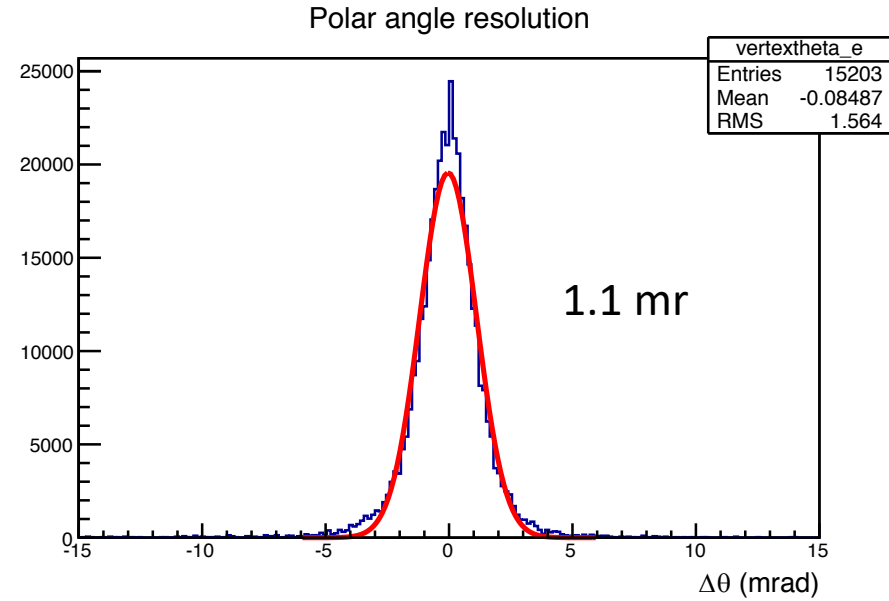
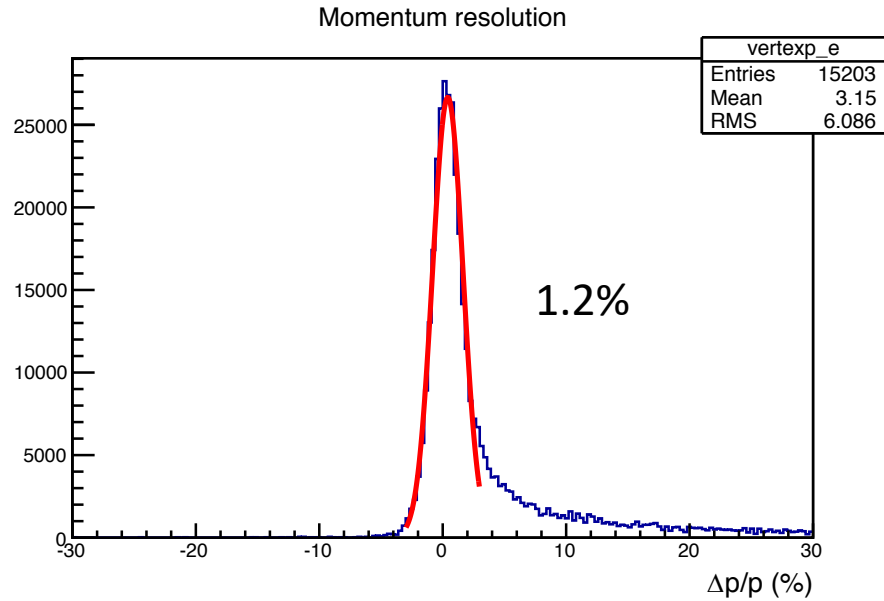
	Accurate track [%]	Inaccurate track [%]
Pion track accuracy	88.5	11.5

	Zero [%]	Single [%]	Multi [%]
Double track efficiency	7.4	86.9	5.6

	Accurate track [%]	Inaccurate track [%]
Double track accuracy	83.6	16.4

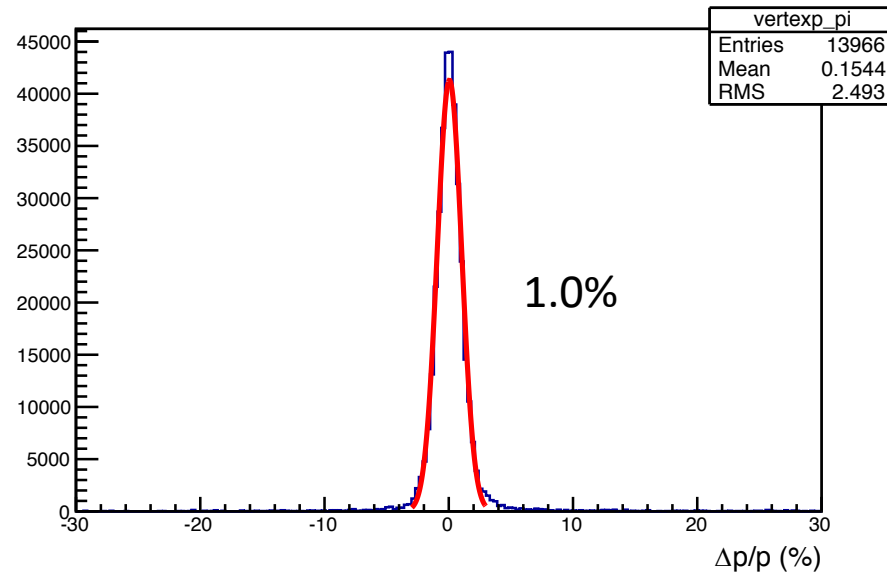
- For the double track efficiency, “zero track” mean no track is found for either the electron or pion, “single track” mean each electron and pion has exactly one track found, “multi track” mean at least one of the two particles has multi tracks found

Electron vertex reso with beam bg

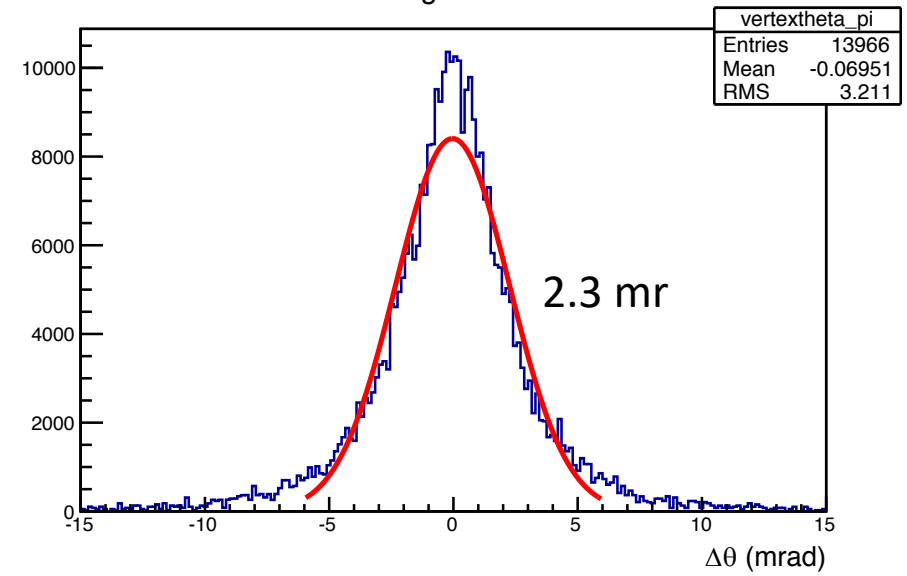


Pion vertex reso with beam bg

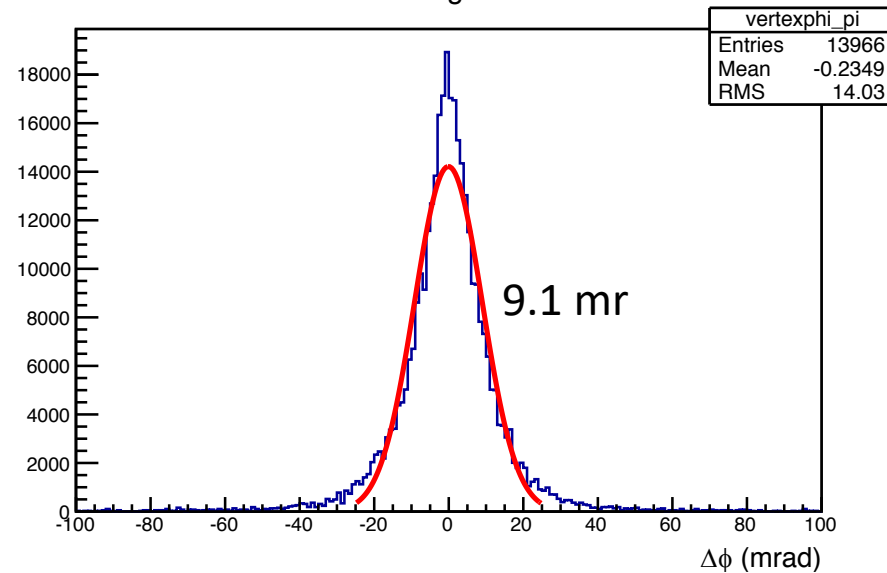
Momentum resolution



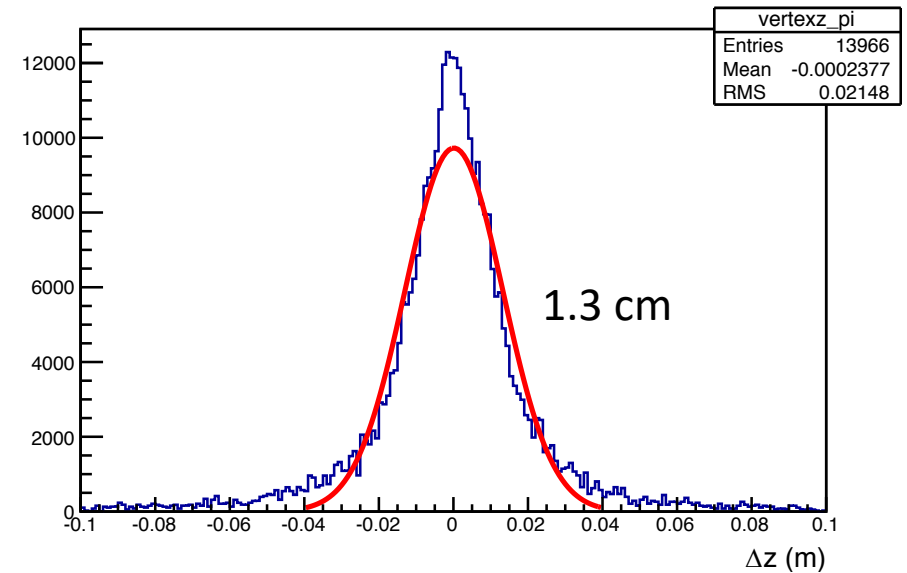
Polar angle resolution



Azimuthal angle resolution



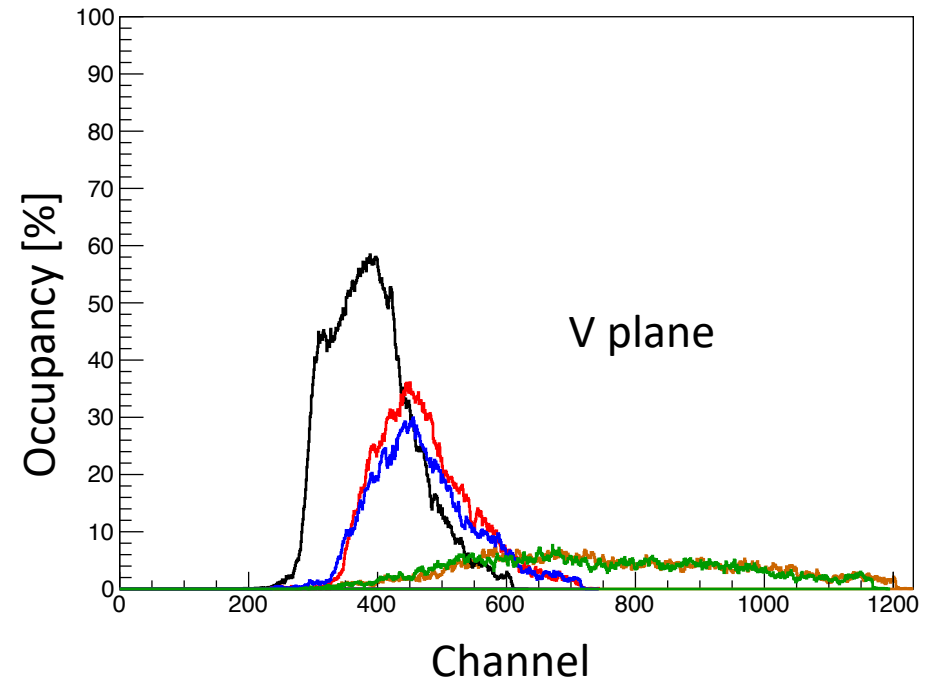
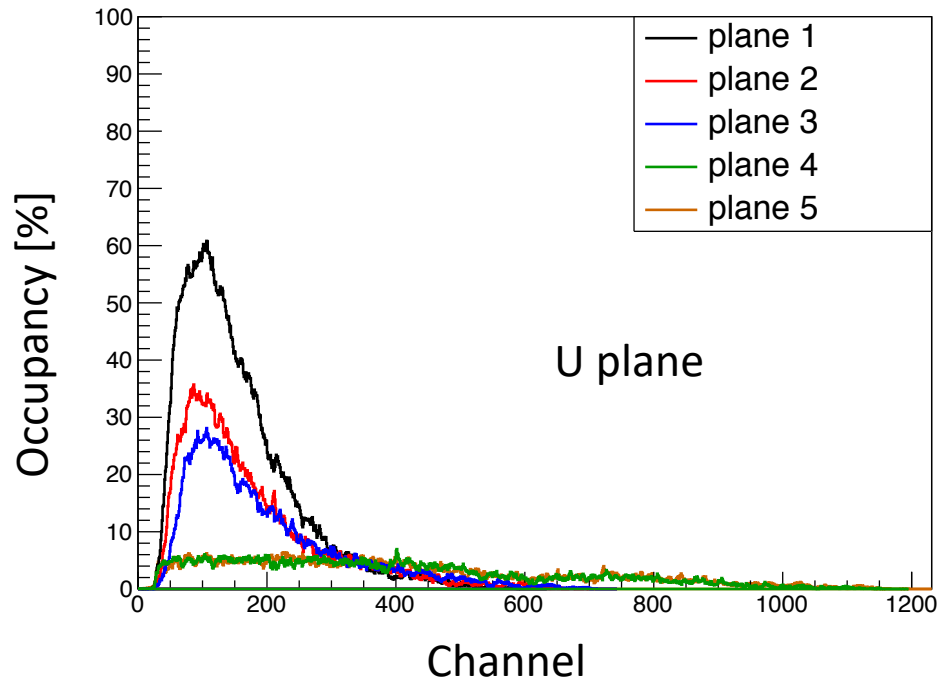
Vertex z resolution



Occupancy with VMM (PVDIS)

- Each tracker consists of 30 GEM chambers
- Each chamber has equal number of u and v strips
- Occupancy obtained assuming 25ns peaking time
- Additional info:
 - Shorter endcap
 - Whole strip no segmentation
 - Using PVDIS files from pass 4
 - Github xweizhi/libsolgem version 19db069

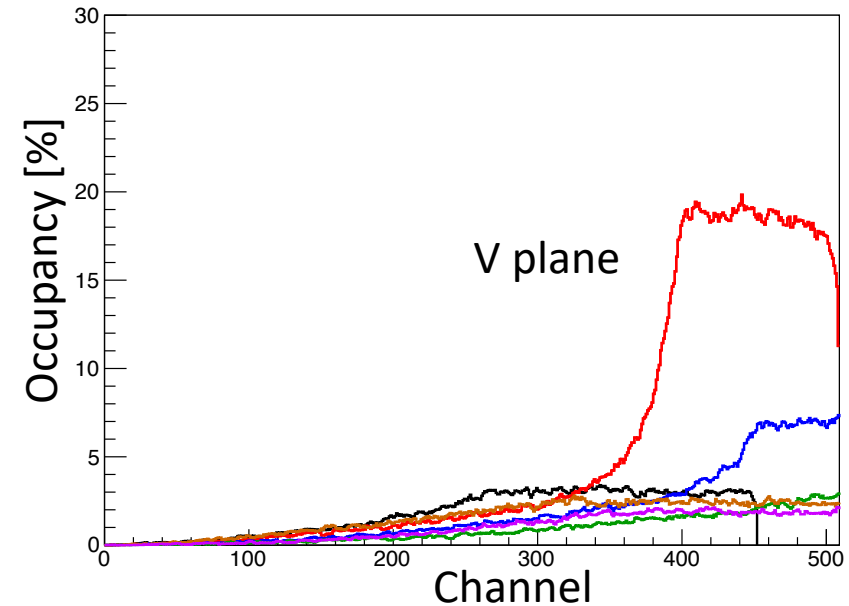
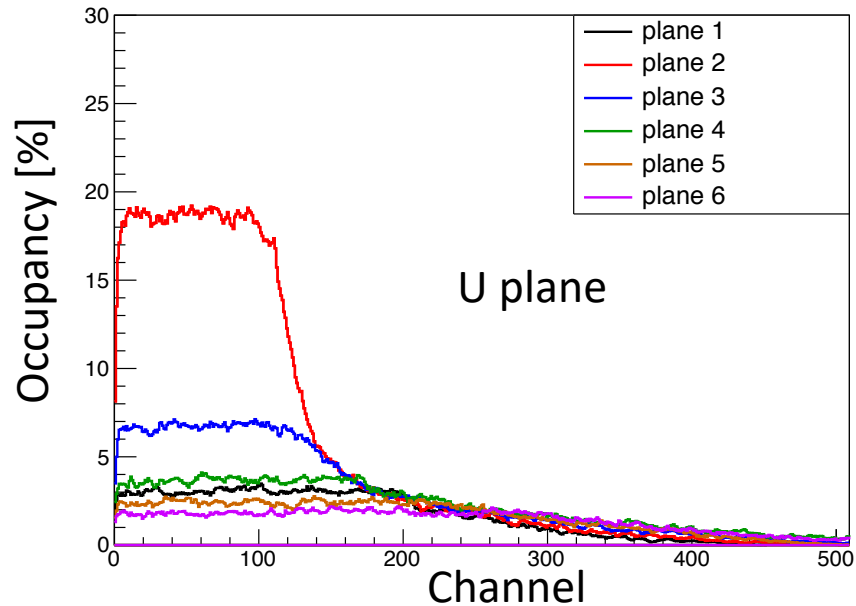
Total strips (u+v) per tracker	Occupancy [%]
34,740	16.2
41,280	8.3
41,280	7.1
68,400	2.7
70,560	2.7



Occupancy with VMM (SIDIS He3)

- Each tracker consists of 30 GEM chambers
- Each chamber has equal number of u and v strips
- Occupancy obtained assuming 25ns peaking time
- Additional info:
 - Shorter endcap
 - Whole strip no segmentation
 - Using SIDIS-He3 files from pass 7
 - Github xweizhi/libsolgem version 19db069

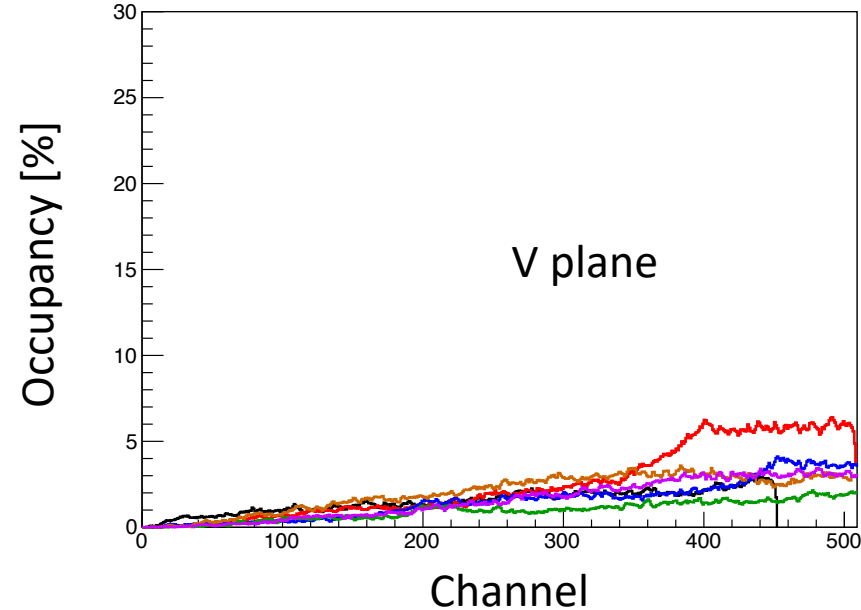
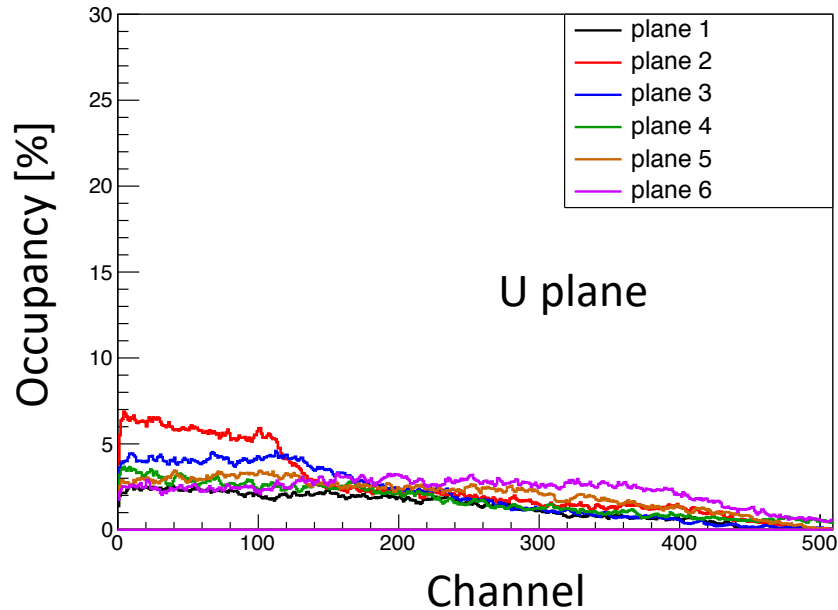
Total strips (u+v) per tracker	Occupancy [%]
27,120	1.8
30,540	5.5
34,920	2.5
42,060	1.6
31,140	1.6
38,340	1.2



Occupancy with VMM (SIDIS NH3)

- Each tracker consists of 30 GEM chambers
- Each chamber has equal number of u and v strips
- Occupancy obtained assuming 25ns peaking time
- Additional info:
 - Shorter endcap
 - Whole strip no segmentation
 - Using SIDIS-NH3 files from pass 6
 - Github xweizhi/libsolgem version 19db069

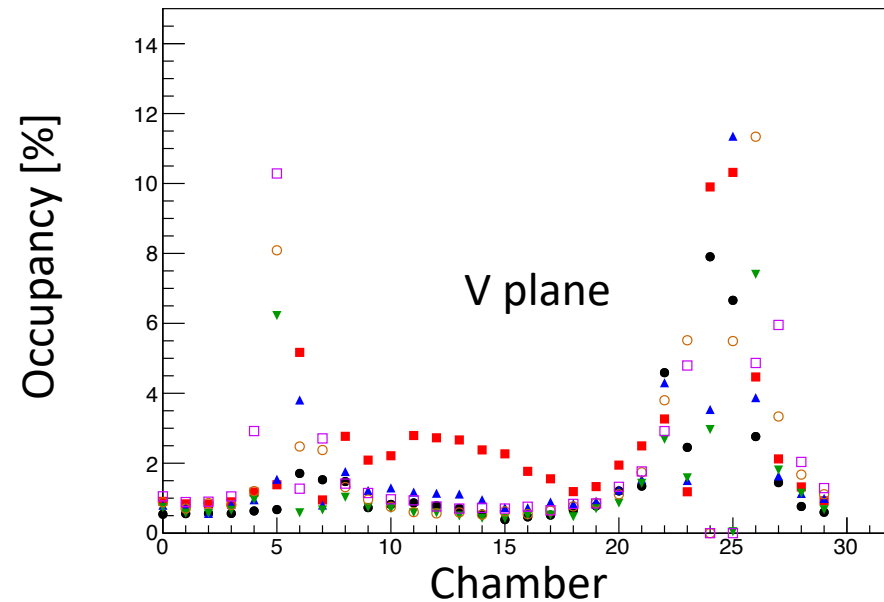
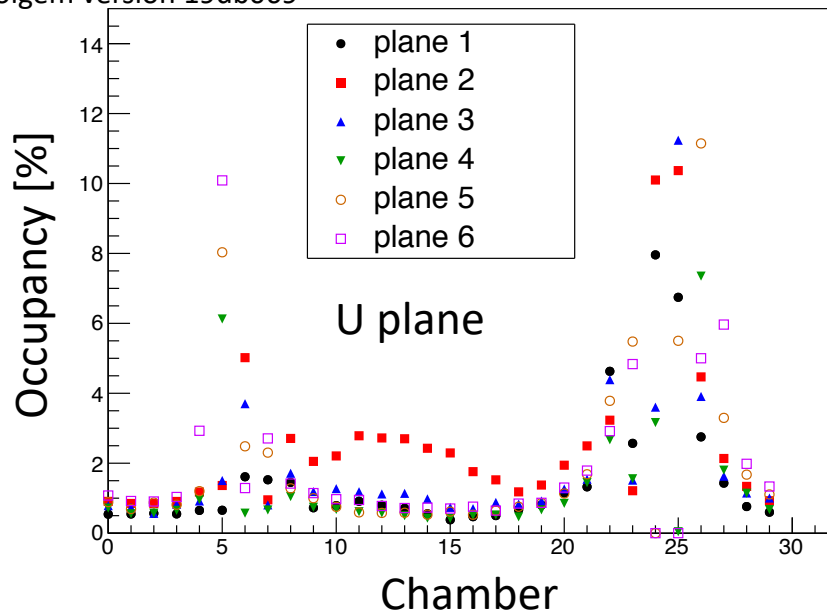
Total strips (u+v) per tracker	Occupancy [%]
27,120	1.5
30,540	2.5
34,920	1.8
42,060	1.3
31,140	2.0
38,340	1.9



Occupancy with VMM (SIDIS NH3)

- Each tracker consists of 30 GEM chambers
- Each chamber has equal number of u and v strips
- Occupancy obtained assuming 25ns peaking time
- Additional info:
 - Shorter endcap
 - Whole strip no segmentation
 - Using SIDIS-NH3 files from pass 6
 - Github xweizhi/libsolgem version 19db069

Total strips (u+v) per tracker	Occupancy [%]
27,120	1.5
30,540	2.5
34,920	1.8
42,060	1.3
31,140	2.0
38,340	1.9



Occupancy with VMM (JPsi)

- Each tracker consists of 30 GEM chambers
- Each chamber has equal number of u and v strips
- Occupancy obtained assuming 25ns peaking time
- Additional info:
 - Shorter endcap
 - Whole strip no segmentation
 - Using JPsi files from pass 5
 - Github xweizhi/libsolgem version 19db069

Total strips (u+v) per tracker	Occupancy [%]
27,120	5.4
30,540	9.7
34,920	6.1
42,060	4.8
31,140	4.3
38,340	3.3

