HPS Winter 2016 Run Week 3 Update

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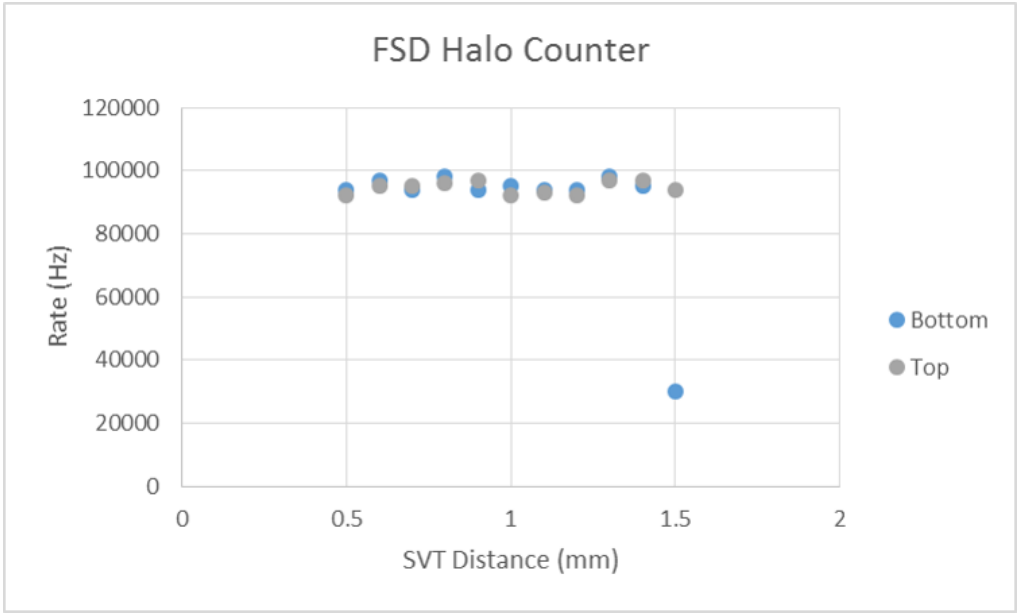
SVT Run Overview

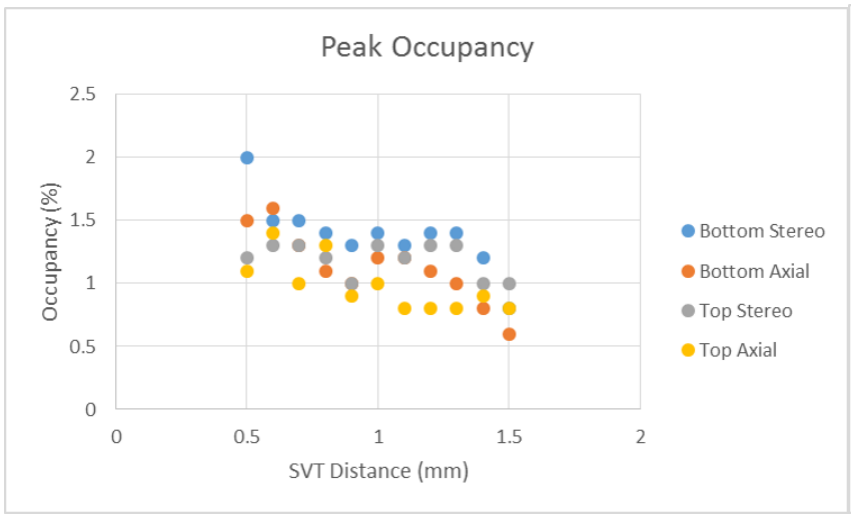
- Successfully timed in late Friday night/Saturday morning (Sho guessed the latency correctly the first time)
- Successfully moved the SVT to 0.5 mm Saturday morning
- Successfully performed APV pulse shape timing studies, HV bias scan for layer 1 hybrids, 8 ns delay scans, trigger scans, and current scans
- Successfully checked tracking with tracking recon monitoring app
  - Track/cluster matching is not great in monitoring app. SVT phase is not correct.
- Decided to perform production runs at the setting Isha $= 70$ and VFS $= 0$ since it showed all around improvement to nominal
- Minor DAQ issues, manual is being updated to try to avoid future problems

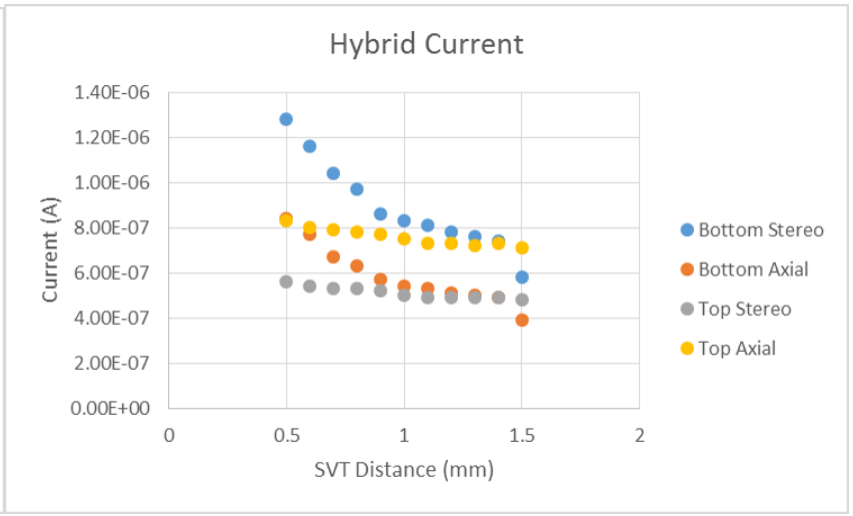
FSD Halo Counter Rates while Lowering SVT

- Note that bottom 1.5 mm was not at 200 nA yet
- Many FSD Halo Counter trips at bottom 0.7 mm. Raised rate limit to 185 kHz.

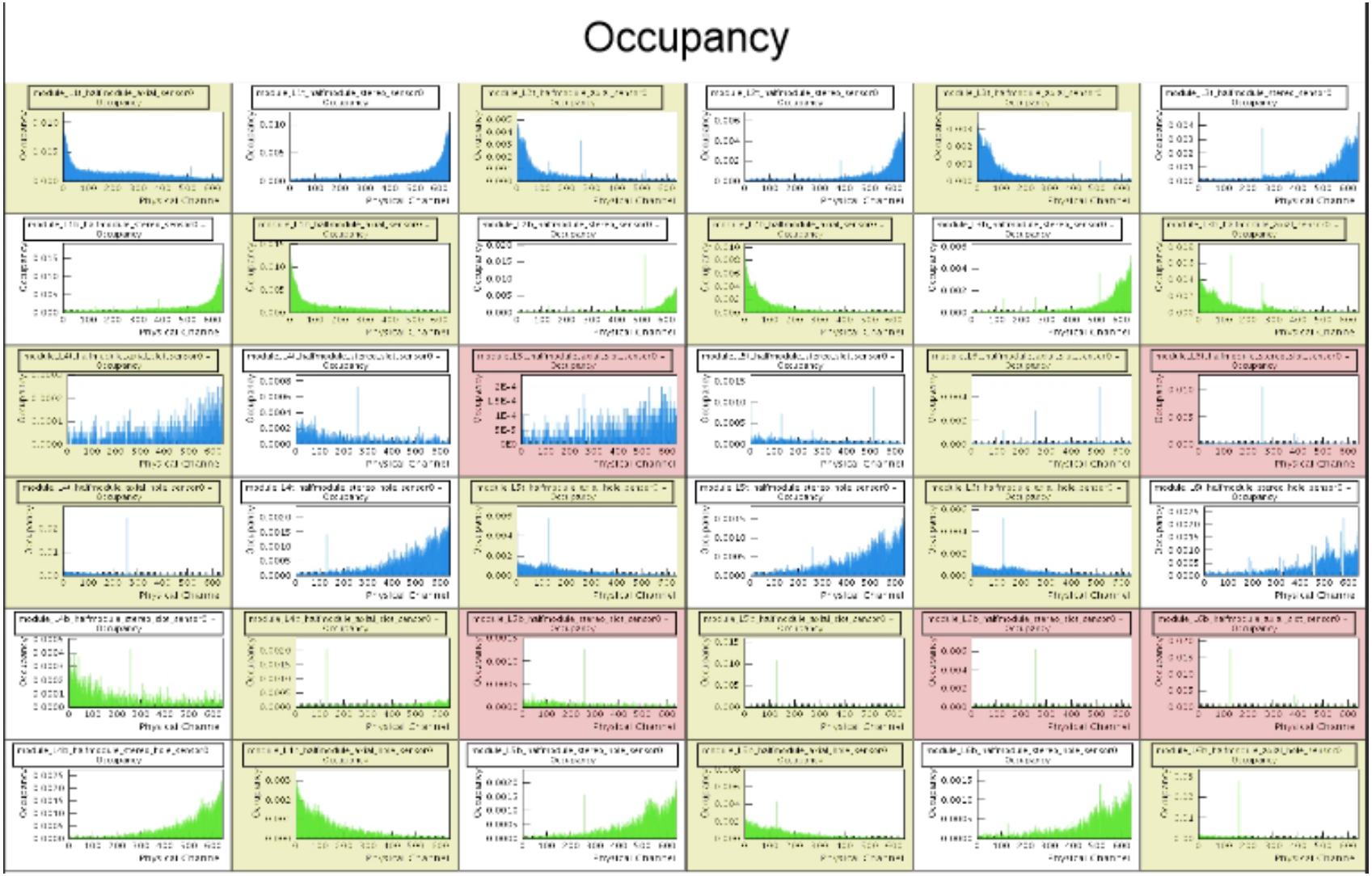


Occupancy and Current While Lowering SVT

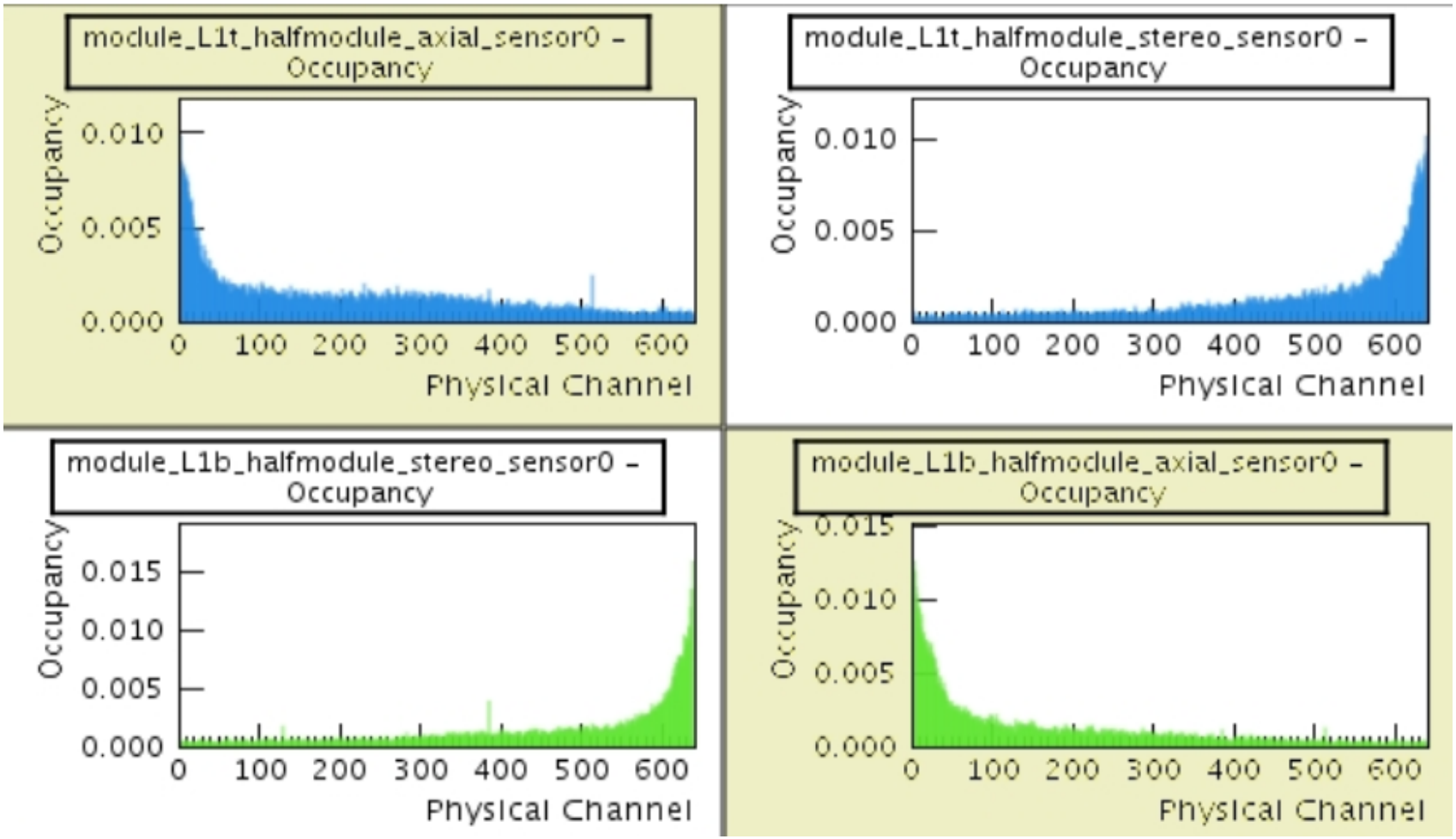




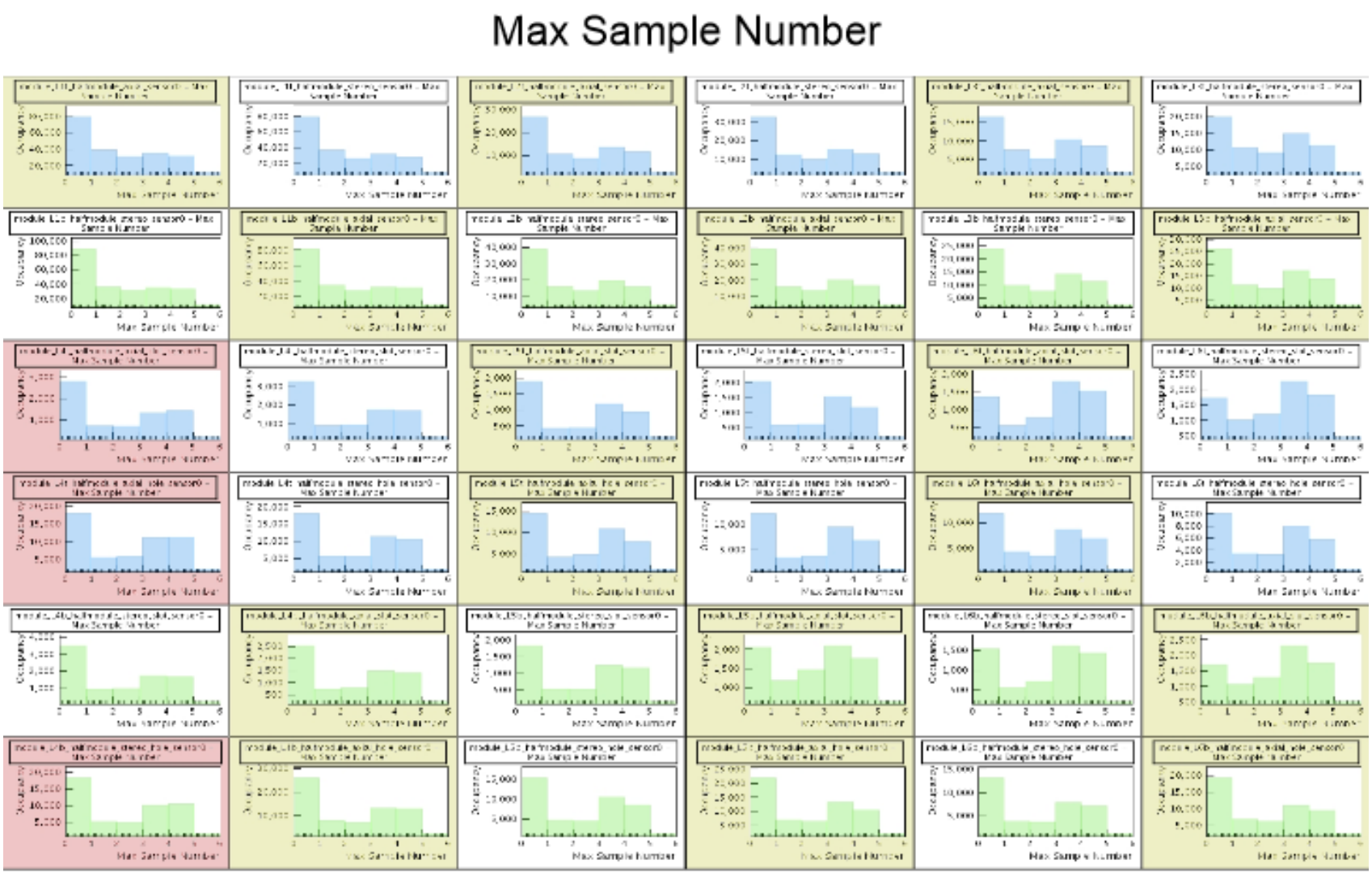
Occupancy 0.5 mm Nominal



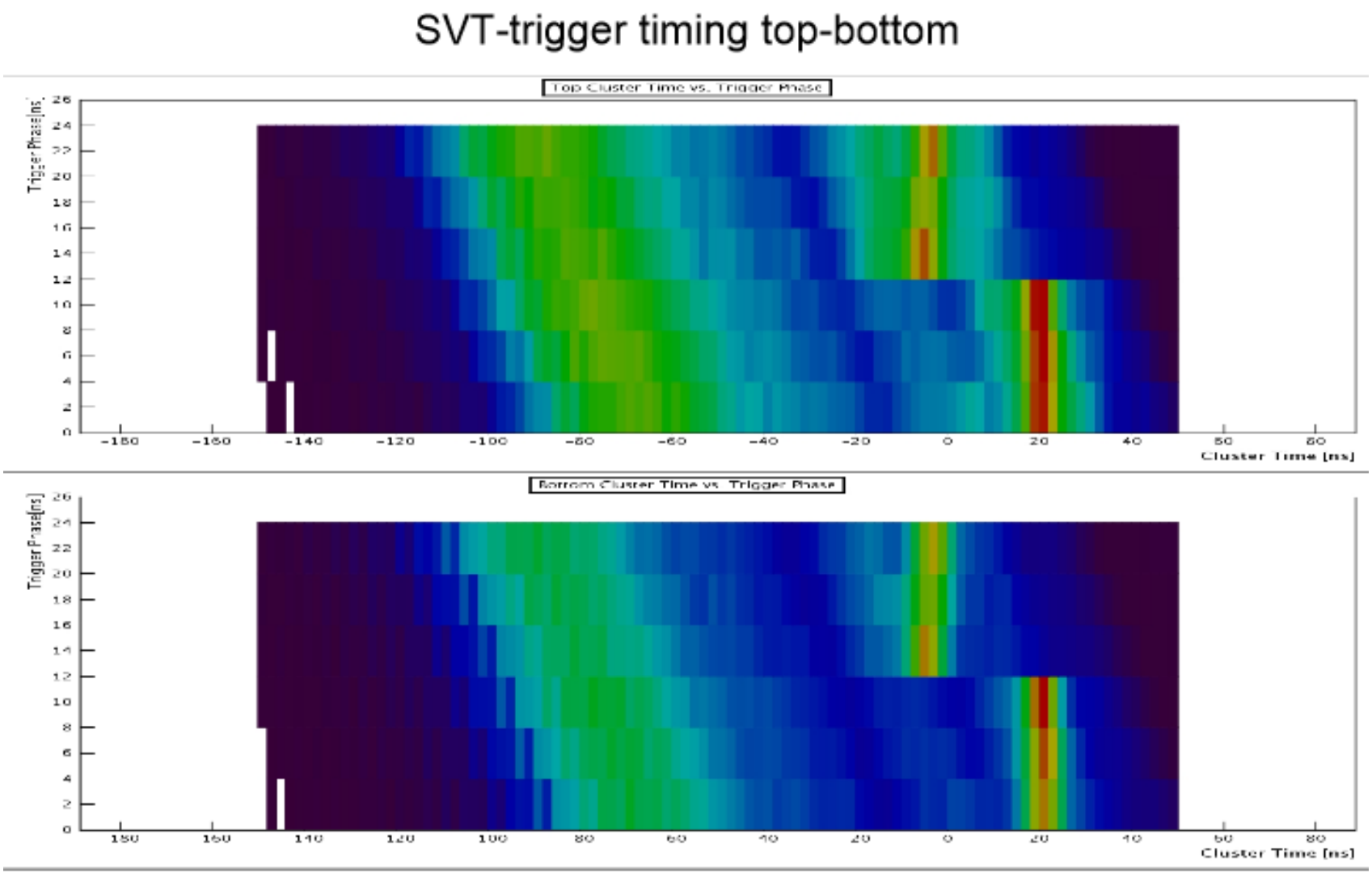
Occupancy 0.5 mm Front Layer Nominal



Max Sample Number 0.5 mm Nominal



SVT Trigger Timing 0.5 mm Nominal



Links to Logbook Plots (SVT at 0.5 mm)

- Isha = 34, VFS = 60 (nominal)
- Isha = 70, VFS = 0
- Isha = 100, VFS = 0
- Isha = 255, VFS = 0
- Several runs dissapeared to tape before I could grab them including the current scans and Isha = 120

Pulse Shape Timing Results

- Isha = 70, VFS = 0 shows overall improvement in SVT performance
  - Pileup reduction and timing resolution improvement
- Results below are the average over all channels and all hybrids (except slot side) of the RMS of track dt histograms in tracking recon monitororing app (about 10000 events)
- There are still things I need to understand about these results

			Real Beam	
Run	Isha	VFS	T0 Res Avg (ns)	Improvement
7373	34	60	3.25	0.0%
7455	70	0	3.07	6.0%
7404	100	0	3.66	-11.1%
7408	120	0		
7456	255	0	3.79	-14.3%

Time Resolution Detailed Results

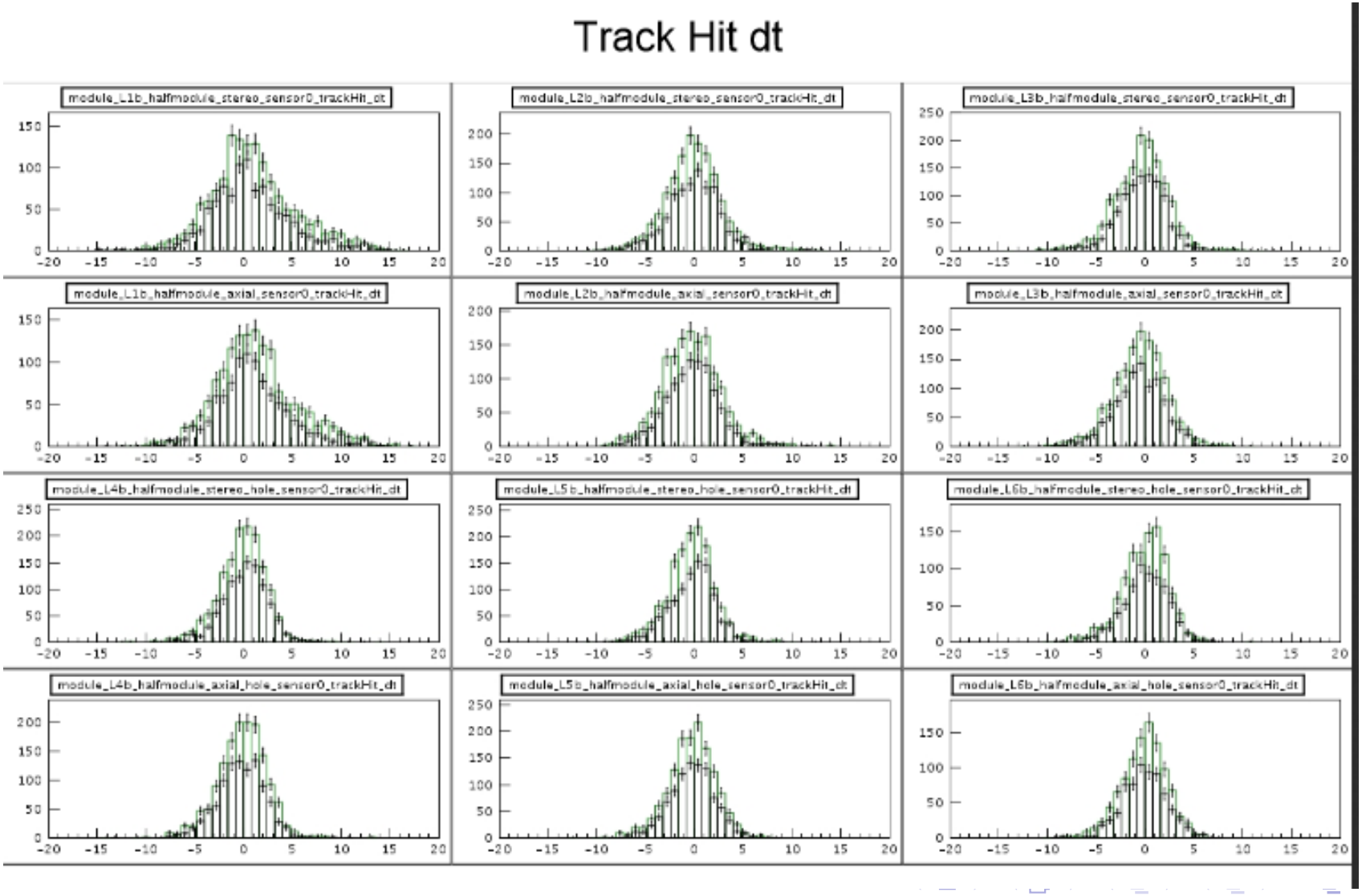
Run	Hybrid			T0 Res (ns)
	Layer	Axial/Stereo	Slot/Hole	
7373 Isha = 34 VFS = 60	1t	Axial	-	4.08
		Stereo	-	4.03
	1b	Axial	-	4.4
		Stereo	-	4.34
	2t	Axial	-	3.14
		Stereo	-	2.98
	2b	Axial	-	3.56
		Stereo	-	3.41
	3t	Axial	-	3
		Stereo	-	3.13
	3b	Axial	-	3.2
		Stereo	-	3.26
	4t	Axial	hole	2.82
		Stereo	hole	3.01
	4b	Axial	hole	3.07
		Stereo	hole	3.08
	5t	Axial	hole	2.9
		Stereo	hole	2.96
	5b	Axial	hole	3.05
		Stereo	hole	2.97
	6t	Axial	hole	2.8
		Stereo	hole	2.93
	6b	Axial	hole	3
		Stereo	hole	2.84

Run	Hybrid			T0 Res (ns)
	Layer	Axial/Stereo	Slot/Hole	
7455 Isha = 70 VFS = 0	1t	Axial	-	3.97
		Stereo	-	3.58
	1b	Axial	-	4.22
		Stereo	-	4.29
	2t	Axial	-	2.97
		Stereo	-	2.95
	2b	Axial	-	3.35
		Stereo	-	3.38
	3t	Axial	-	2.81
		Stereo	-	2.8
	3b	Axial	-	3.12
		Stereo	-	3.12
	4t	Axial	hole	2.68
		Stereo	hole	2.77
	4b	Axial	hole	2.73
		Stereo	hole	2.78
	5t	Axial	hole	2.85
		Stereo	hole	2.74
	5b	Axial	hole	2.91
		Stereo	hole	2.99
	6t	Axial	hole	2.69
		Stereo	hole	2.64
	6b	Axial	hole	2.65
		Stereo	hole	2.57

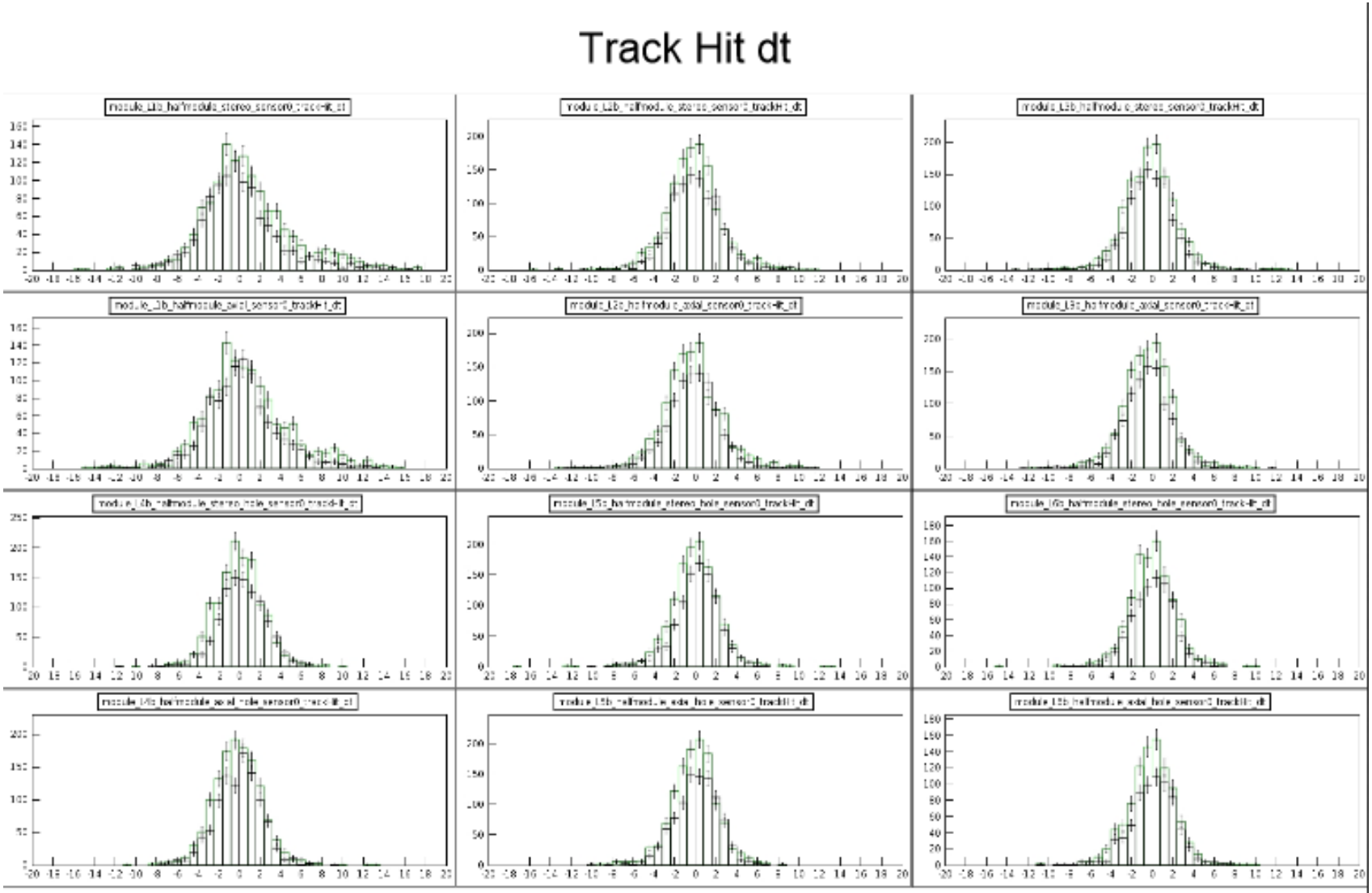
Time Resolution Detailed Results Continued)

Run	Hybrid			T0 Res (ns)	Run	Hybrid			T0 Res (ns)
	Layer	Axial/Stereo	Slot/Hole			Layer	Axial/Stereo	Slot/Hole	
7404 Isha = 100 VFS = 0	1t	Axial	-	4.17	**7456 Isha = 255 VFS = 0**	1t	Axial	-	4.22
		Stereo	-	4.13			Stereo	-	3.98
	1b	Axial	-	4.68		1b	Axial	-	4.12
		Stereo	-	4.7			Stereo	-	4.14
	2t	Axial	-	3.31		2t	Axial	-	3.67
		Stereo	-	3.45			Stereo	-	3.77
	2b	Axial	-	3.72		2b	Axial	-	3.84
		Stereo	-	4.07			Stereo	-	3.8
	3t	Axial	-	3.34		3t	Axial	-	3.73
		Stereo	-	3.25			Stereo	-	3.82
	3b	Axial	-	3.79		3b	Axial	-	3.92
		Stereo	-	3.73			Stereo	-	3.88
	4t	Axial	hole	3.92		4t	Axial	hole	3.57
		Stereo	hole	3.22			Stereo	hole	3.49
	4b	Axial	hole	3.48		4b	Axial	hole	3.62
		Stereo	hole	3.6			Stereo	hole	3.54
	5t	Axial	hole	3.48		5t	Axial	hole	4.1
		Stereo	hole	3.39			Stereo	hole	3.85
	5b	Axial	hole	3.4		5b	Axial	hole	3.91
		Stereo	hole	3.6			Stereo	hole	3.75
	6t	Axial	hole	3.06		6t	Axial	hole	3.56
		Stereo	hole	3.31			Stereo	hole	3.46
	6b	Axial	hole	3.42		6b	Axial	hole	3.69
		Stereo	hole	3.51			Stereo	hole	3.59
T0 Res Avg				**3.66**	**T0 Res Avg**				**3.79**

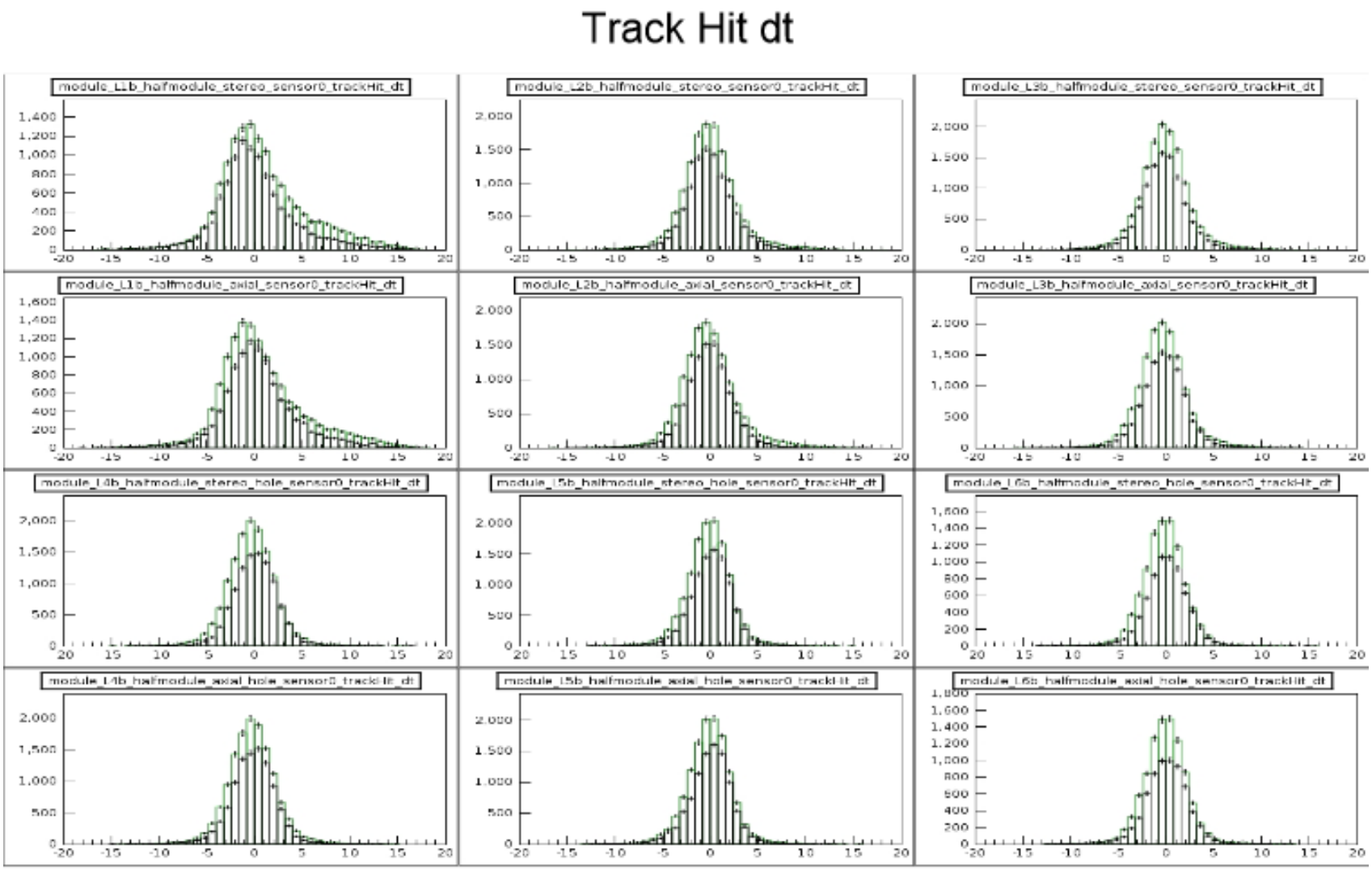
Isha = 34, VFS = 60 Tracking Time Resolution



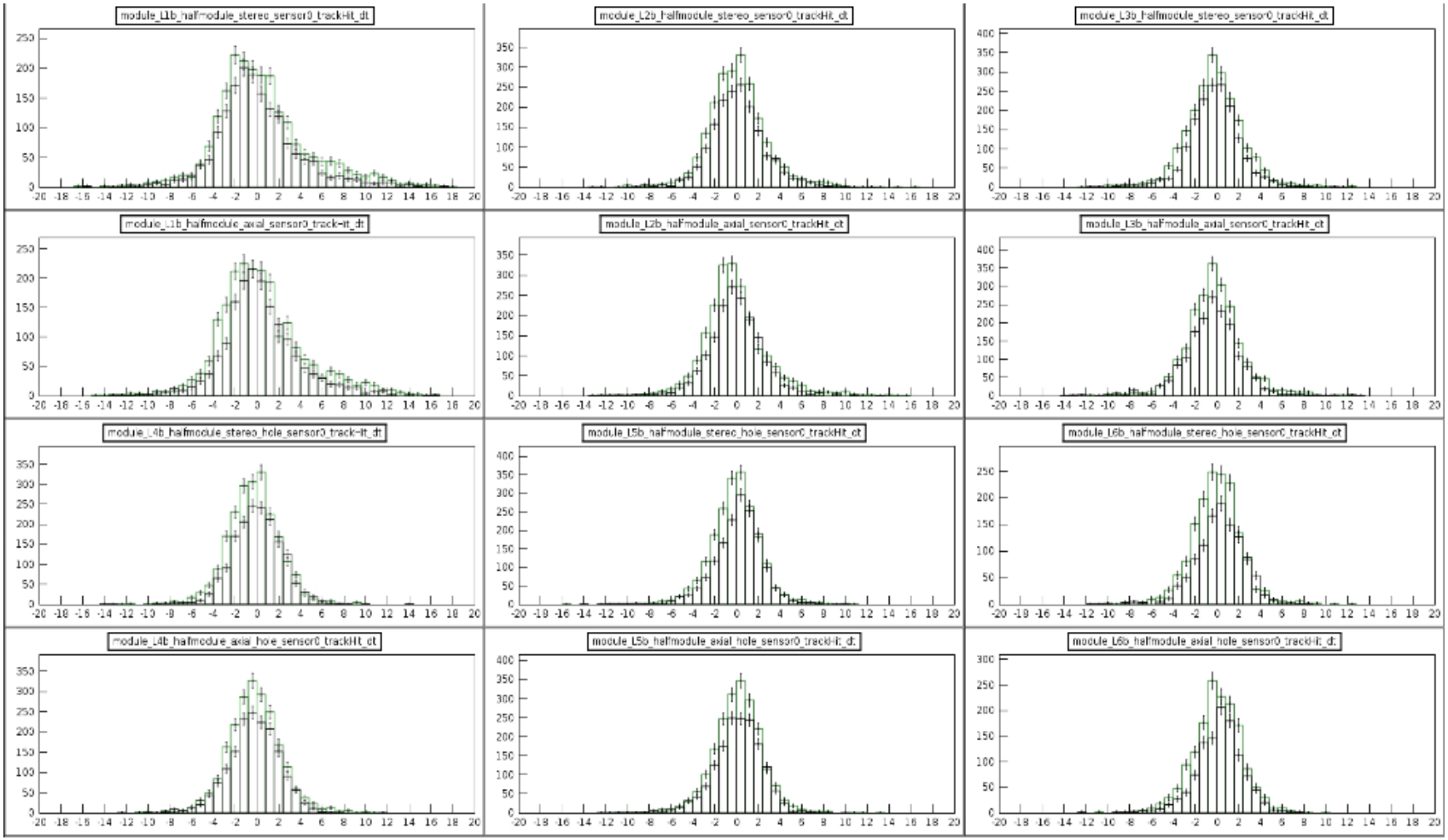
Isha = 70, VFS = 0 Tracking Time Resolution



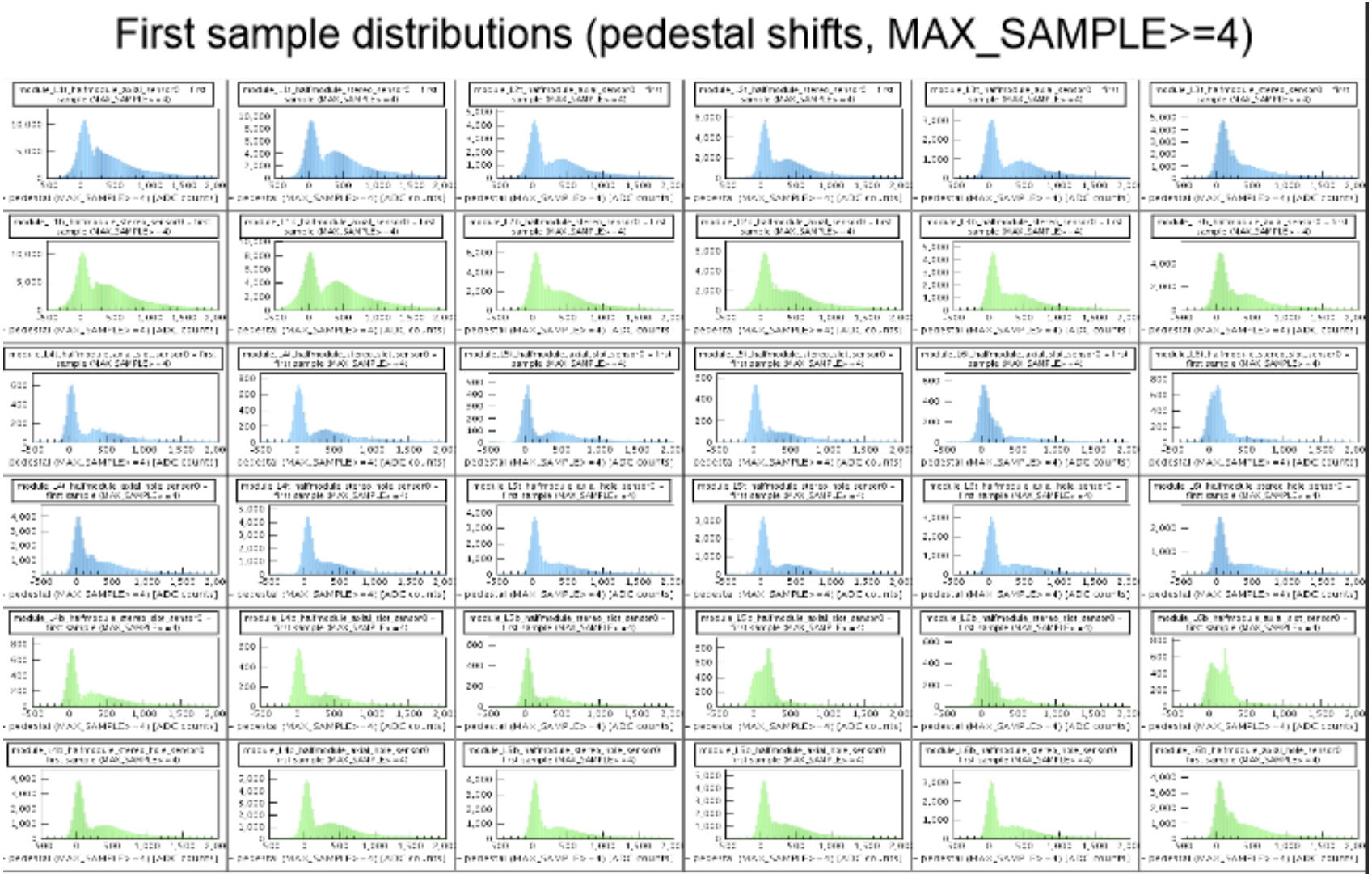
Isha = 100, VFS = 0 Tracking Time Resolution



Isha = 255, VFS = 0 Tracking Time Resolution

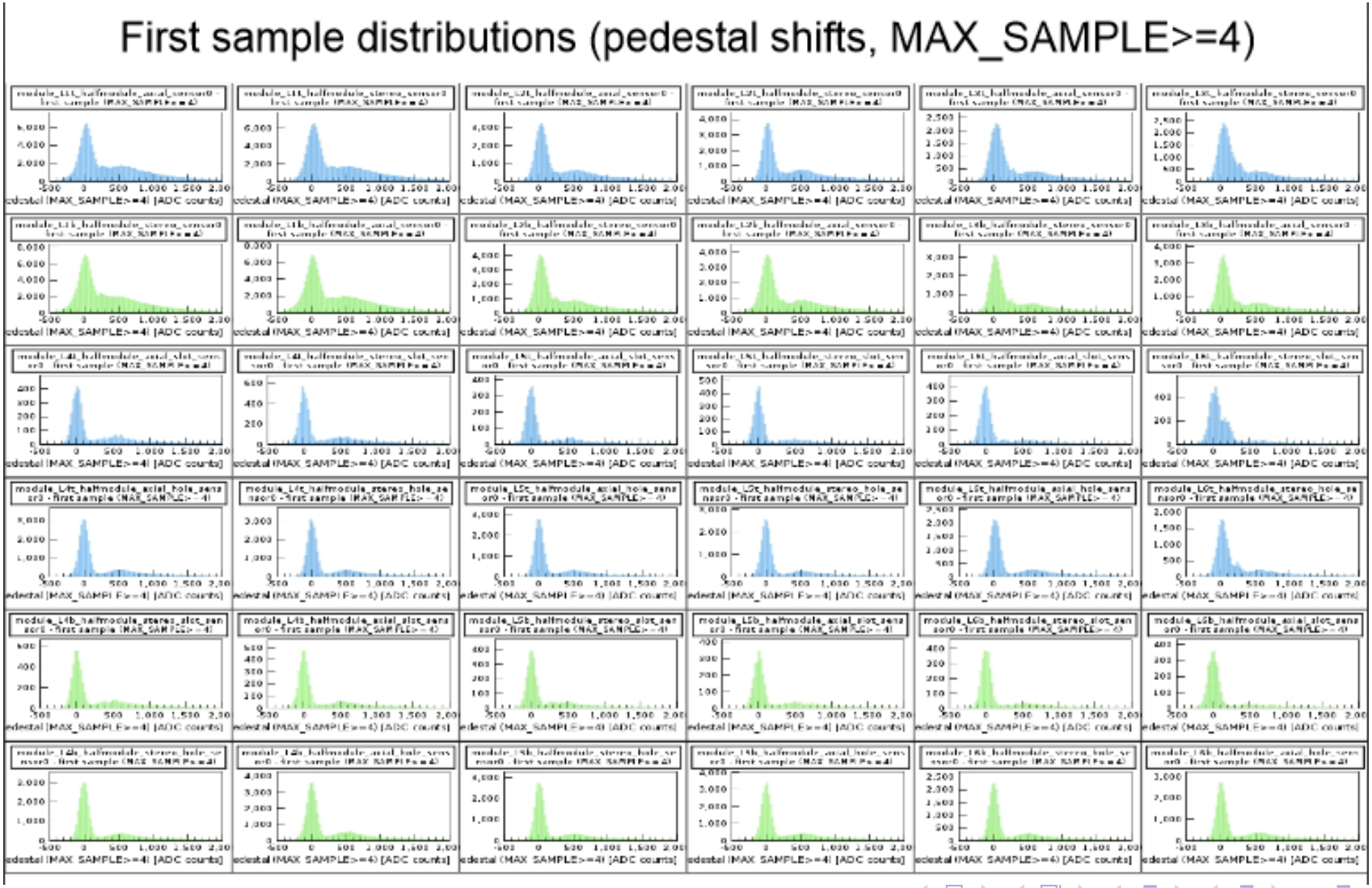


Isha = 34, VFS = 60 Pileup

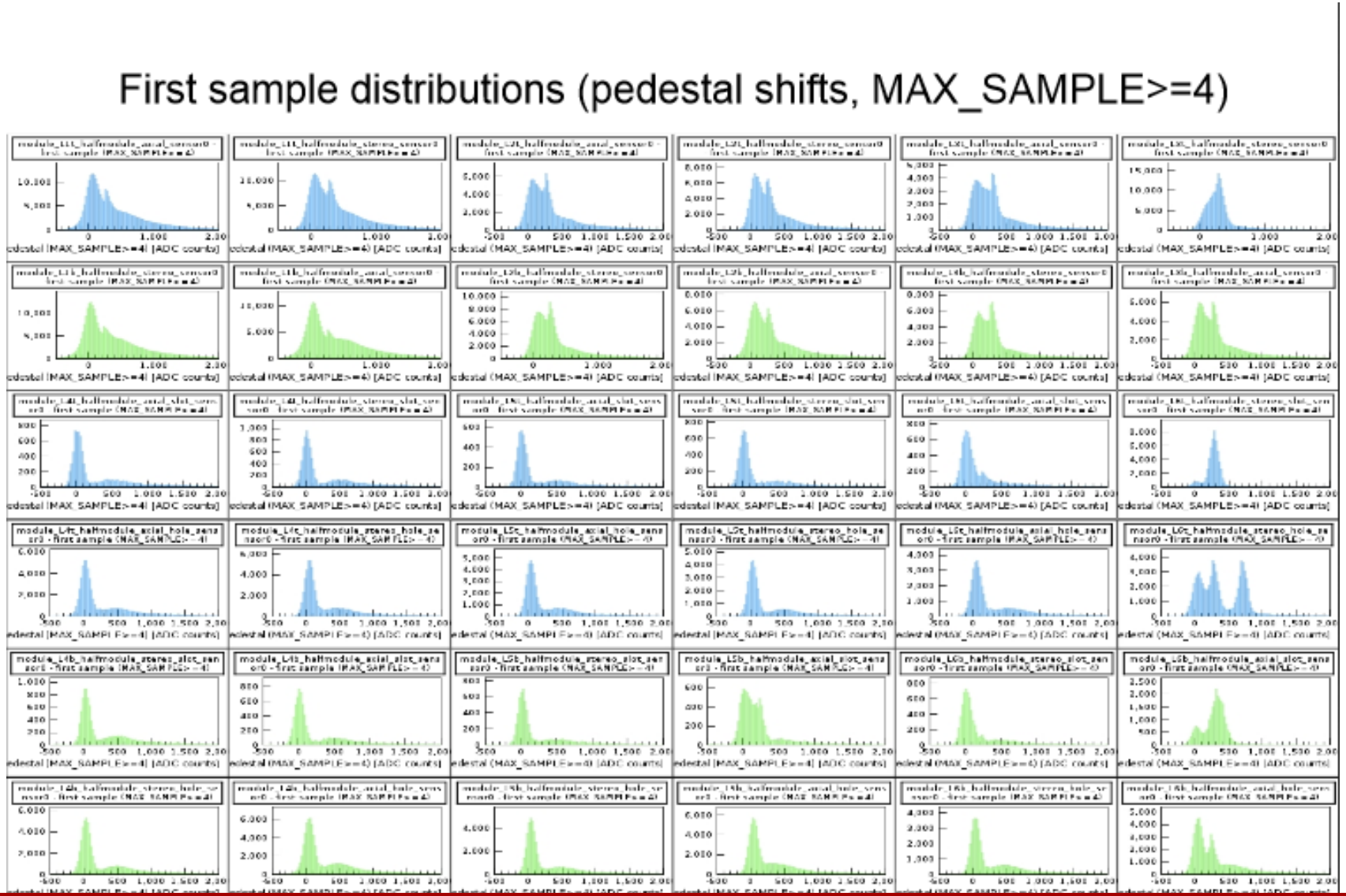


Isha = 70, VFS = 0 Pileup

Isha = 100, VFS = 0 Pileup



Isha = 255, VFS = 0 Pileup



Things to Do

- Sample 0 Layer 1 pedestal shifts
- Understand 8 ns. latency scans
- More careful analysis of pulse shape parameters
- Analyze current scans
- Continue looking at the strange L6 channels