HCal Tile Testing Status

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SiPM shipments

- We classify our received SiPM shipments into 3 groups

Group	Shipment date	Notes
A	July 2015	matched pair for dual readout rectangular test panel
B	October 2015	3 SiPMs mounted, 1 outer and 2 inner HCal tiles
C	March 2016	5 SiPMs unmounted, 7 outer HCal tiles

- SiPM inventory

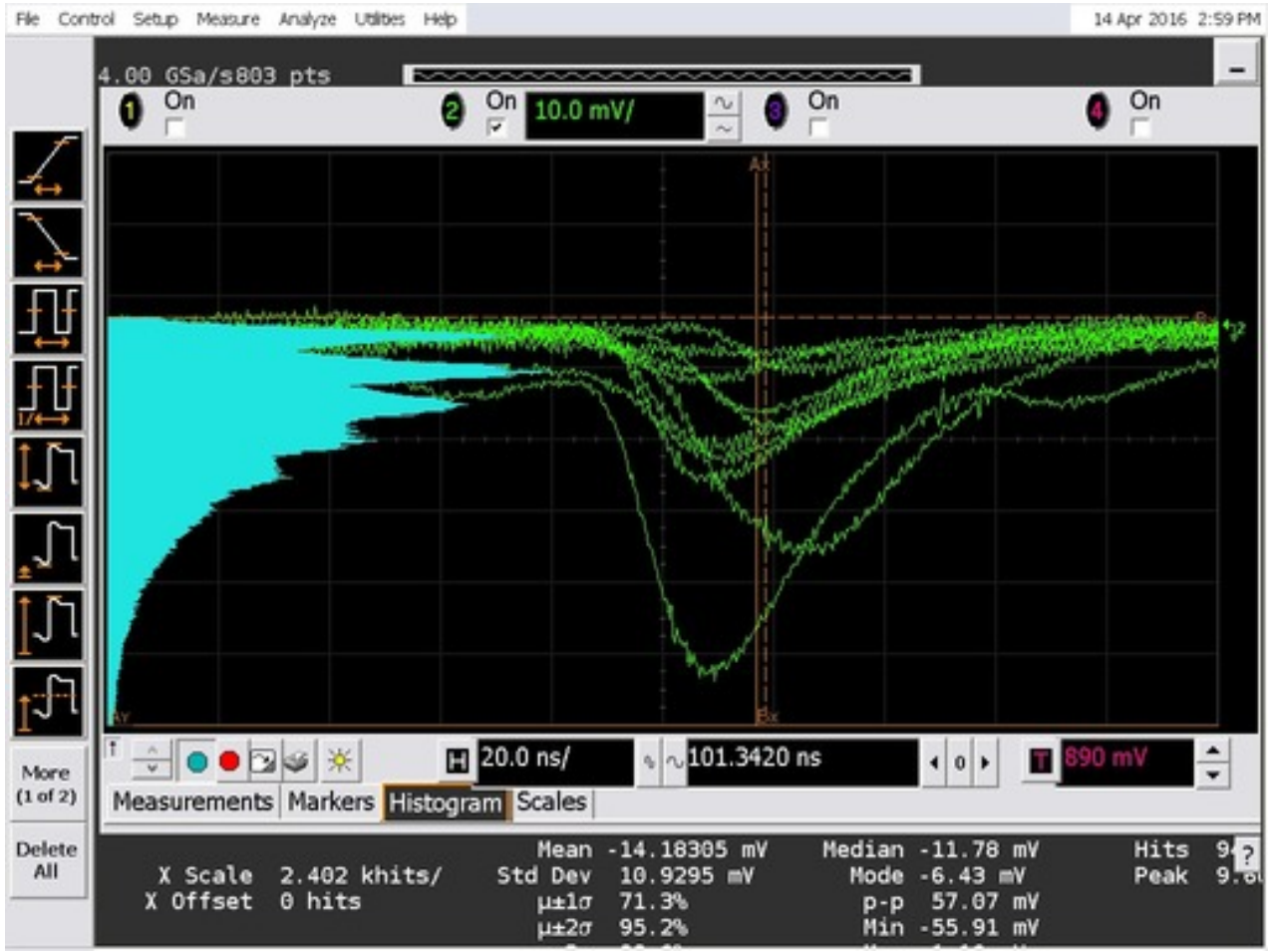
Group	Model number	Serial number
A	S12572-025P	2116
A	S12572-025P	2120
B	S12572-025P	3168
B	S12572-025P	3172
B	S12572-025P	3173
C	Unknown	927
C	Unknown	965
C	Unknown	972
C	Unknown	973
C	Unknown	992

SiPM shipments

- Previous shipments (groups A and B) from BNL included detailed info for each SiPM: model number, recommended operating voltage, gain, dark current, etc

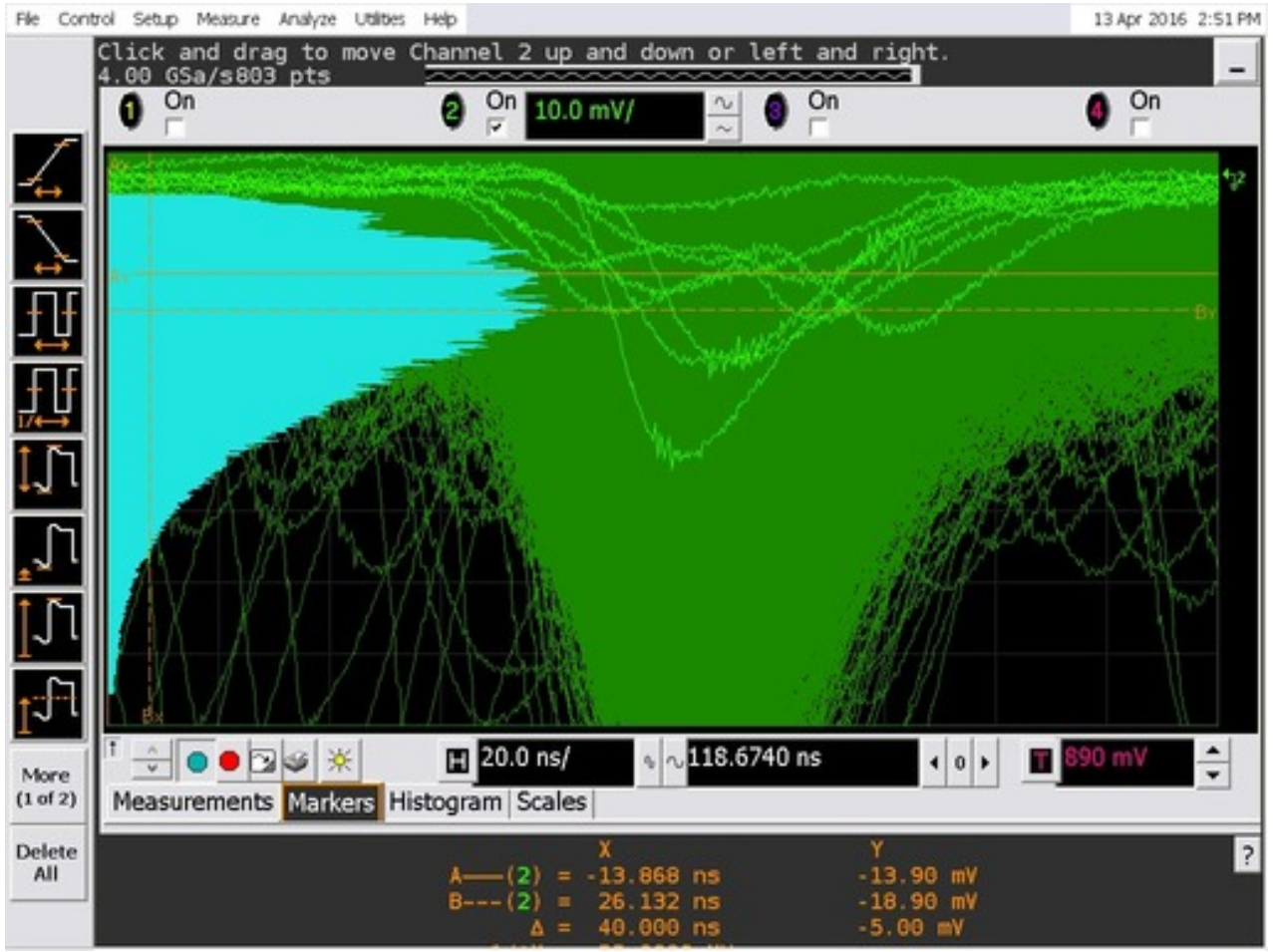
- This shipment (group C) had all 5 SiPMs (for 7 tiles) tossed into the same bag with no additional information

SiPM single PE peaks, group A



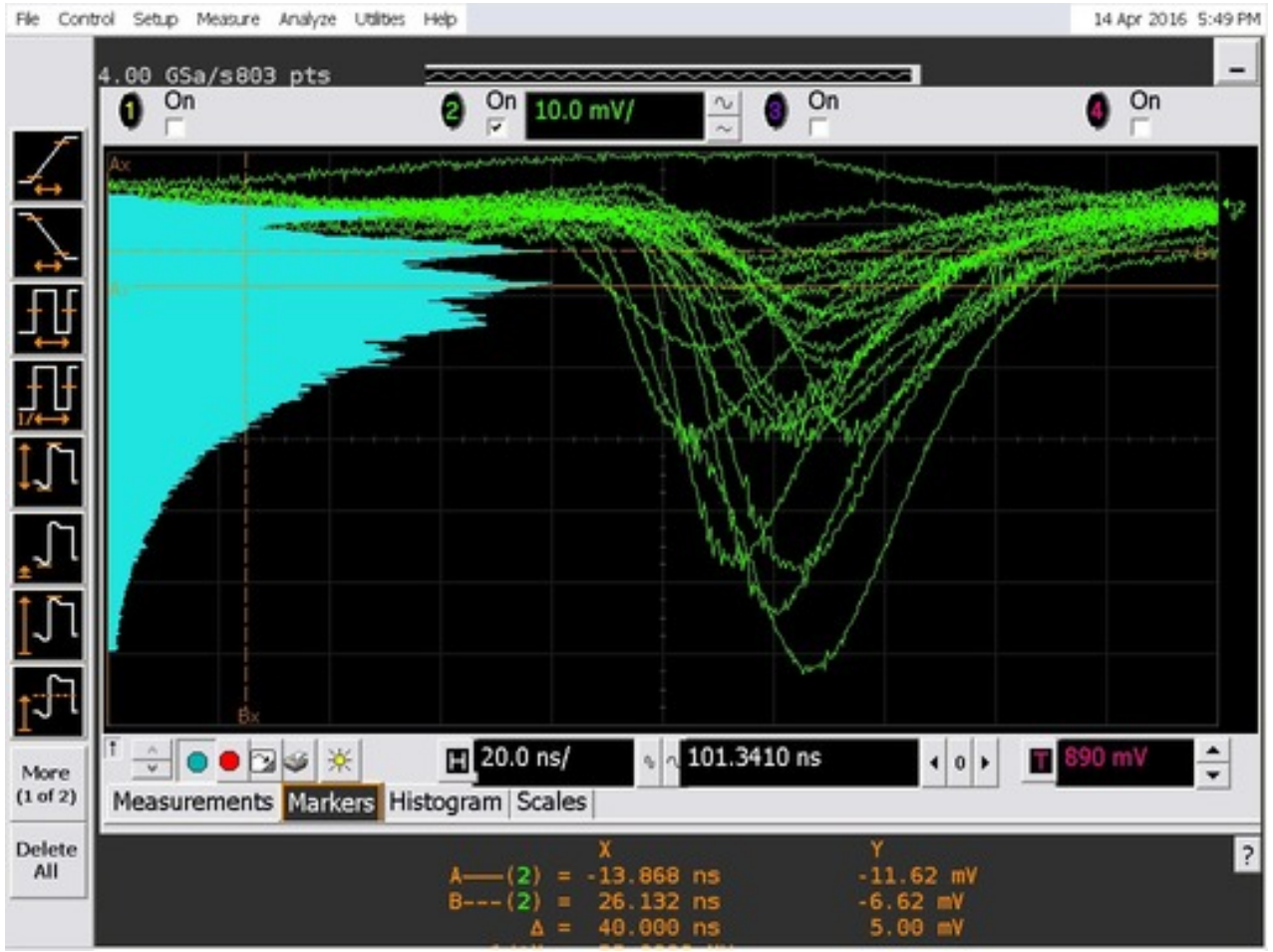
- Clear peaks
- Sent to us with shielded leads already attached

SiPM single PE peaks, group B



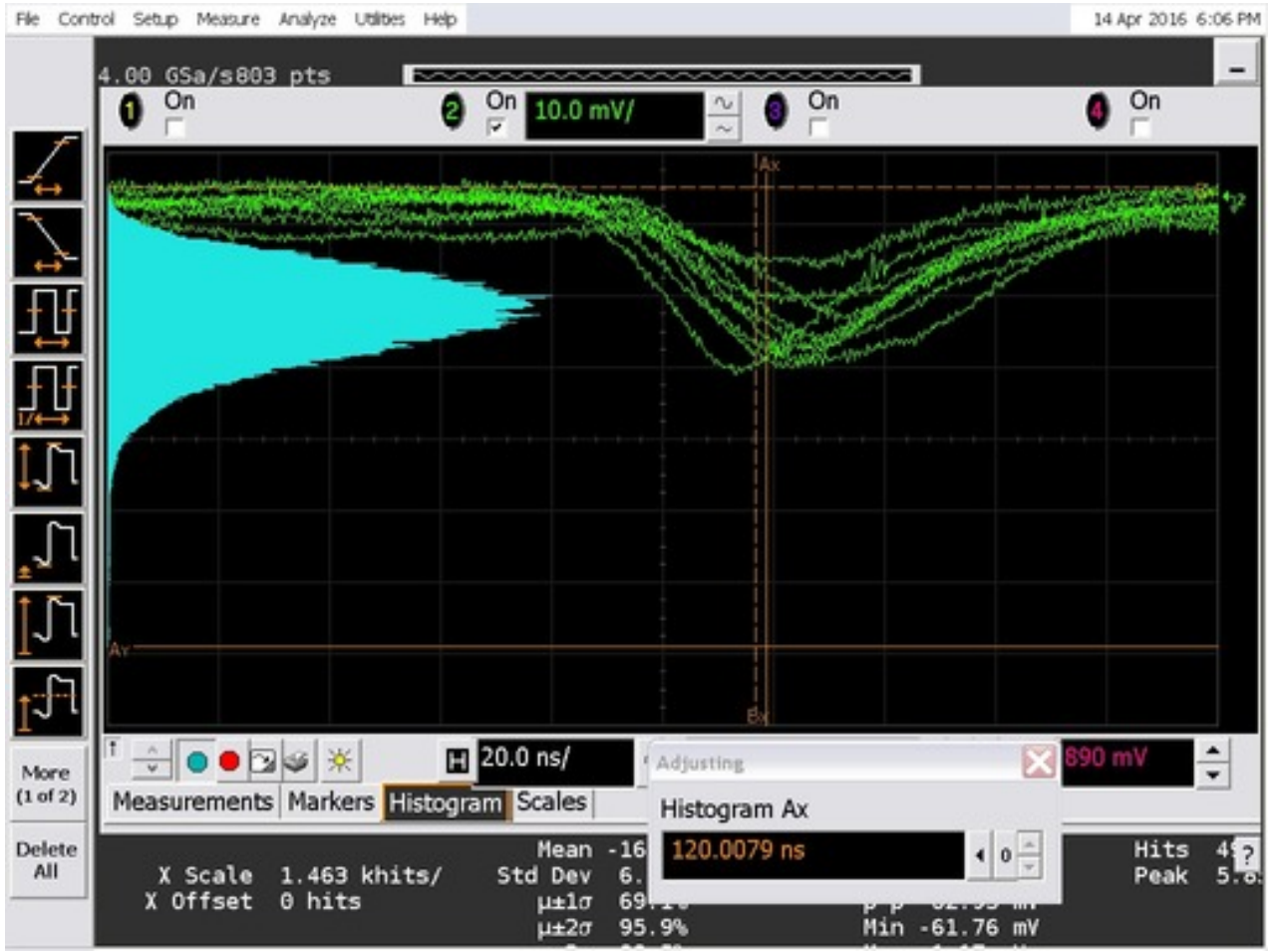
- Marginal peaks, but findable

SiPM single PE peaks, group B



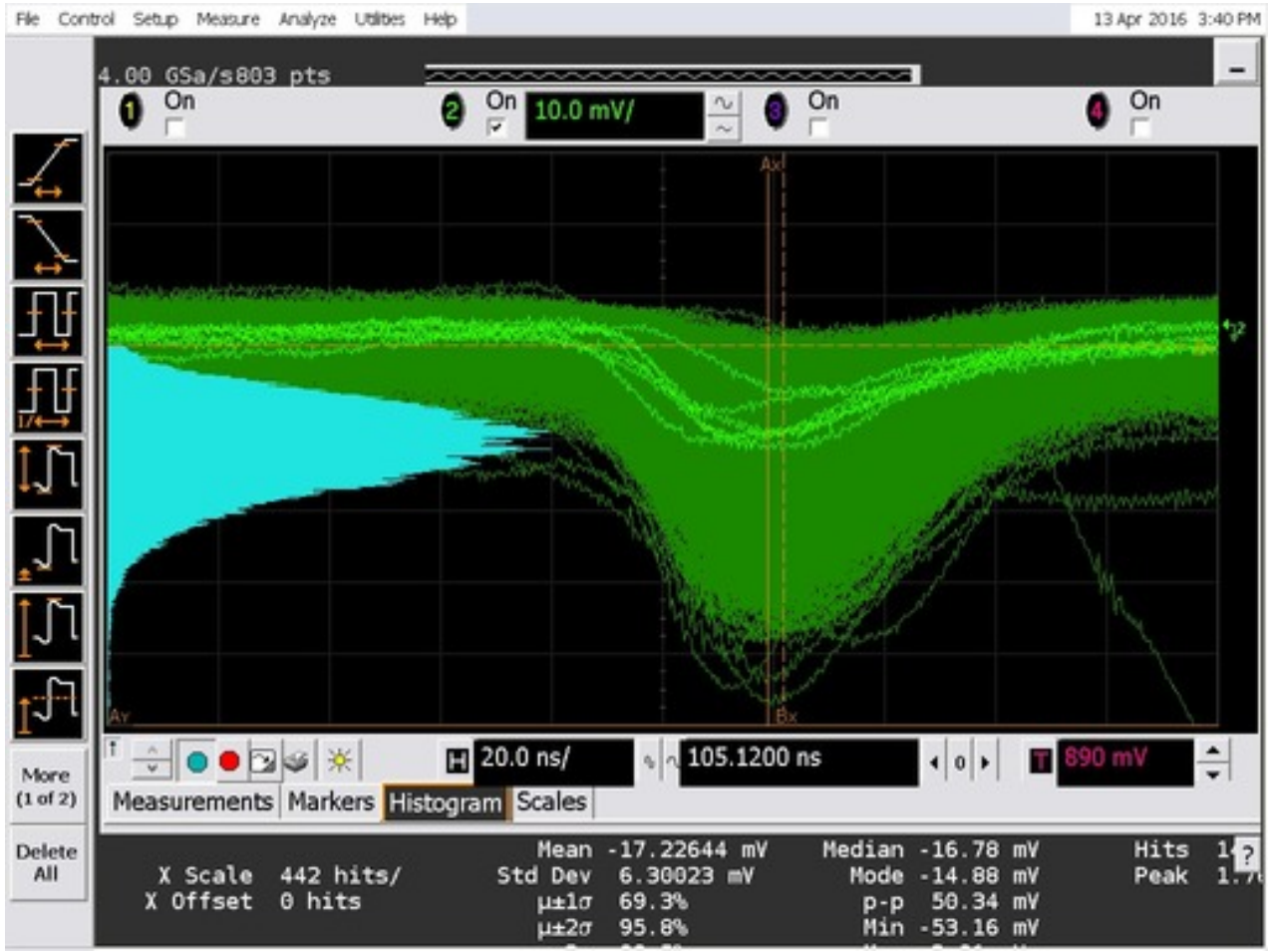
- Marginal peaks, but findable
- Adding shielding to the leads improves the peaks

(Lack of) SiPM single PE peaks, group C



- No peaks to be found

(Lack of) SiPM single PE peaks, group C



- No peaks to be found
- Adding shielding to the leads doesn't help

SiPM problems

- Despite intensive efforts, we cannot obtain pixel peak spacing on the SiPMs sent to us as part of the shipment of the 7 outer HCal tiles
- Nevertheless, we can roughly evaluate performance by comparing the average SiPM voltage in response to a fixed LED voltage at a fixed position on single tile

SiPM (serial) number	SiPM signal (mV) LED at 1.2 V	SiPM signal (mV) LED at 1.8 V	group	notes
3168	75.87	348.27	B	soldered on shielded leads
3172	76.72	355.18	B	
3173	77.59	345.69	B	
927	13.40	64.48	C	soldered on shielded leads
965	15.86	75.86	C	
972	18.10	74.14	C	
973	14.82	71.38	C	
992	12.93	62.40	C	

Note: all SiPMs were biased with 67.86 V, the exact spec for 3168

- Dramatic difference, roughly a factor of 4-6 decrease from group B to group C —Are the new ones (group C) defective? Are they a completely different model?

Short summary

- None of the small blue manufacturers bags were included in the last shipment, so we don't really know anything about them
- It seems fair to say either all 5 are seriously defective or they're a completely different model with very different performance
- It would be very helpful for BNL to tell us what these are
- If they're different, that probably explains these differences, and our tests tell us something important about their performance
- If they're the same, then there are serious quality control issues, and we'll need a good scheme for confirming approximate uniformity for performance in sPHENIX