

Preliminary PASTA results at mCBM

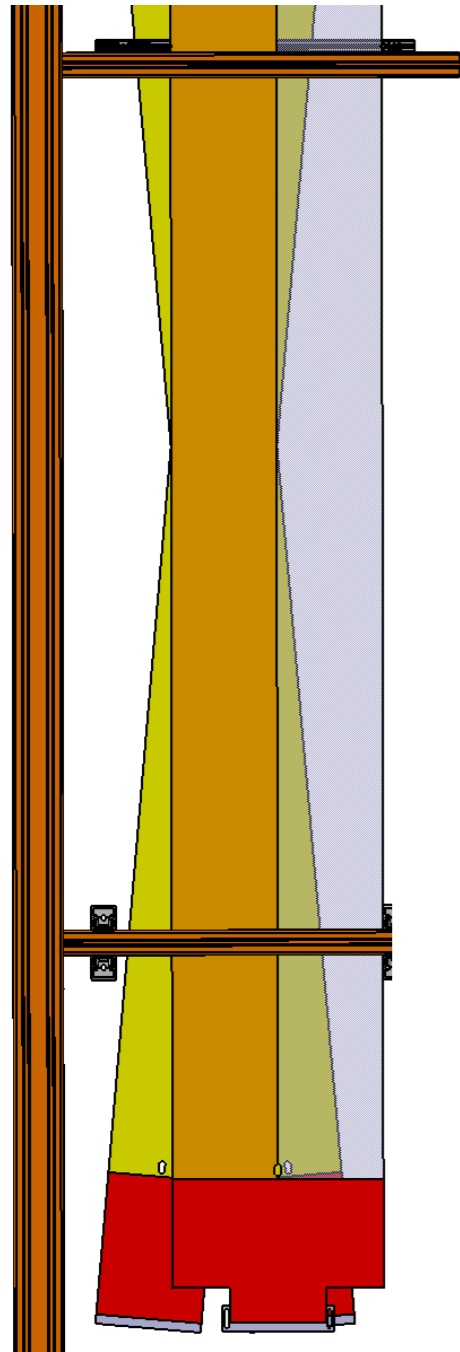
Radoslaw Karabowicz

PASTA @ mCBM

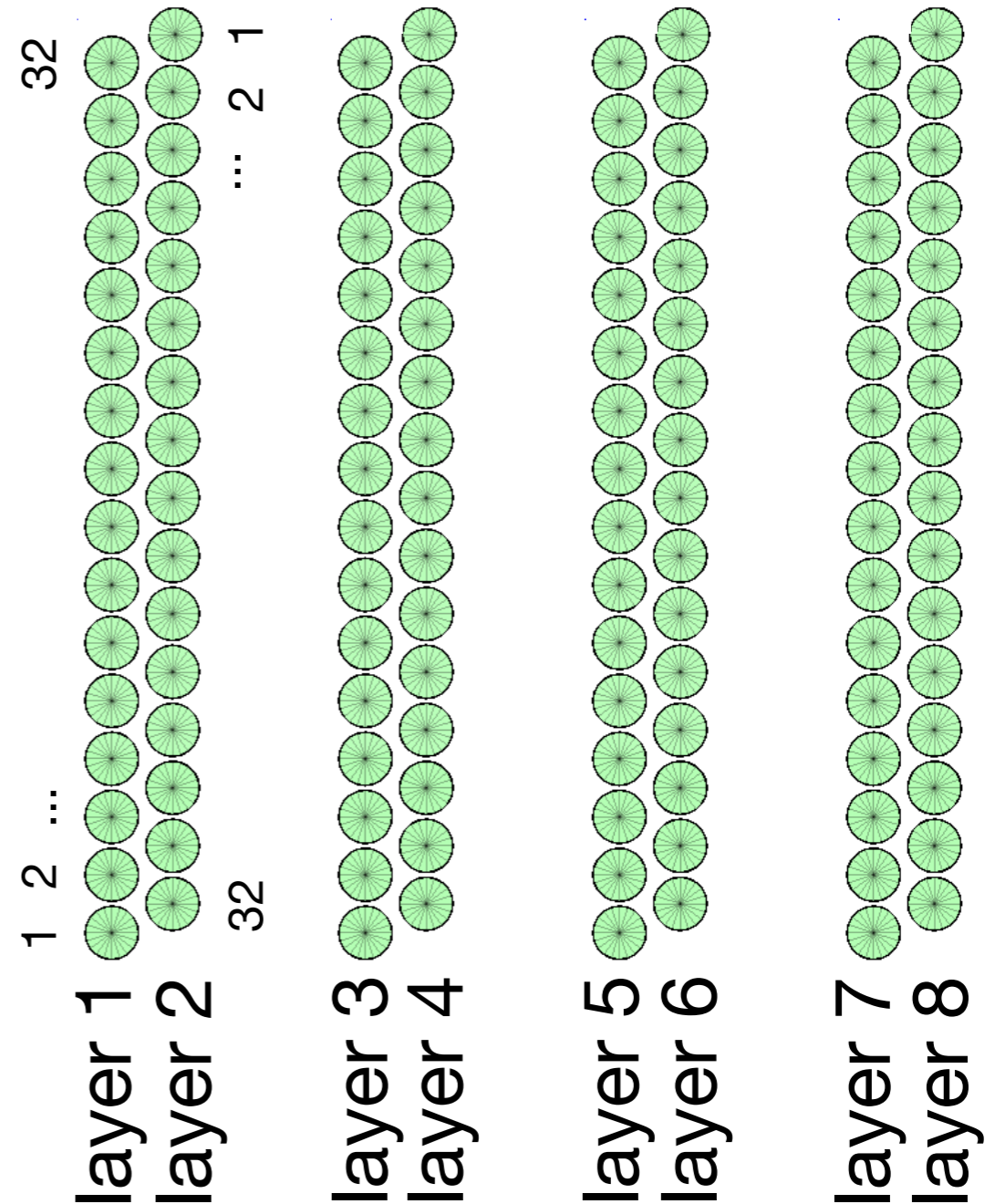
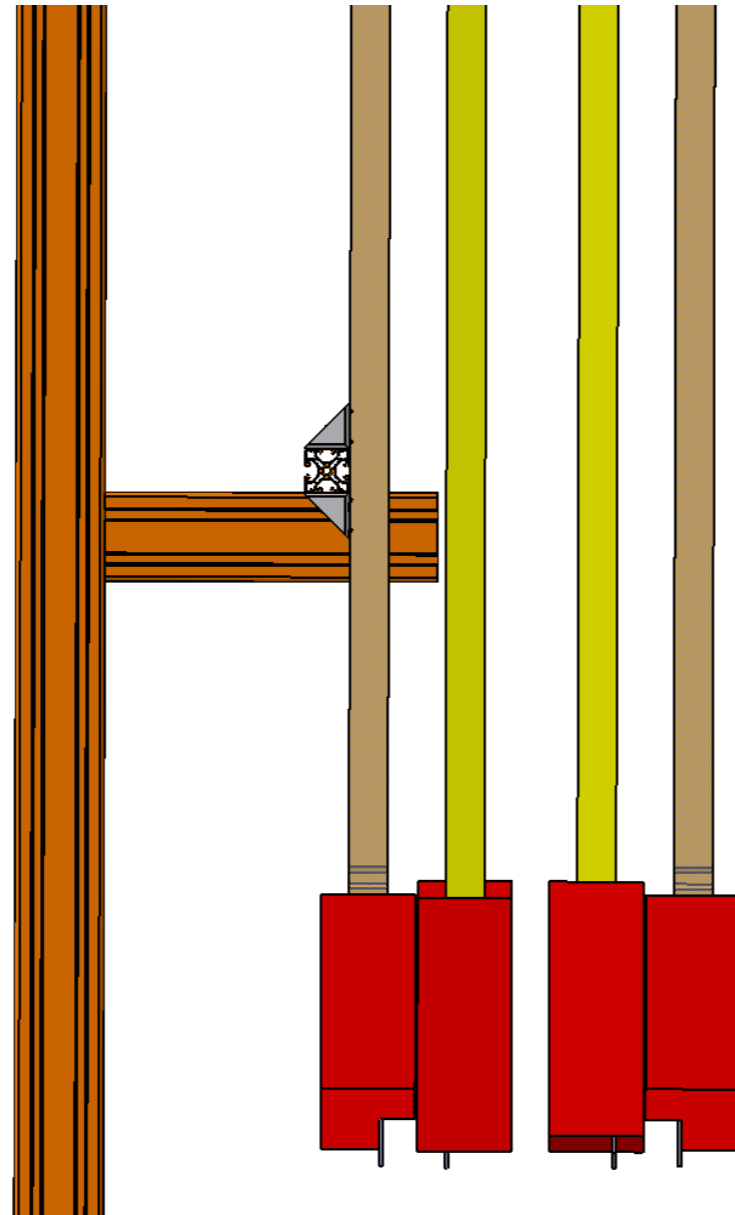
front view

side view

top view (straw level)

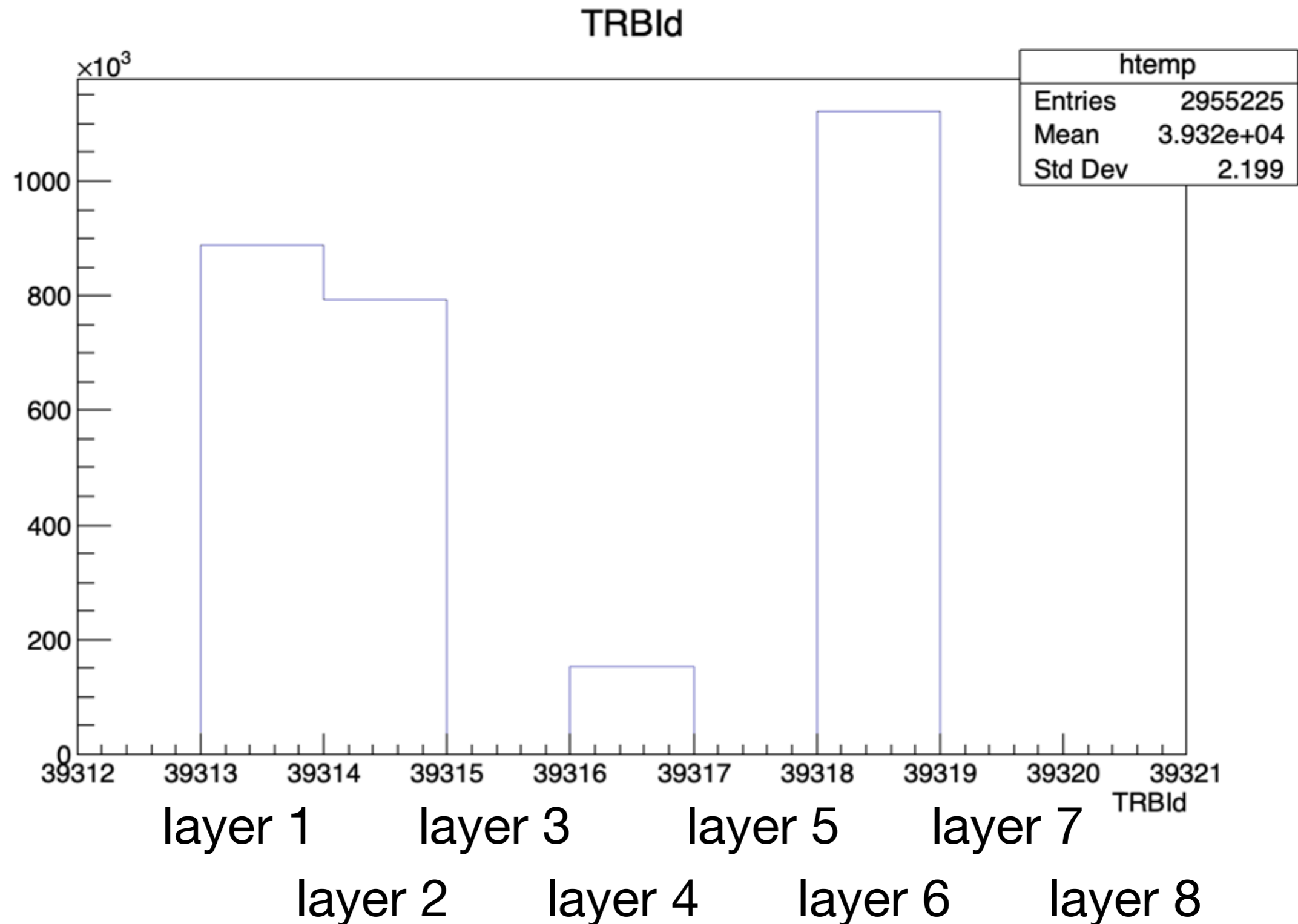


plots by Stefan Koch



X (vert.) U (-5deg) V (+5deg) X

Number of digis per layer

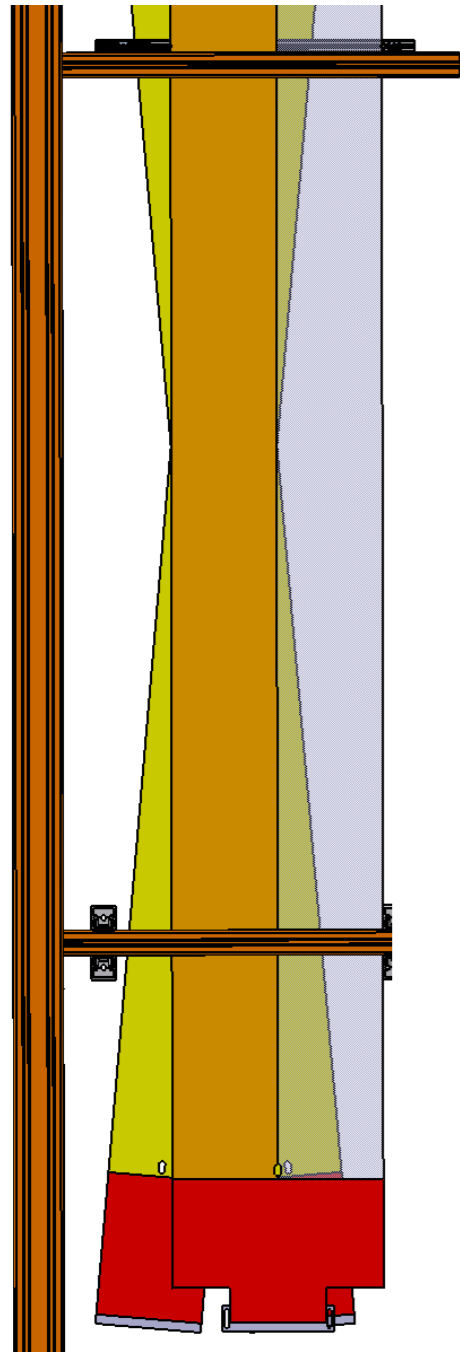


PASTA @ mCBM

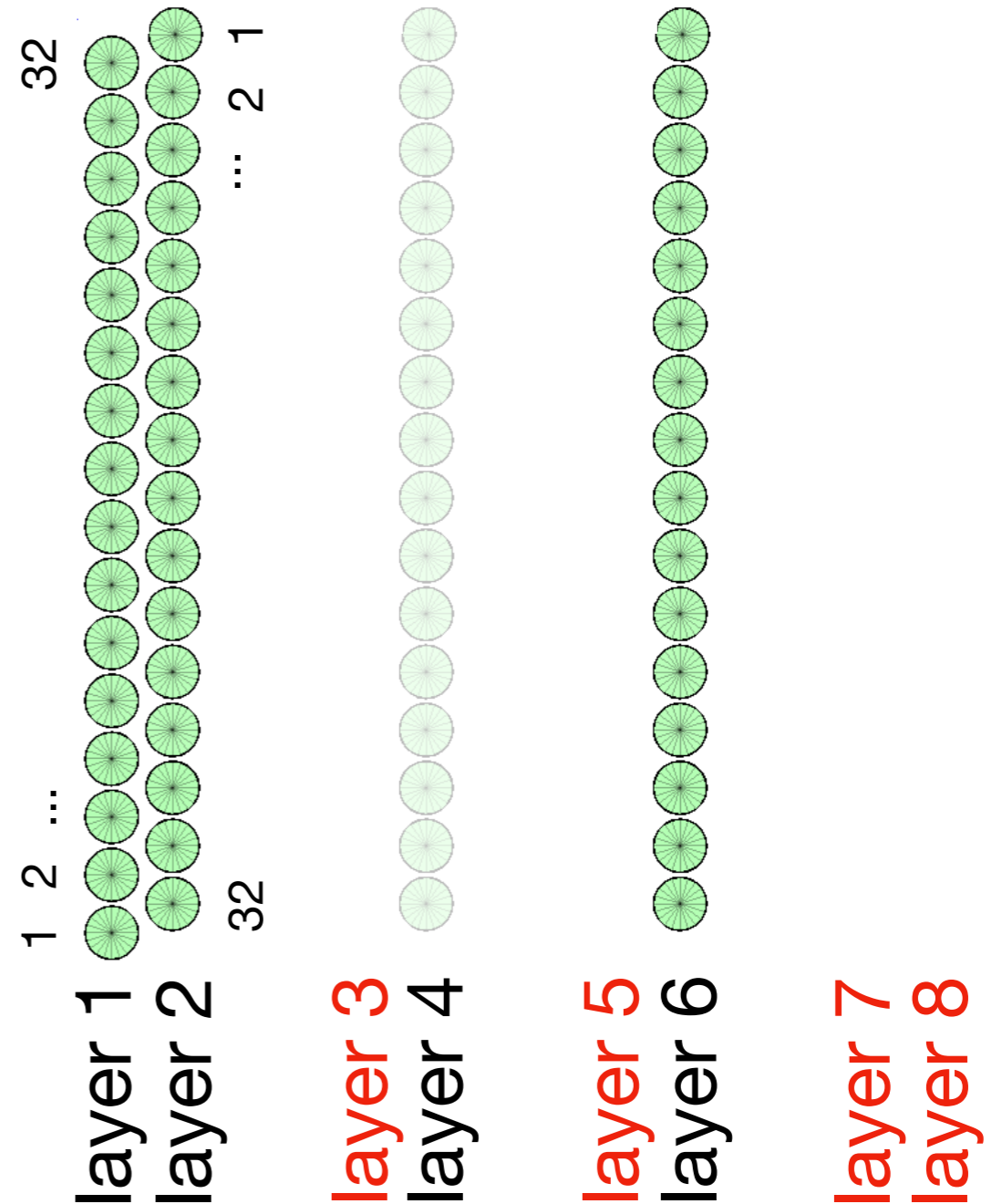
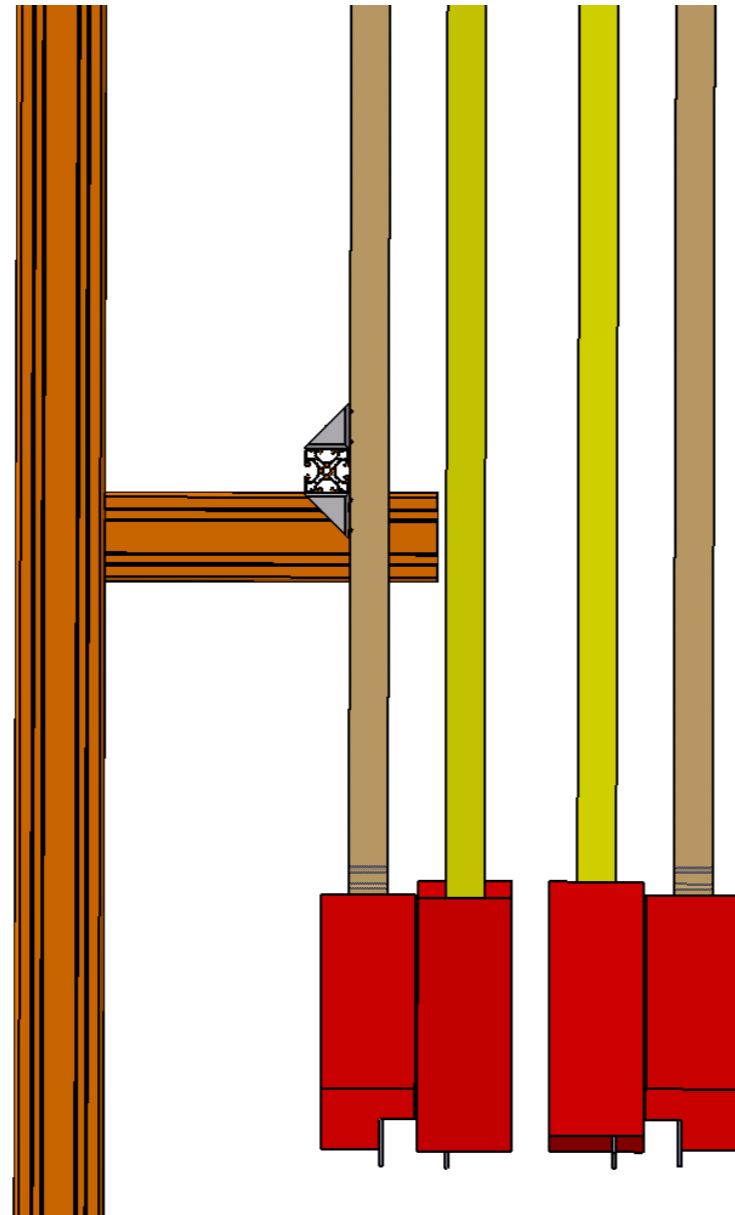
front view

side view

top view (straw level)



plots by Stefan Koch



X (vert.) U (-5deg) V (+5deg) X

Collected data Feb 05-17

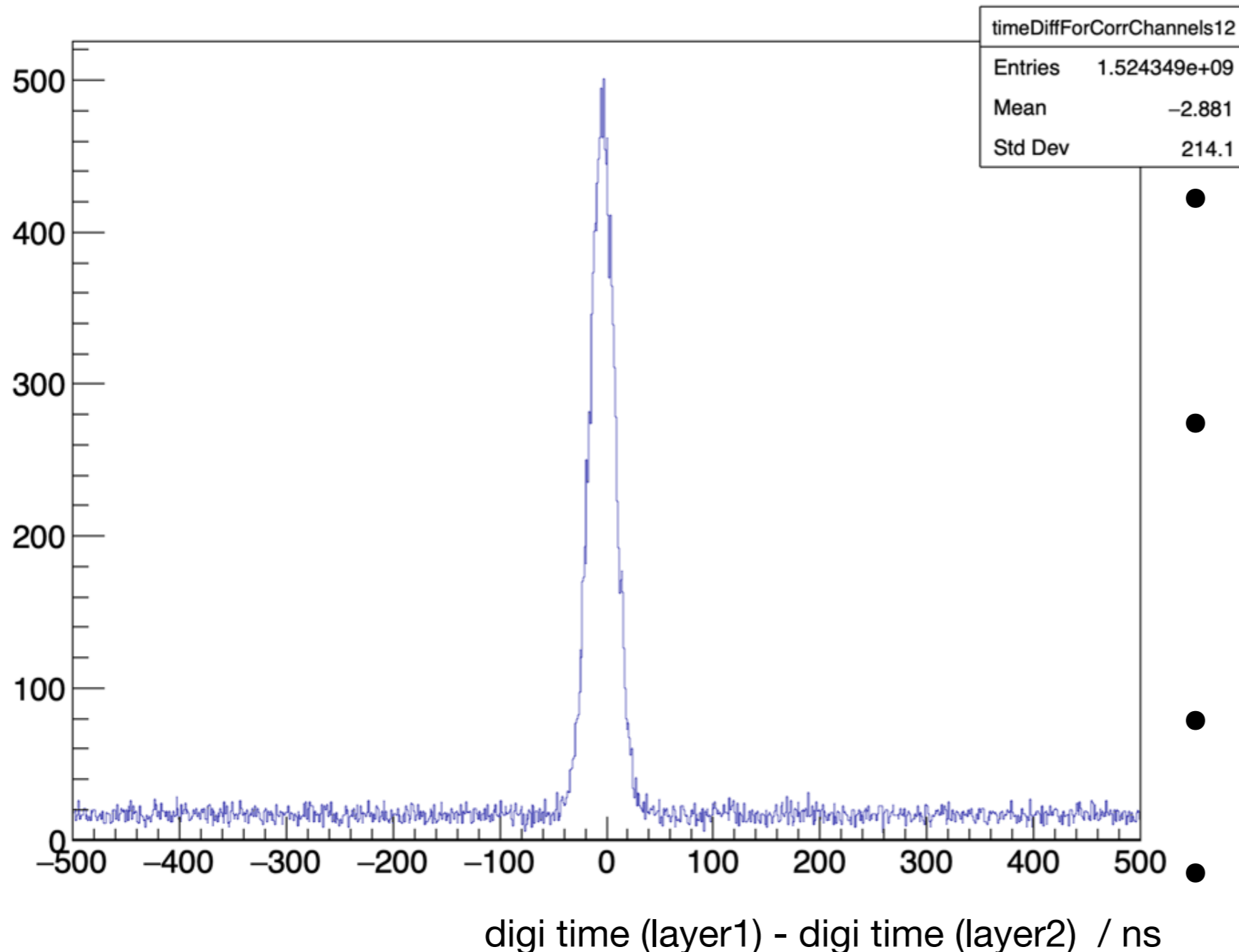
- 63 runs (3424 ... 3545)
- on average 1 hour long (5min ... 100min)

Analyzed data

- run 3536 (100 min), node10 (1/4), process1 (1/2)
- around 12 minutes of beam analyzed

Time correlation X1 vs X2

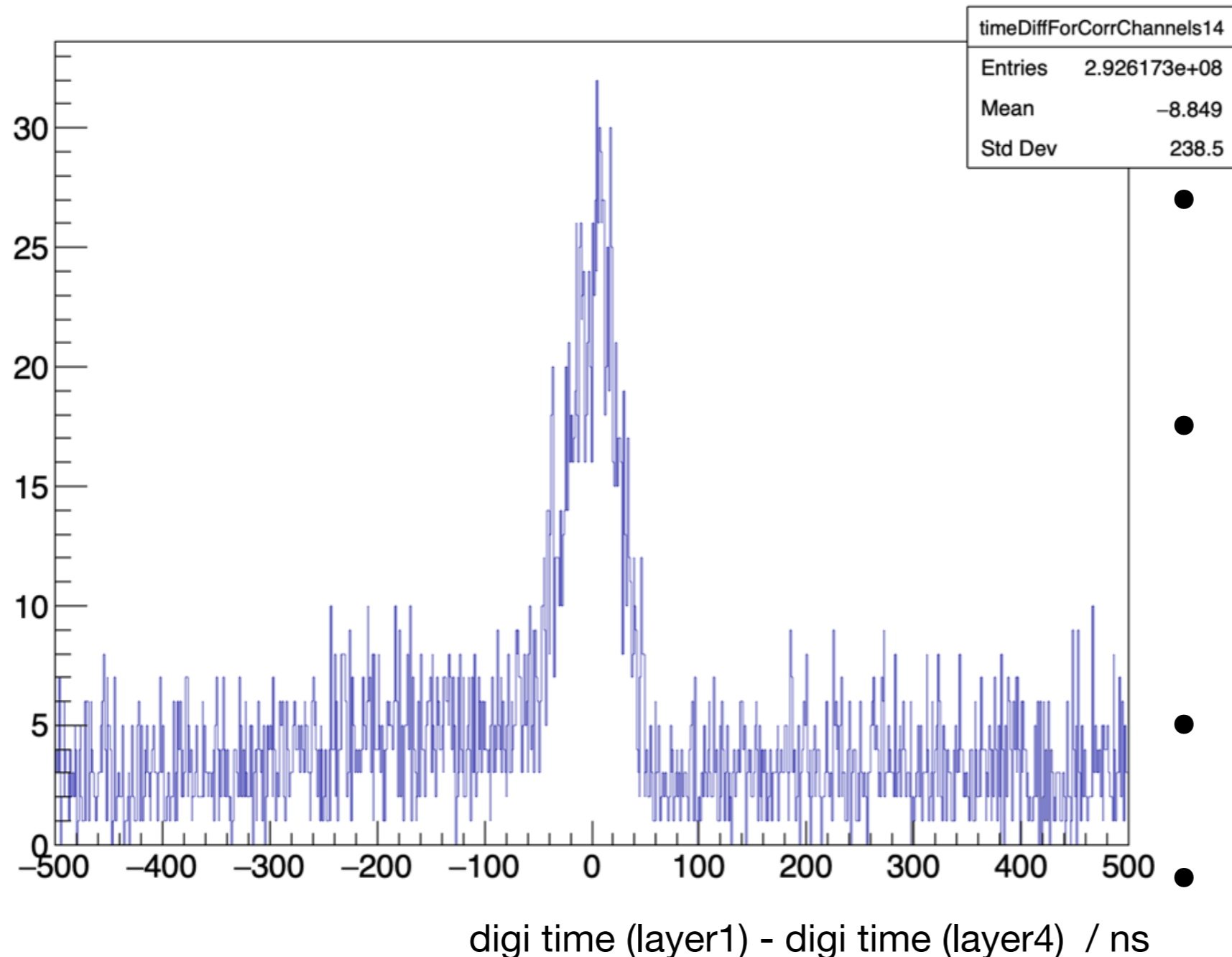
Time difference for digis on layers 1 and 2



- Digis in layer1 and layer2 time correlated
- Center at $\sim -2\text{ns}$
- Full width of $\sim 80\text{ns}$
- Peak height of ~ 500

Time correlation X1 vs U2

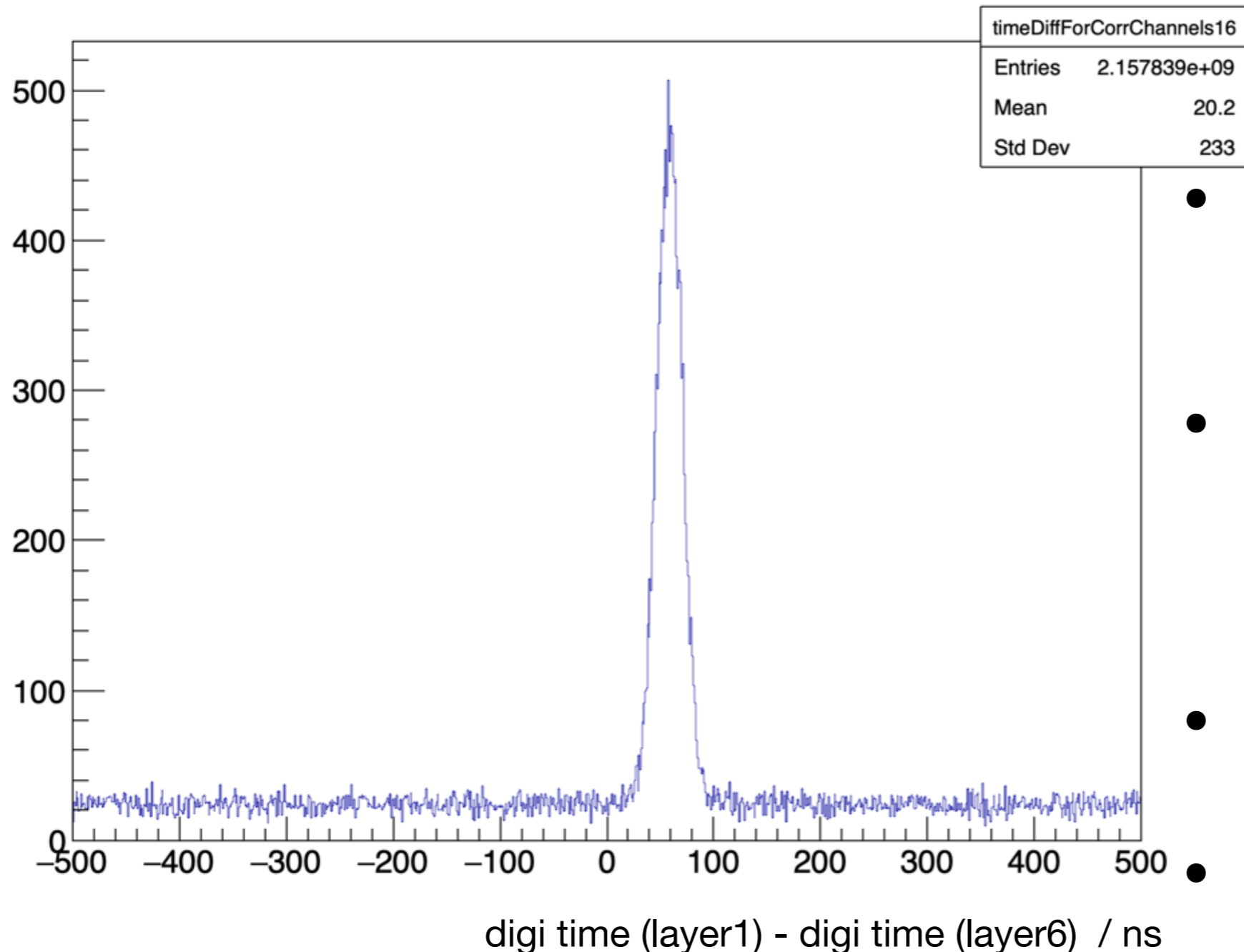
Time difference for digis on layers 1 and 4



- Digis in layer1 and layer4 time correlated
- Center at ~ -2 ns
- Full width of ~ 100 ns
- Peak height of ~ 30

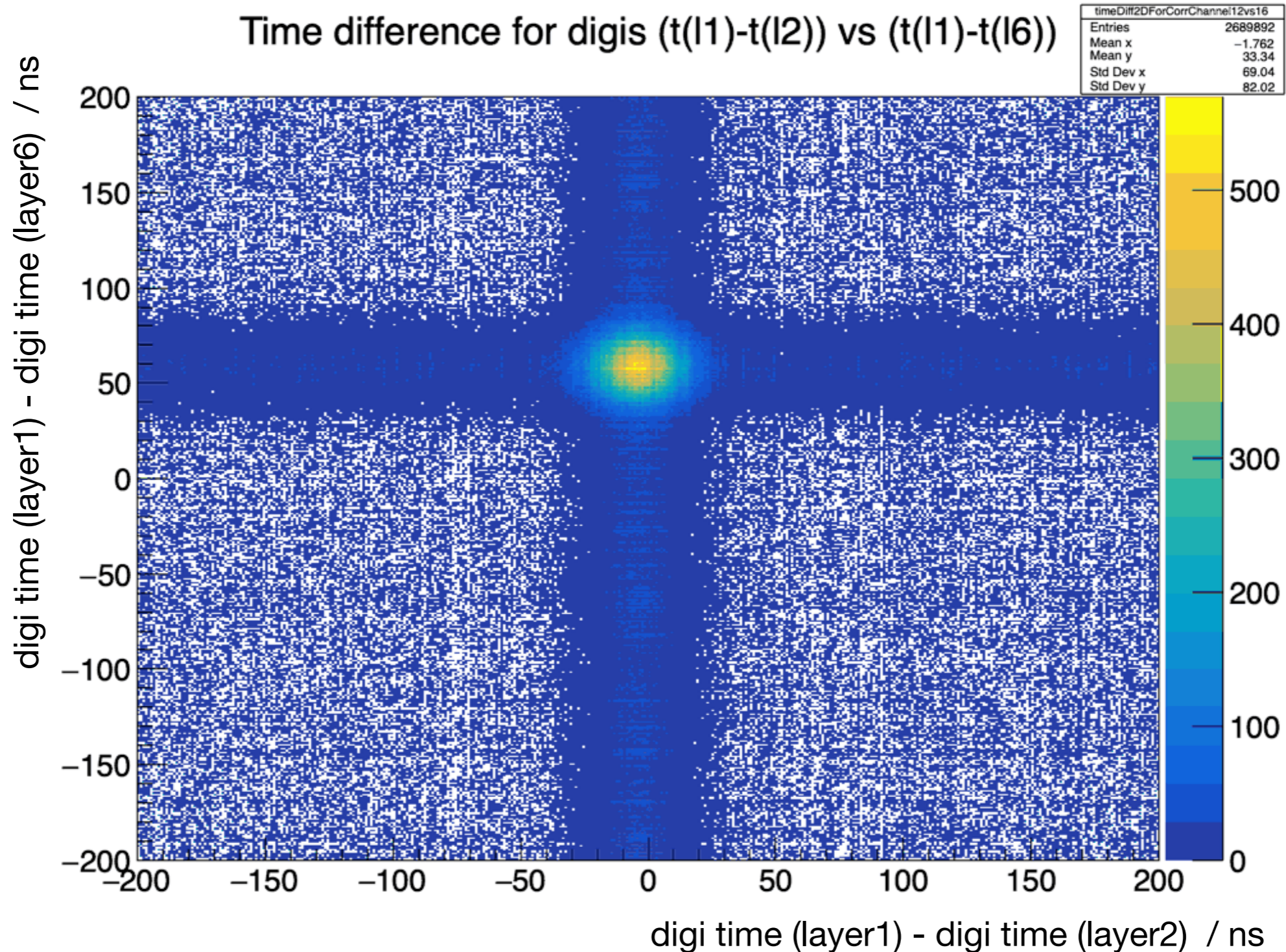
Time correlation X1 vs V2

Time difference for digis on layers 1 and 6



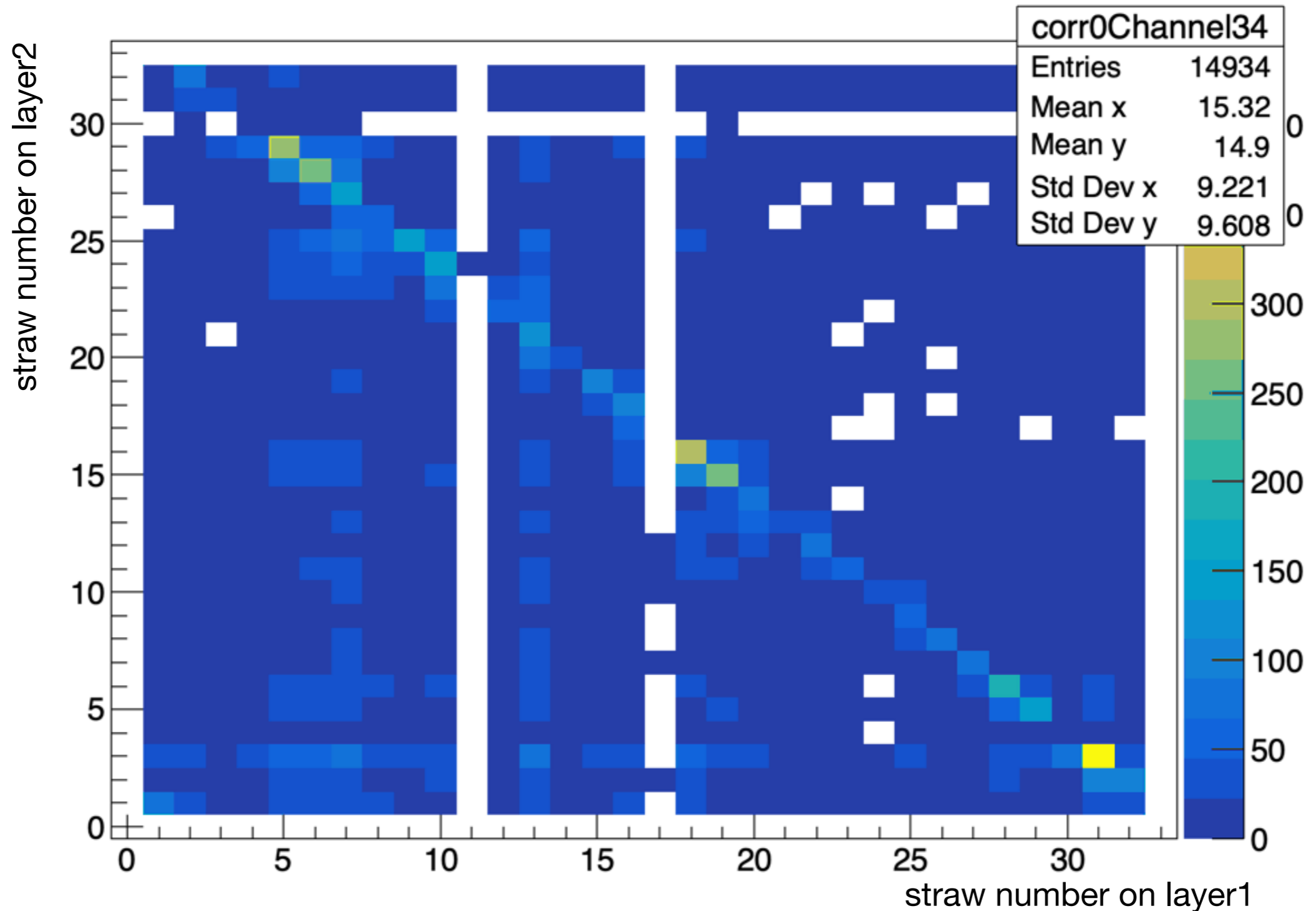
- Digis in layer1 and layer6 time correlated
- Center at ~ 60ns (cable length of ~ 20m???)
- Full width of ~ 80ns
- Peak height of ~ 500

Time correlation 2D



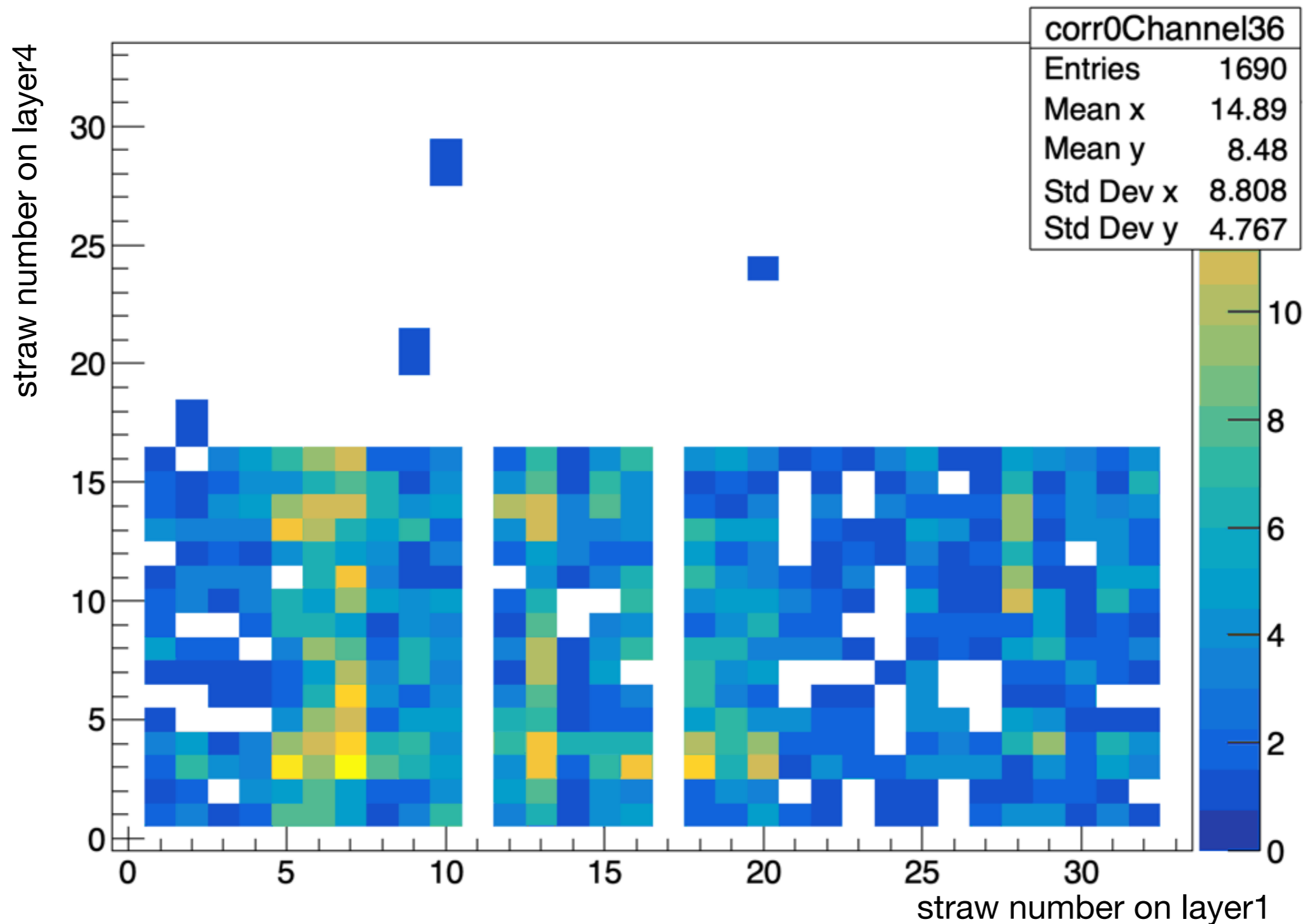
Straw correlation X1 vs X2

Correlation between layers 1 and 2 (time +/-40ns)



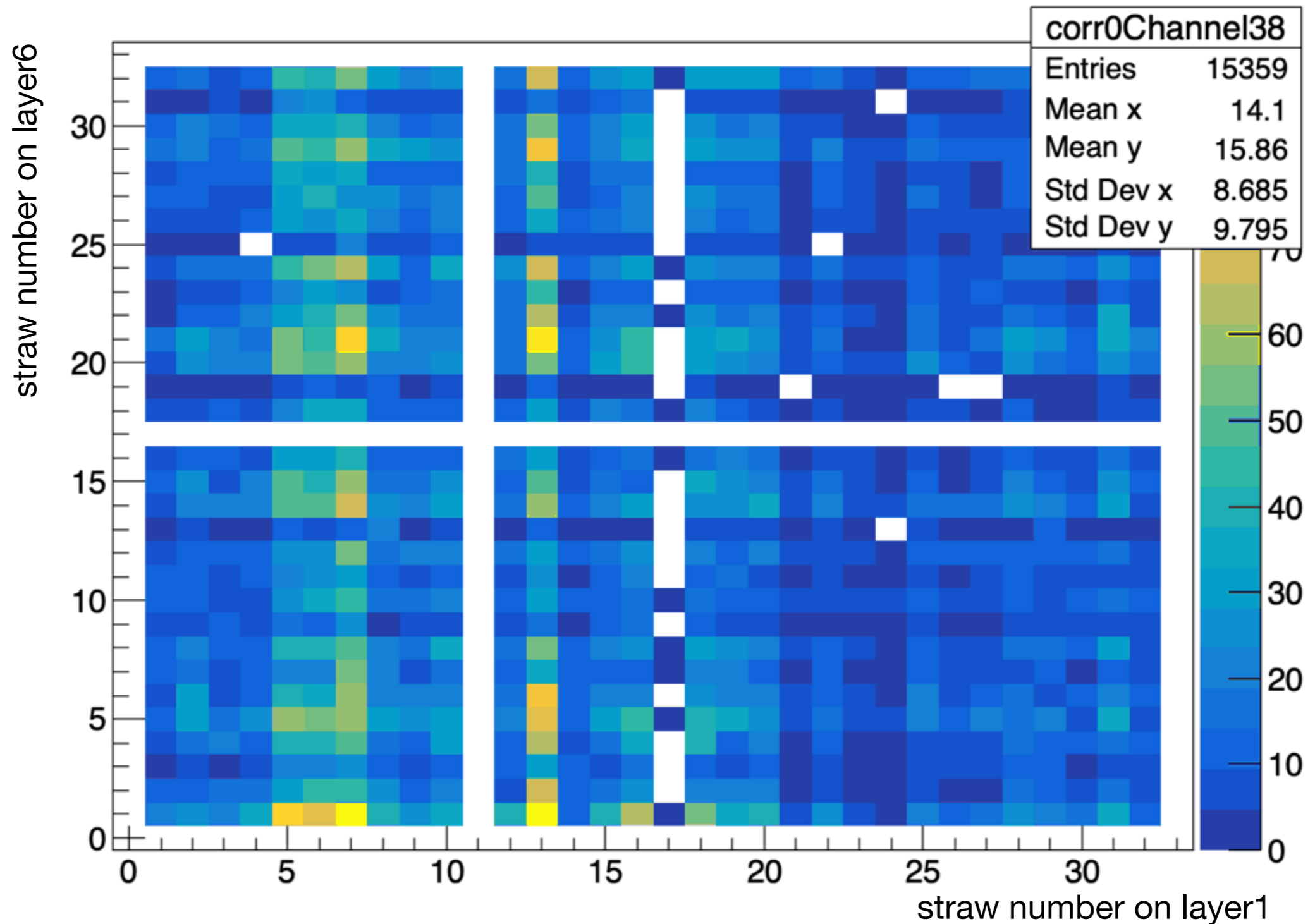
Straw correlation X1 vs U2

Correlation between layers 1 and 4 (time +/-60ns)



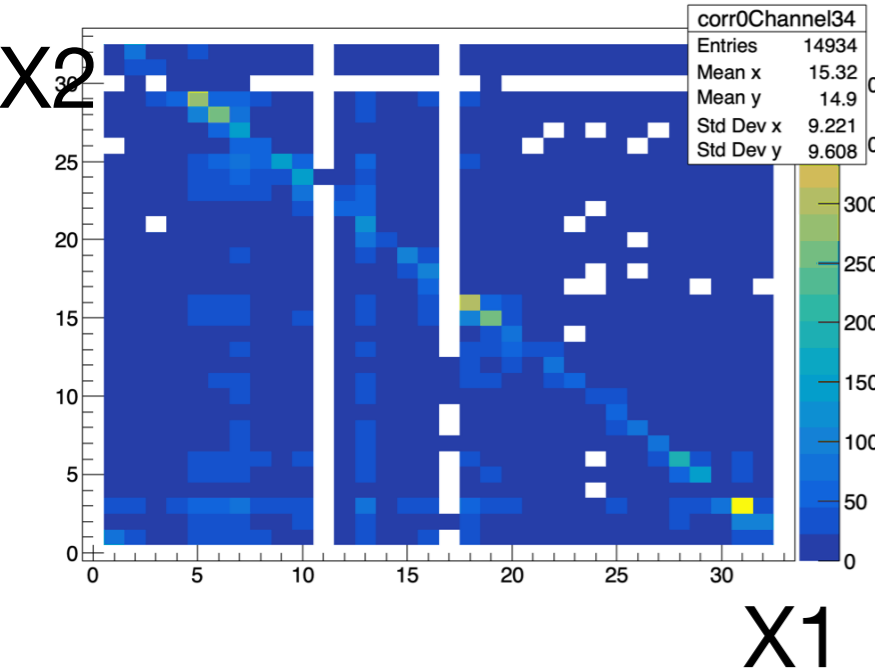
Straw correlation X1 vs V2

Correlation between layers 1 and 6 (time-60 +/-40ns)

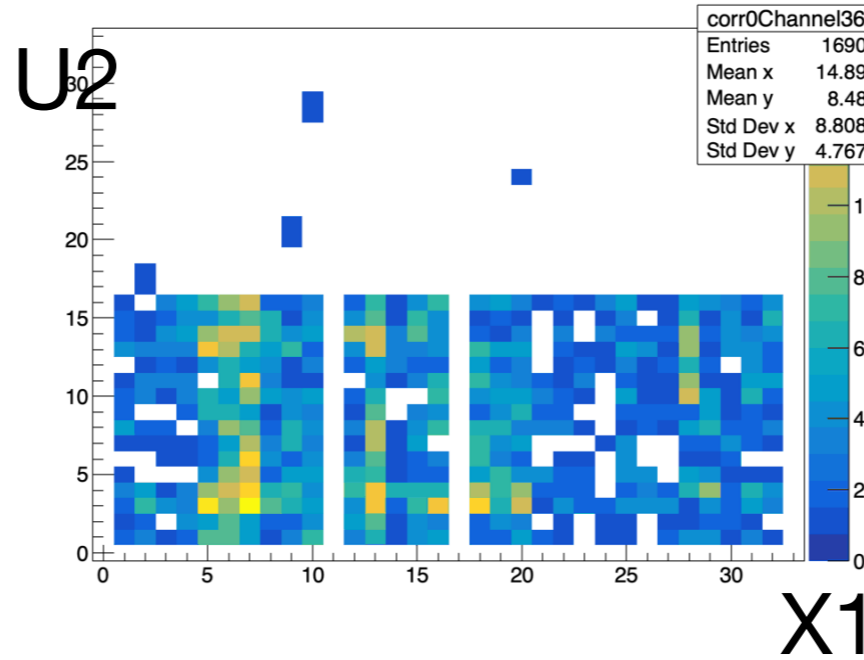


Comparison to simulation

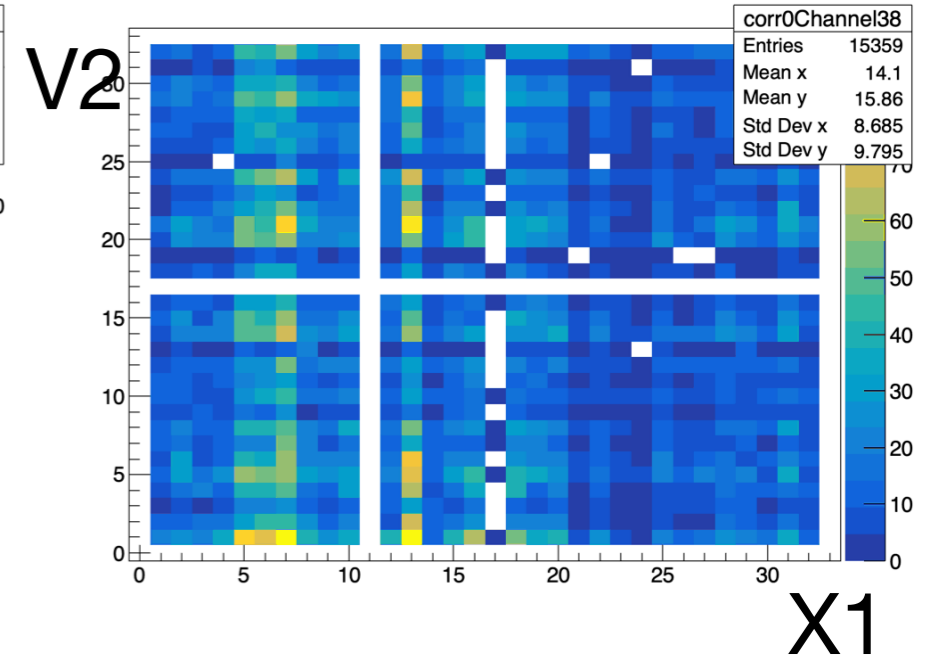
Correlation between layers 1 and 2 (time +40ns)



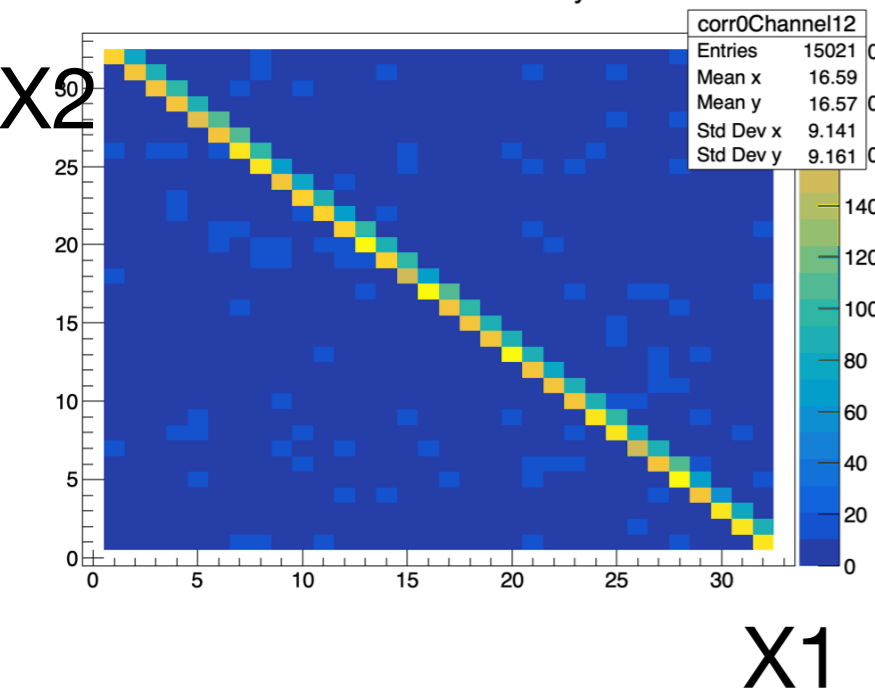
Correlation between layers 1 and 4 (time +60ns)



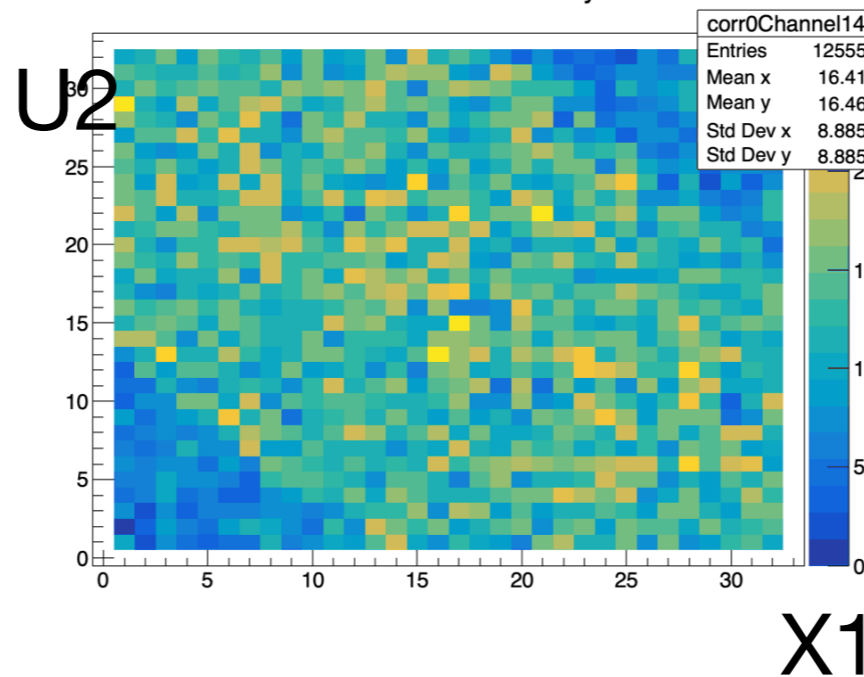
Correlation between layers 1 and 6 (time-60 +40ns)



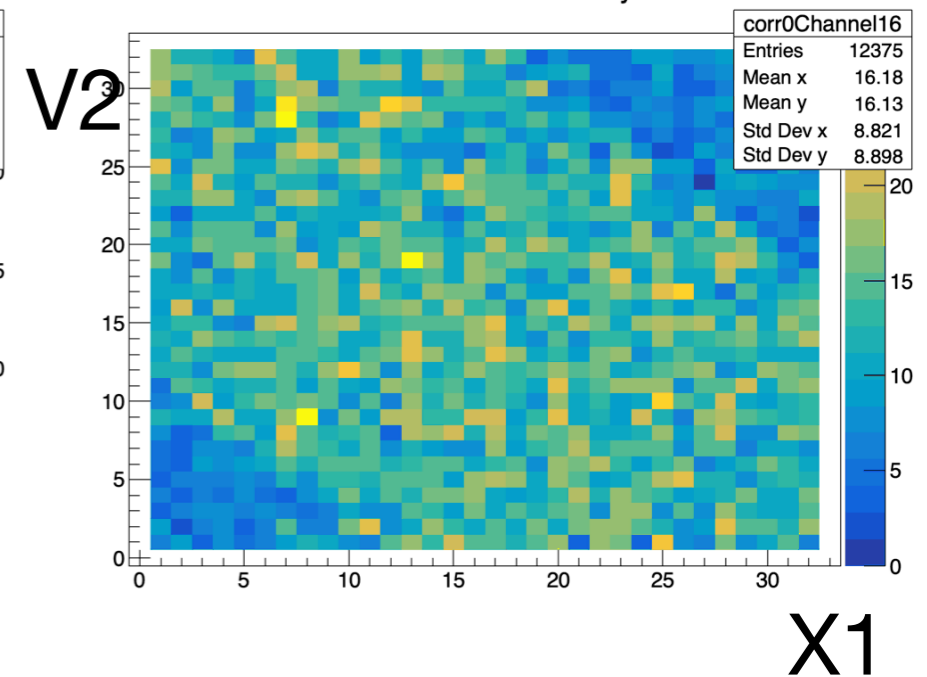
Simulation: Correlation between layers 1 and 2



Simulation: Correlation between layers 1 and 4

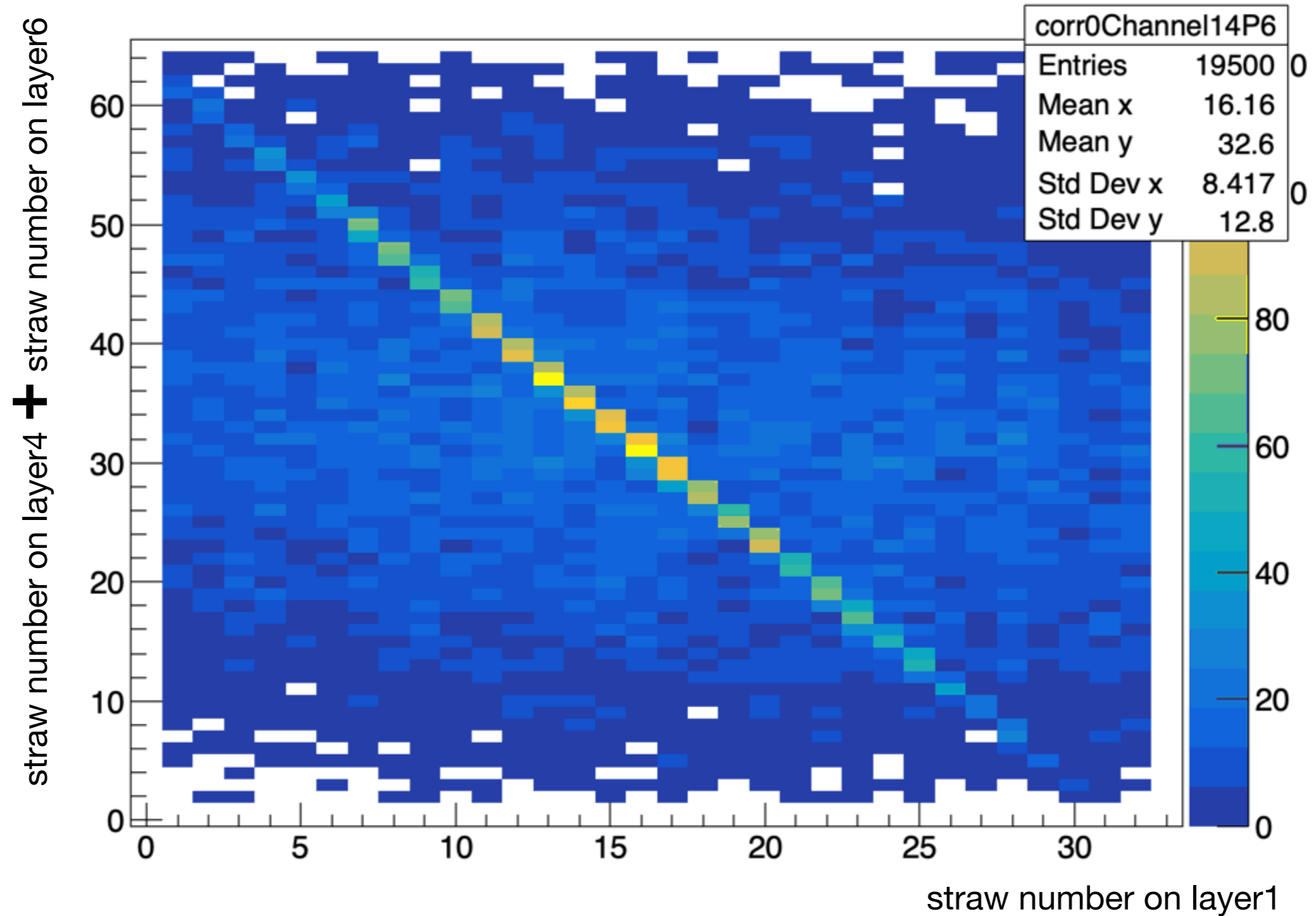


Simulation: Correlation between layers 1 and 6



Simulation

Simulation: Correlation between layers 1 and 4 + 6



~Signal to noise ratio~

$$R_{S/N} = \frac{\text{number of digis with correlation on another layer}}{\text{number of all digis on this layer}}$$

~Signal to noise ratio~

	layer1 X1	layer2 X2	layer4 U2	layer6 V2
#digis	887,930	792,278	153,598	1,121,419
#digis with time-correlated digi on any layer	42,306	37,664	89,203	47,543
percentage	4.76%	4.75%	58.08%	4.24%
#digis with time-correlated digi on other layer	30,472	28,401	4,423	29,132
percentage	3.43%	3.58%	2.87%	2.59%

Number of time correlations

===	layer1 X1	layer2 X2	layer4 U2	layer6 V2
layer1 X1		14940	1443	15359
layer2 X2	14940		1334	13357
layer4 U2	1443	1334		1785
layer6 V2	15359	13357	1785	

~Acceptance x Efficiency~

$$AE = \frac{\text{number of 3 layer correlations}}{\text{number of 2 layer correlations}}$$

~Acceptance x Efficiency~

	X2 U2 V2	X1 U2 V2	X1 X2 V2	X1 X2 U2
3 layer correlation	32	31	378	28
X1X2			14940	14940
			E(V2) = 2.53%	E(U2) = 0.19%
X1U2		1443		1443
		E(V2) = 2.15%		E(X2) = 1.94%
X1V2		15359	15359	
		E(U2) = 0.20%	E(X2) = 2.46%	
X2U2	1334			1334
	E(V2) = 2.40%			E(X1) = 2.10%
X2V2	13357		13357	
	E(U2) = 0.24%		E(X1) = 2.82%	
U2V2	1785	1785		
	E(X2) = 1.79%	E(X1) = 1.74%		

Special thanks to:

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Stefan Koch (PASTA@mCBM visualization)

Abhishek Kumar Sharma (MUST simulations)

Shreya Roy (LHCb OT comparison)

Thank you for attention

Making PASTA at mCBM in 2025 possible:

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- **GSI: R. Karabowicz**
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- **JGU, Krakow: G. Korcyl, B. Sobol**
- **Bose Inst., India: S. Chattopadhyay , Z. Ahammed , S. Chattopadhyay**