Charge Asymmetry Test

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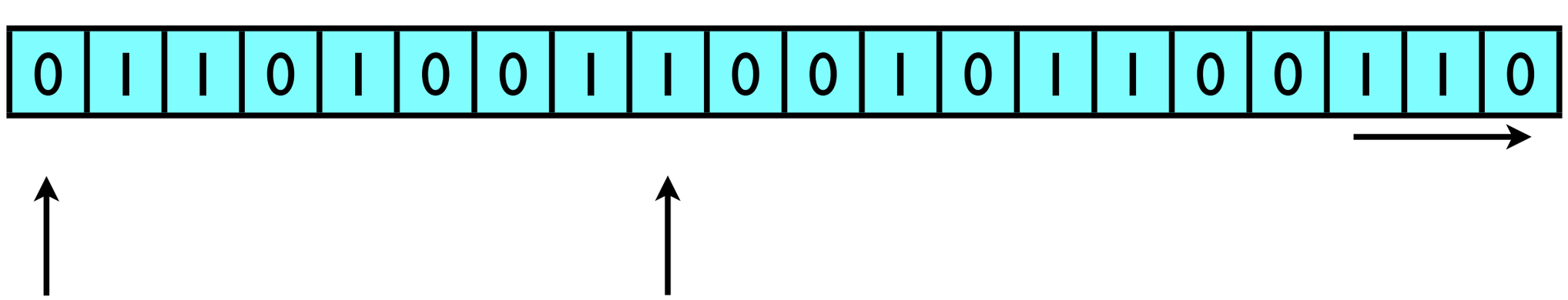
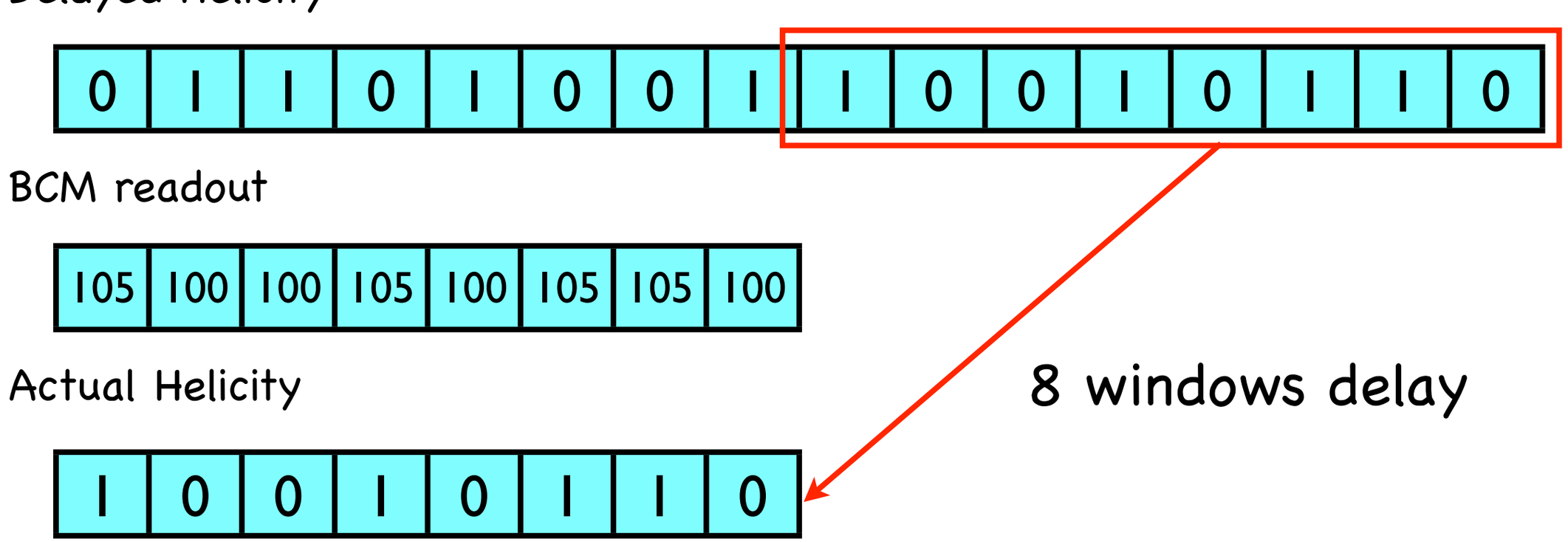
Helicity and Charge Asymmetry

- QWEAK runs with a helicity flip rate 960.02 Hz
- The helicity reported from the helicity board is not the actual helicity of the beam at that time: delayed by 8 windows



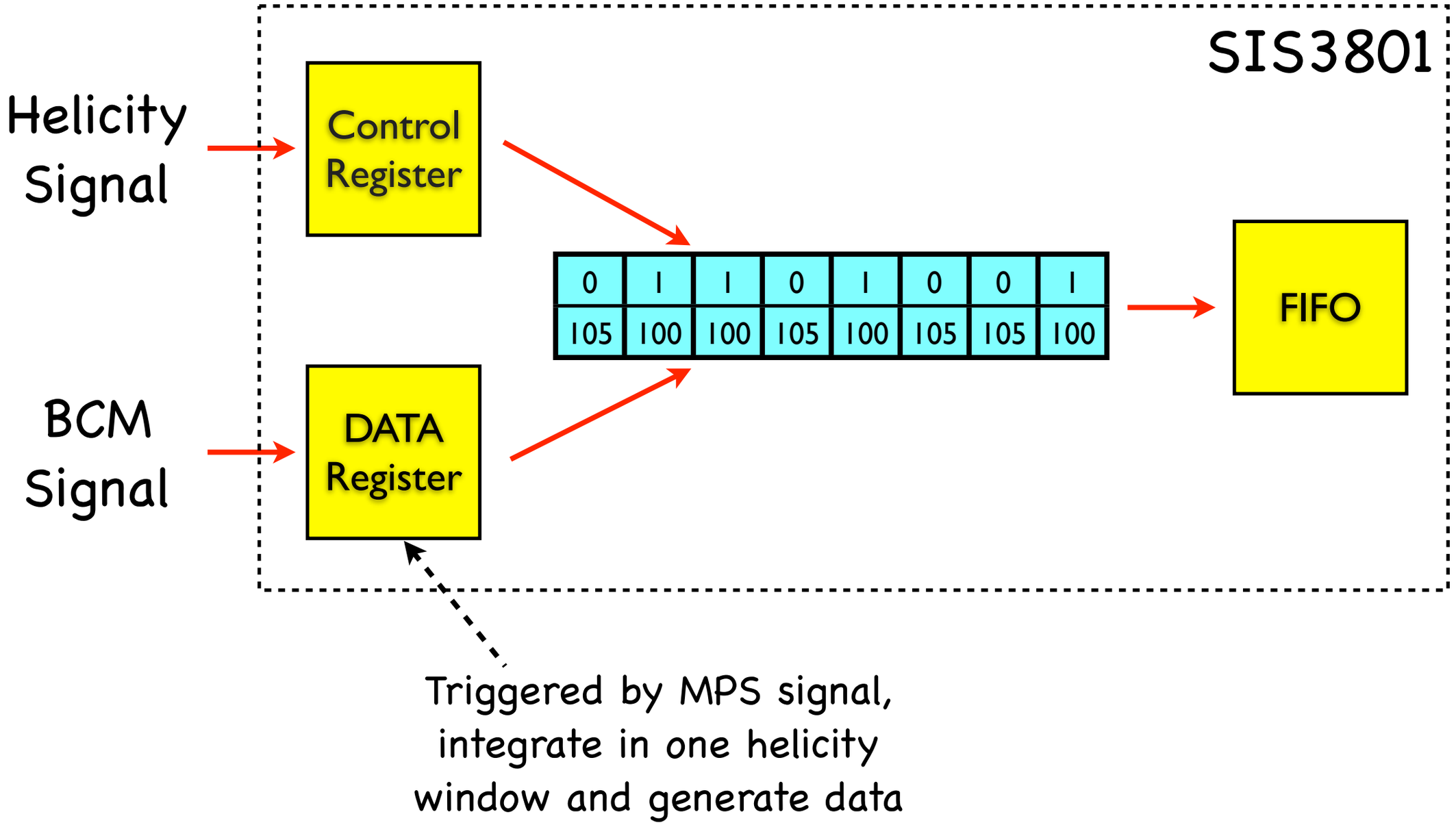
Helicity and Charge Asymmetry

- BCM signal will change with the actual helicity
- BCM readout is stored with delayed helicity
- Solution: ring buffer

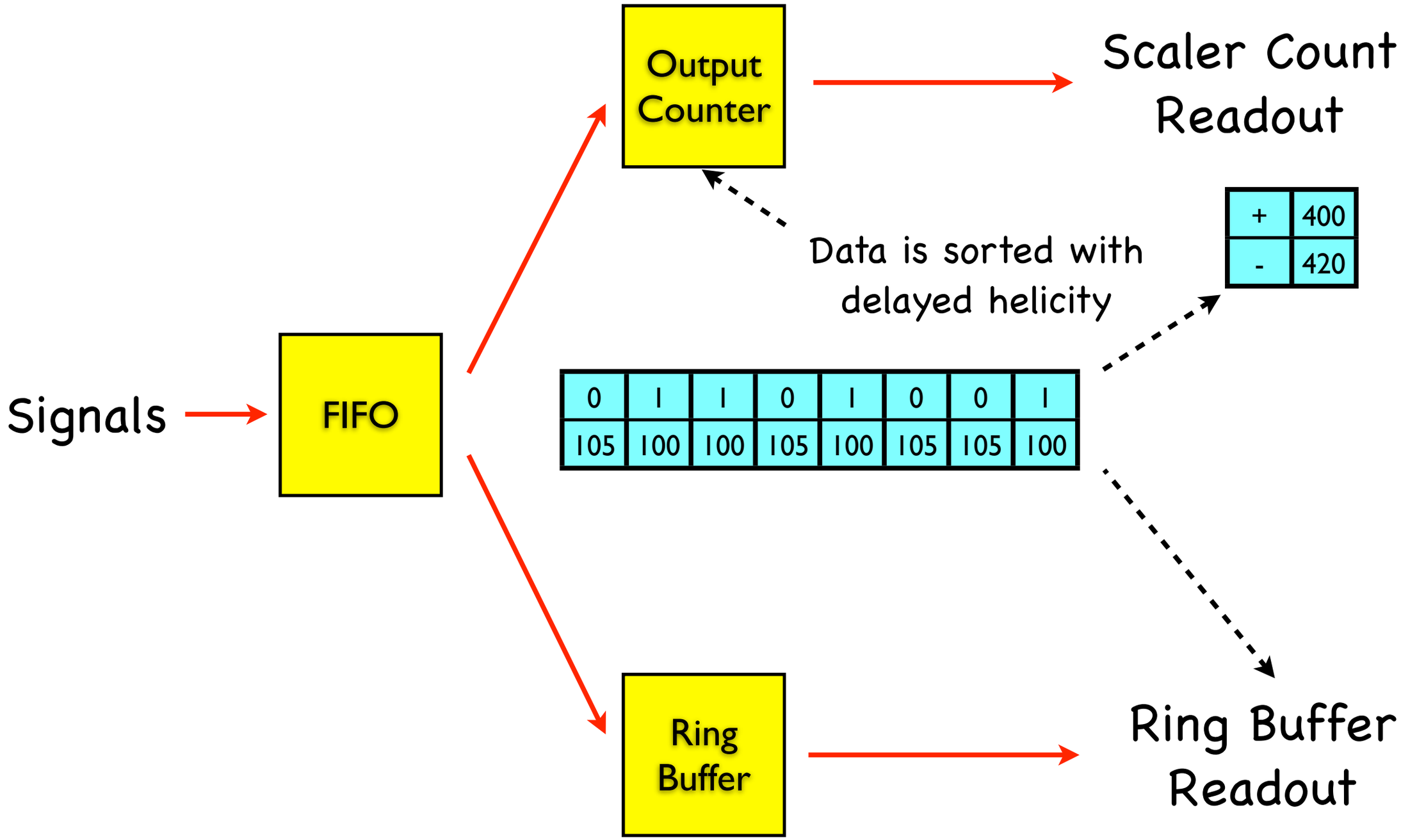


Hardware Setup: Ring Buffer

- Electronics setup: follow R. Michaels tech notes, same setup as DVCS

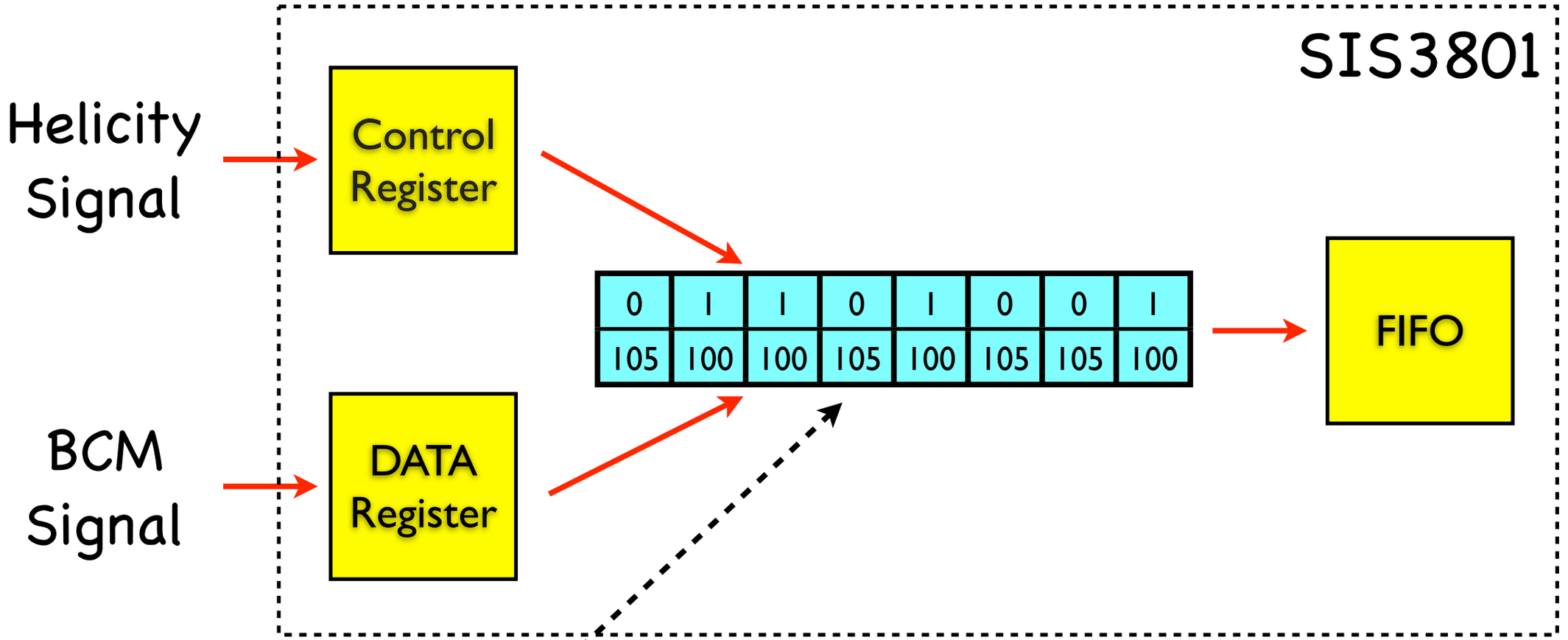


Hardware Setup: Ring Buffer



Hardware Setup: Ring Buffer

- One problem during commission



The delayed helicity and BCM is not aligned inside SIS3801, it should be delayed by 8 windows but it as actually 7 windows

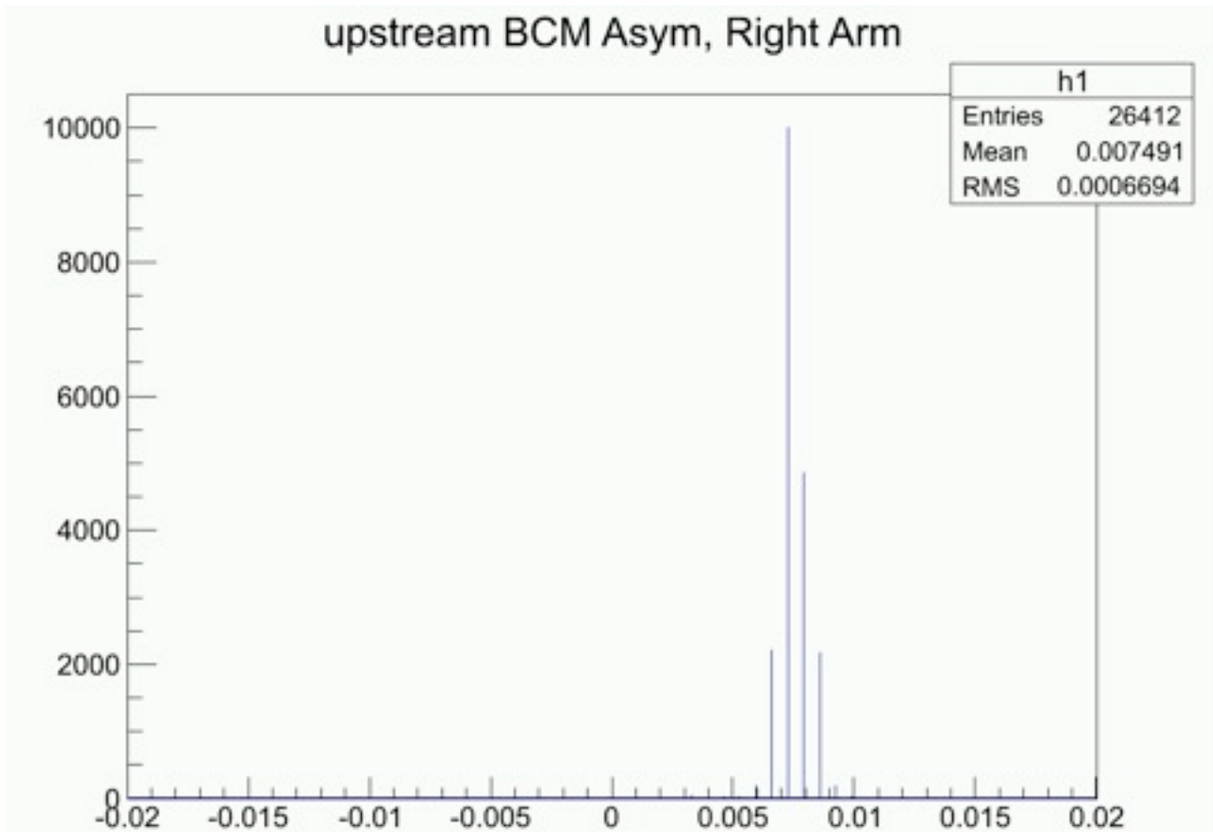
0	1	1	0	1	0	0	1
105	100	100	105	100	105	105	100

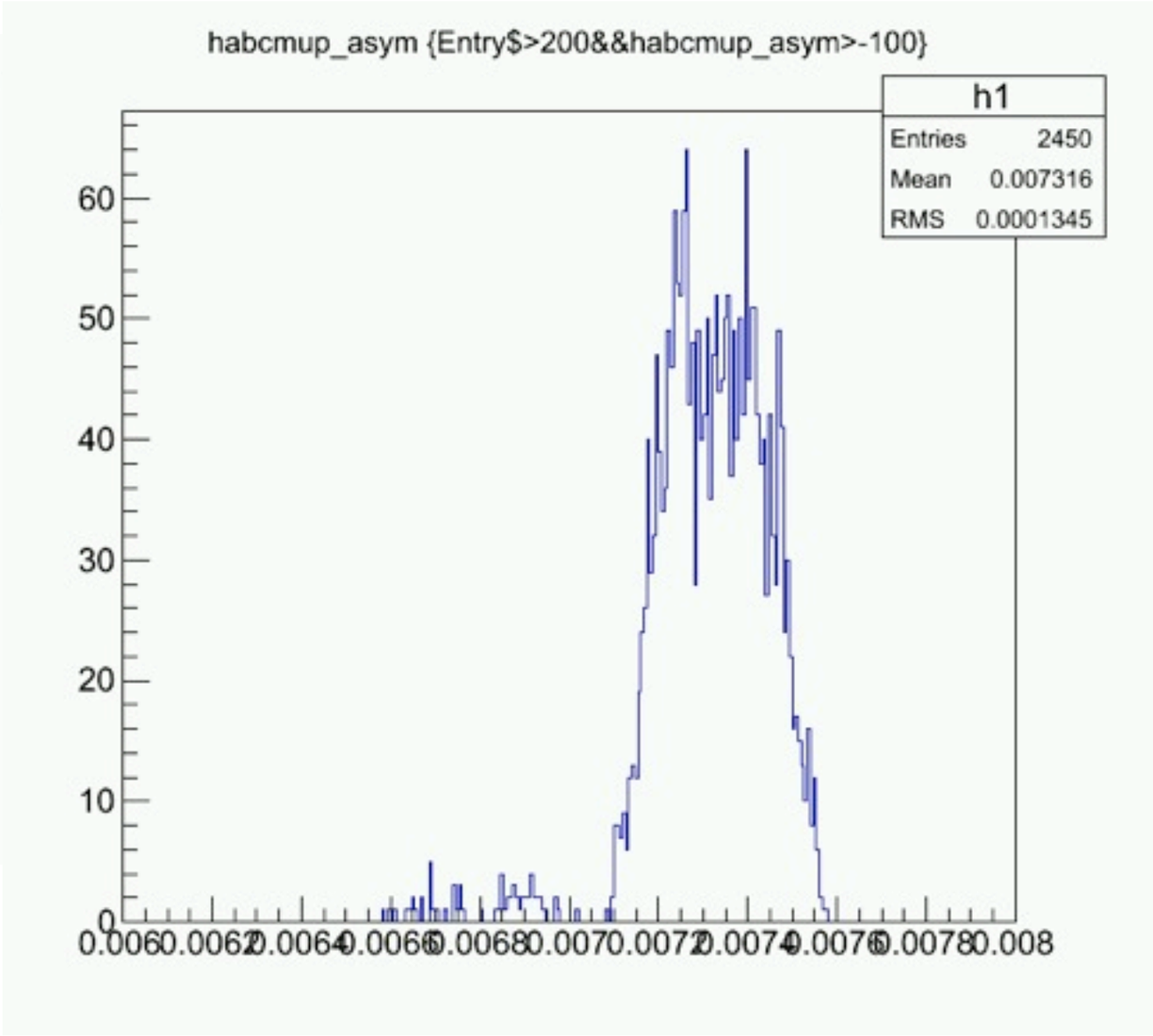
	0	1	1	0	1	0	0
105	100	100	105	100	105	105	100

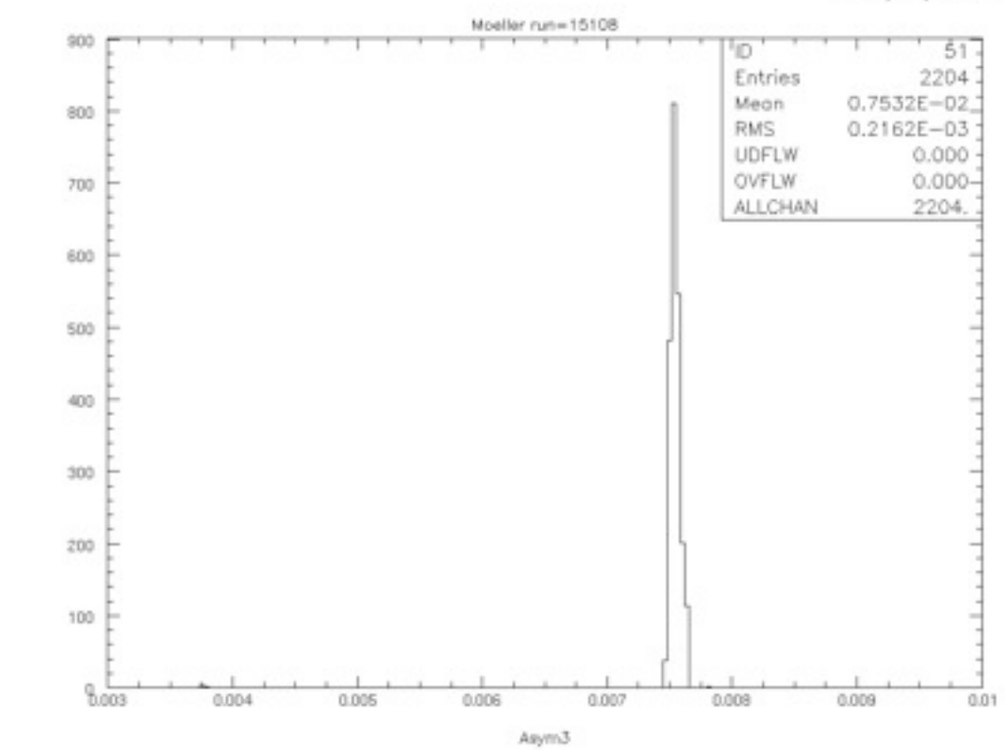
Test Setup

- Use local helicity board to generate a fake helicity signal (delayed and no-delayed)
- Use DAC to generate a fake BCM signal which has a large asymmetry, this signal is based on actual helicity
- Put delayed helicity actual helicity, fake BCM signal into our normal DAQ system (HRS, HAPPEX, Moller, 3rd Arm...)
- Pengjia will give a plot of this with details

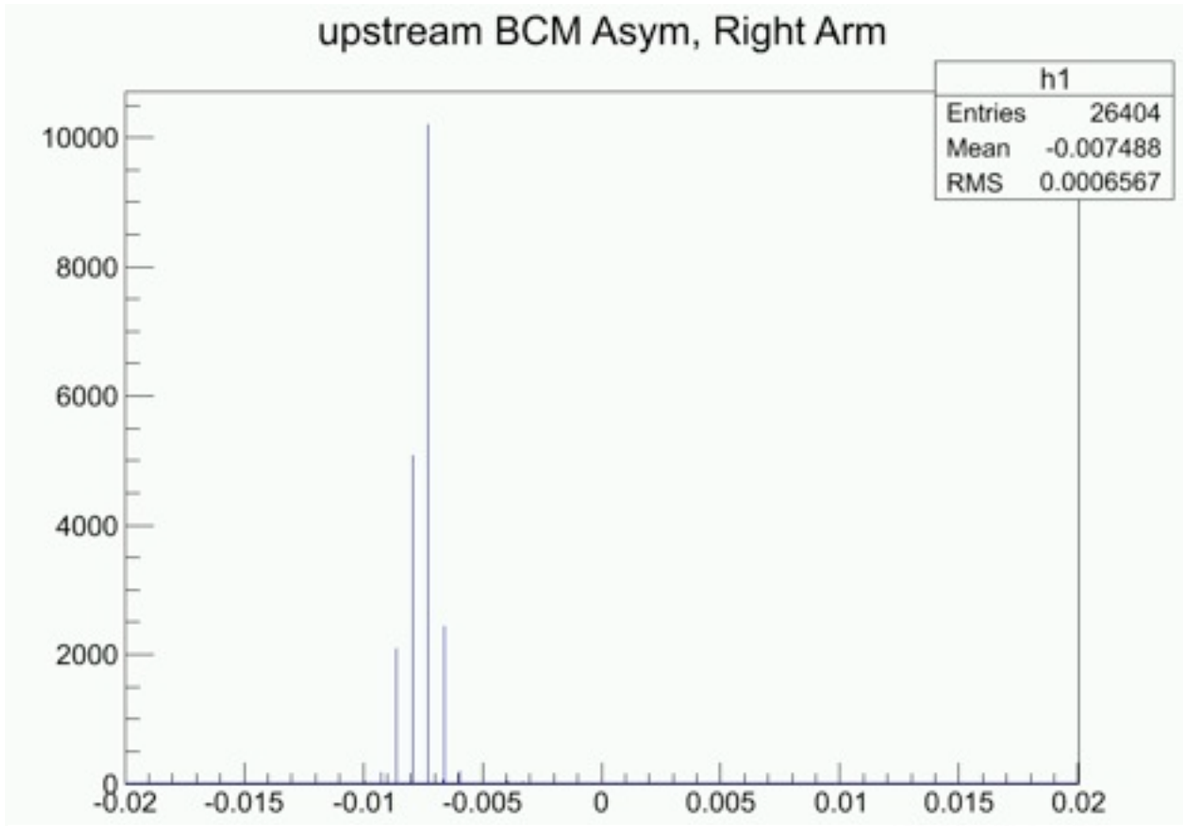
Results, Asym Setpoint 0.75%

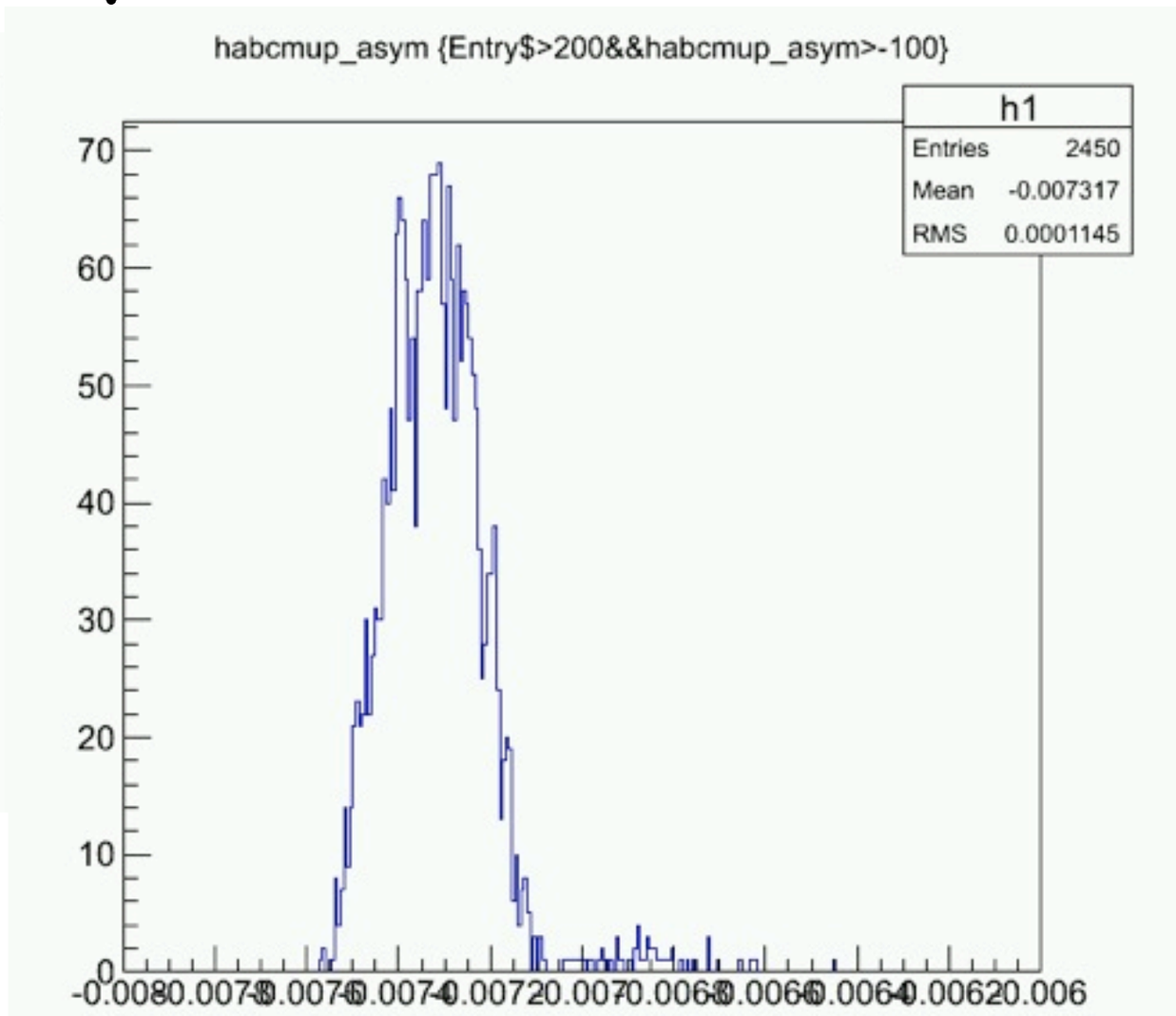


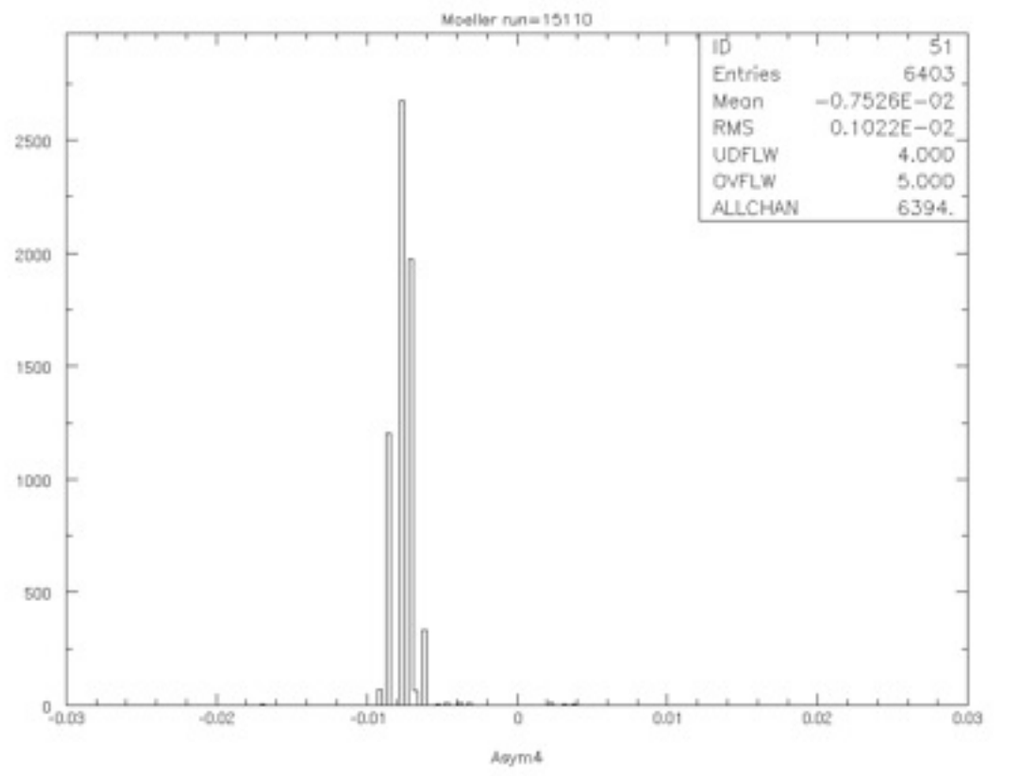




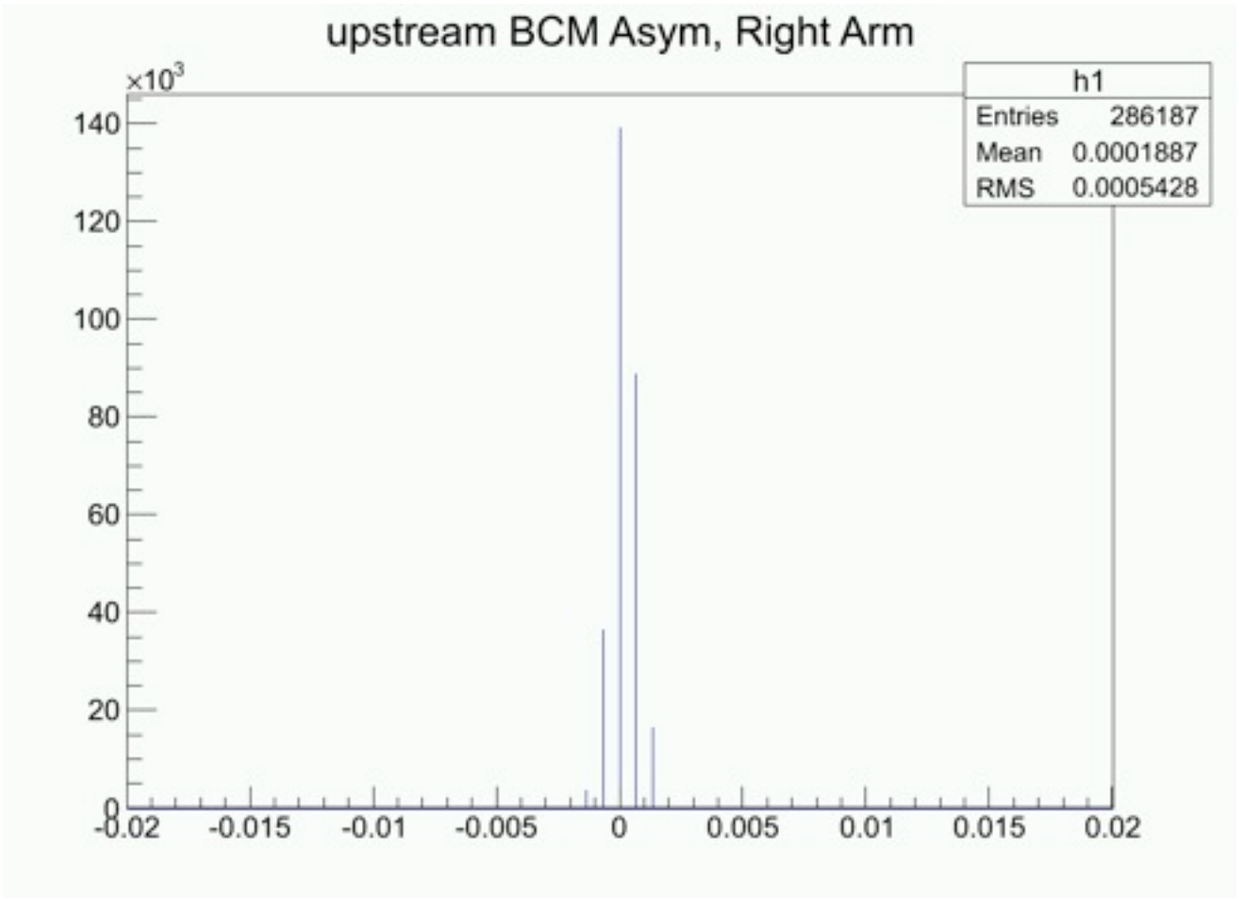
Results, Asym Setpoint -0.75%

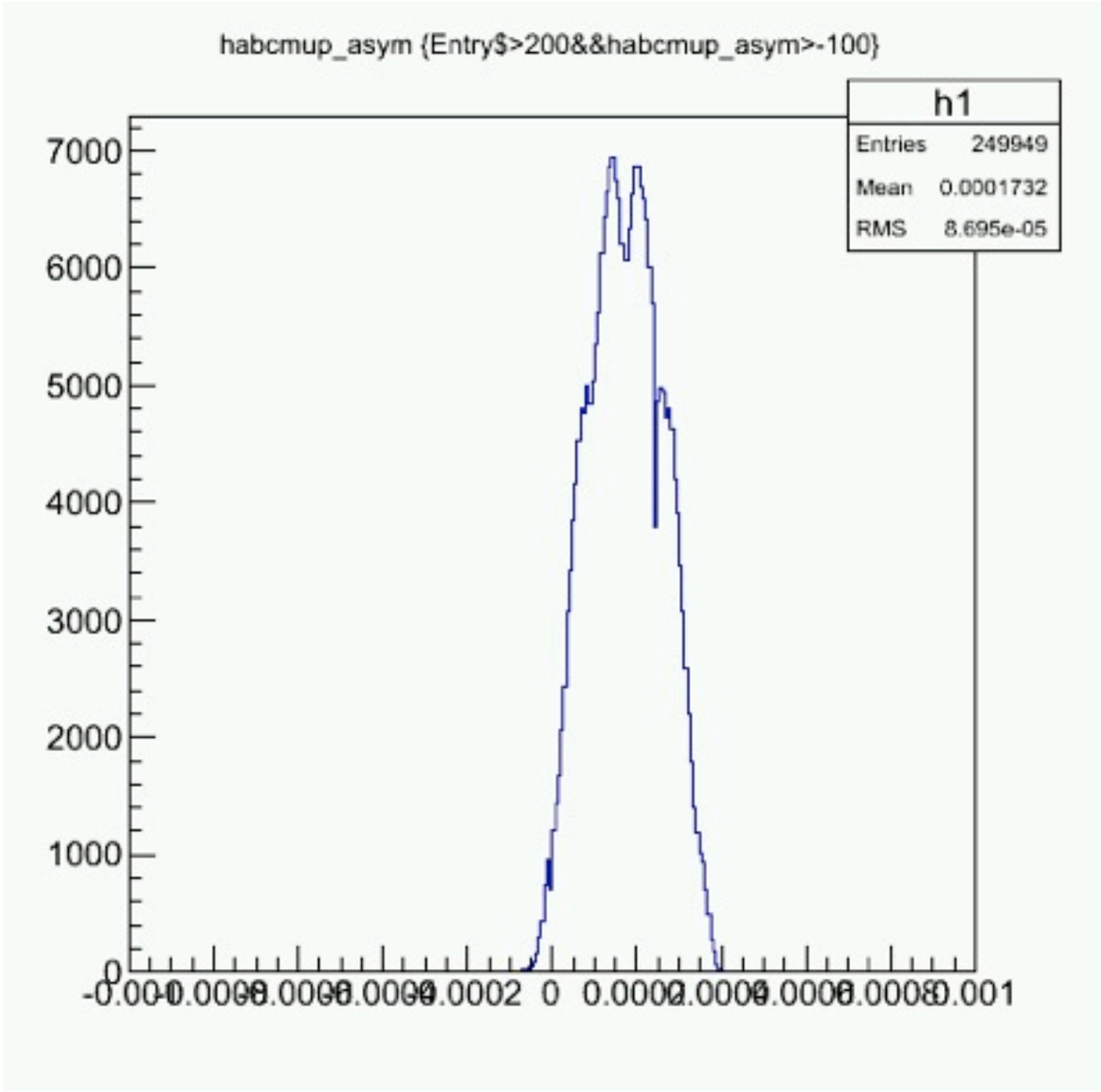




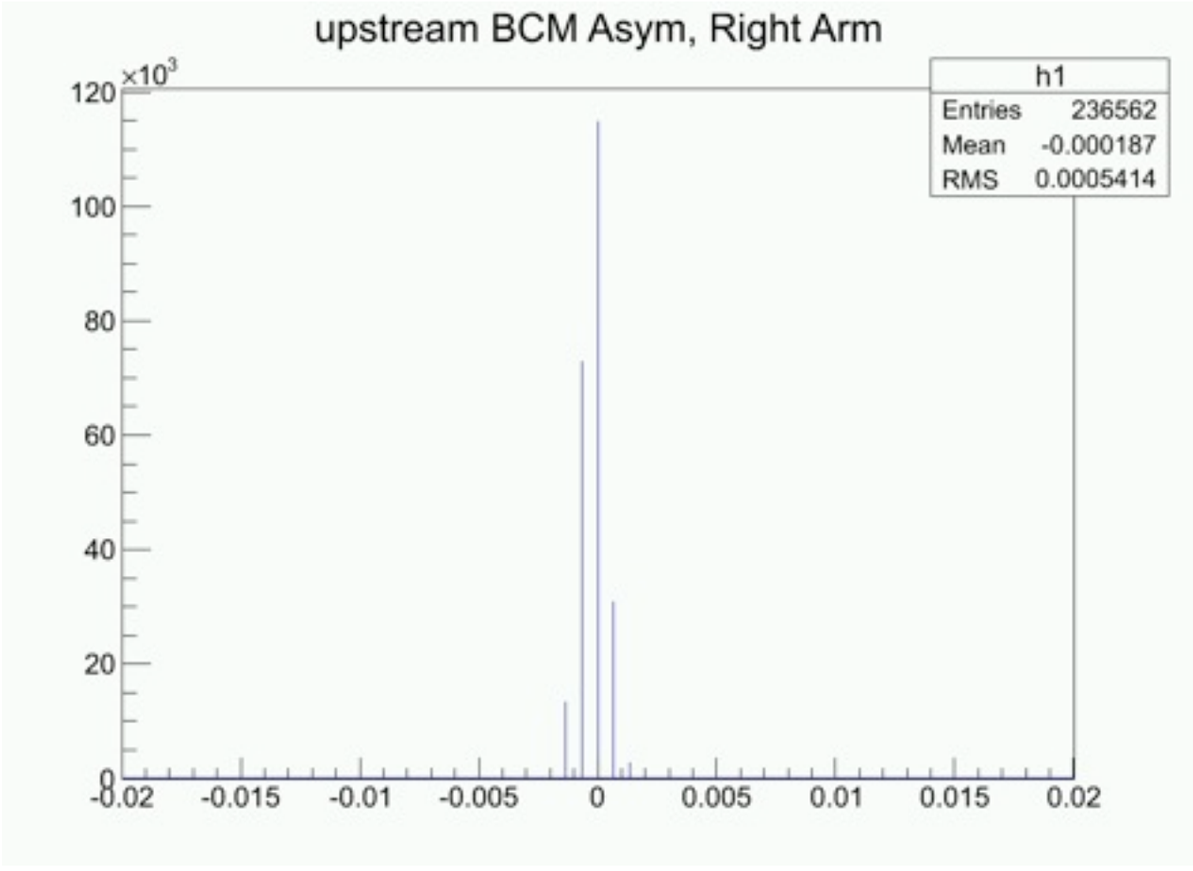


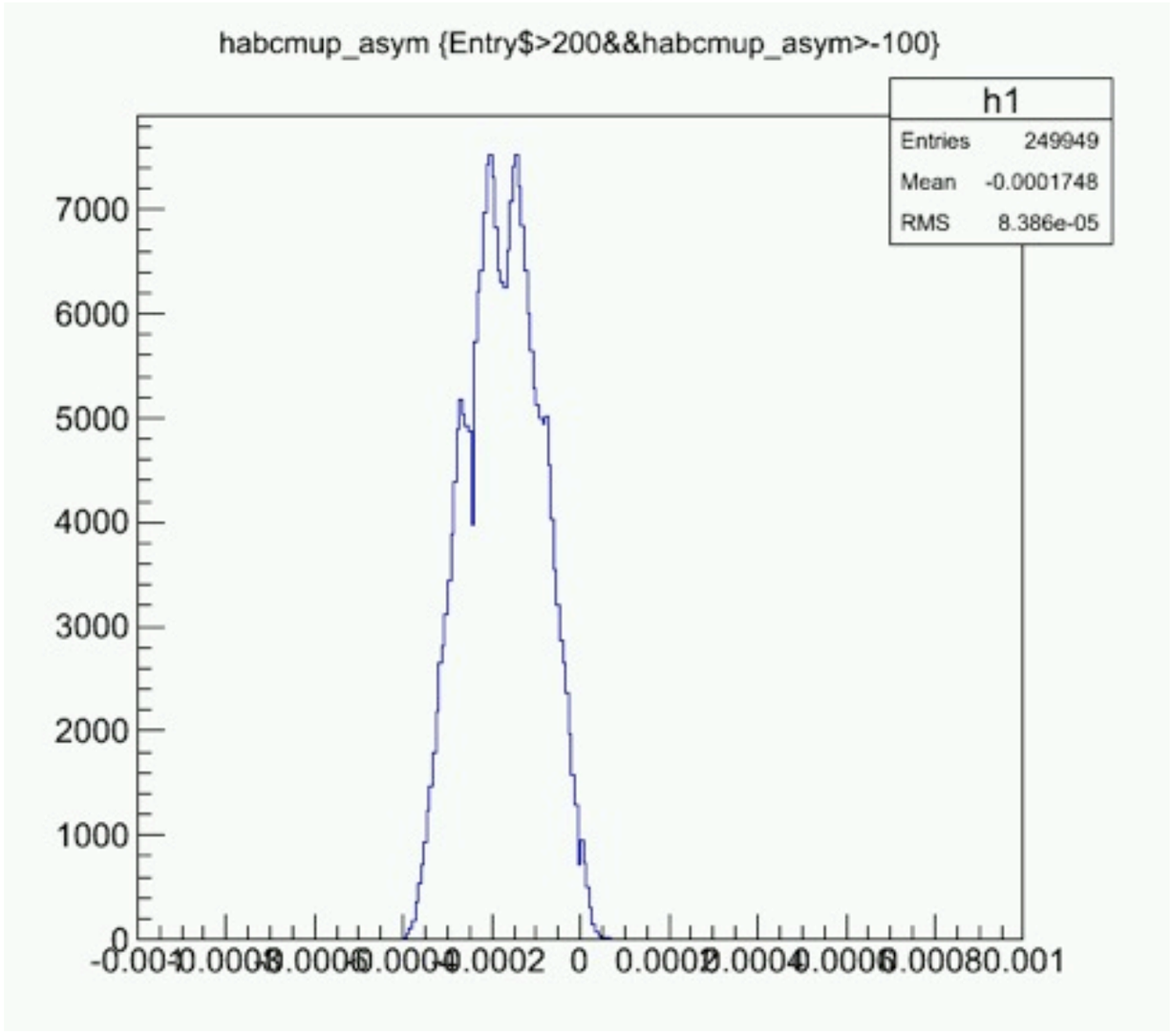
Results, Asym Setpoint 190ppm





Results, Asym Setpoint -190ppm





Conclusion and Unsolved Problem

- HRS scaler test result is consistent with HAPPEX DAQ and Moller DAQ
- This test can not explain why Hall C see -5% asymmetry when we see -1% during commission
- Do a test just now together with Hall C, it seems we get the same result with scaler, however this still can not answer the above question