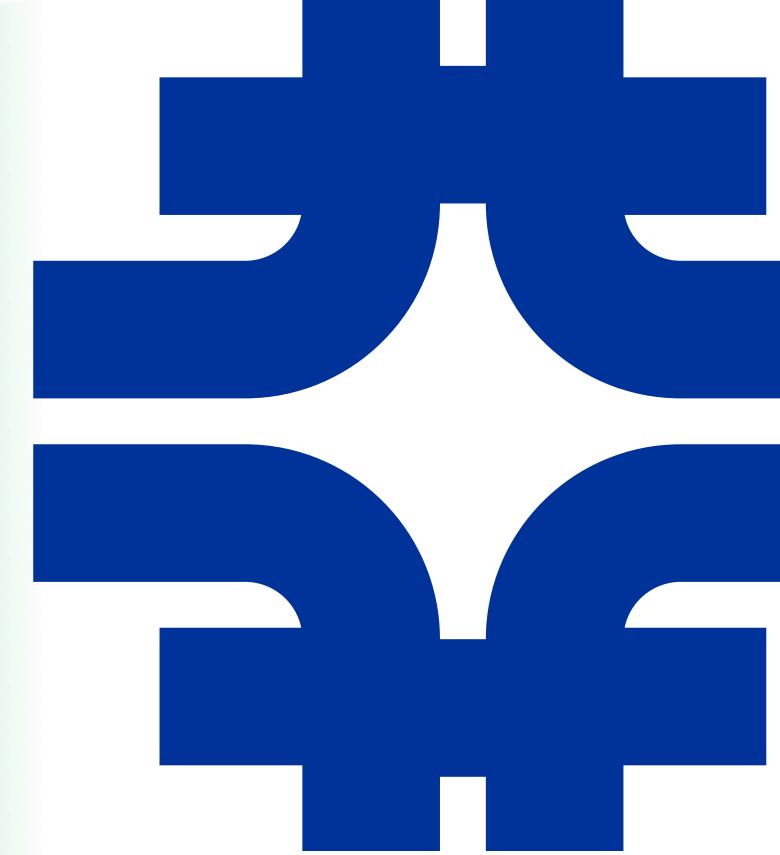
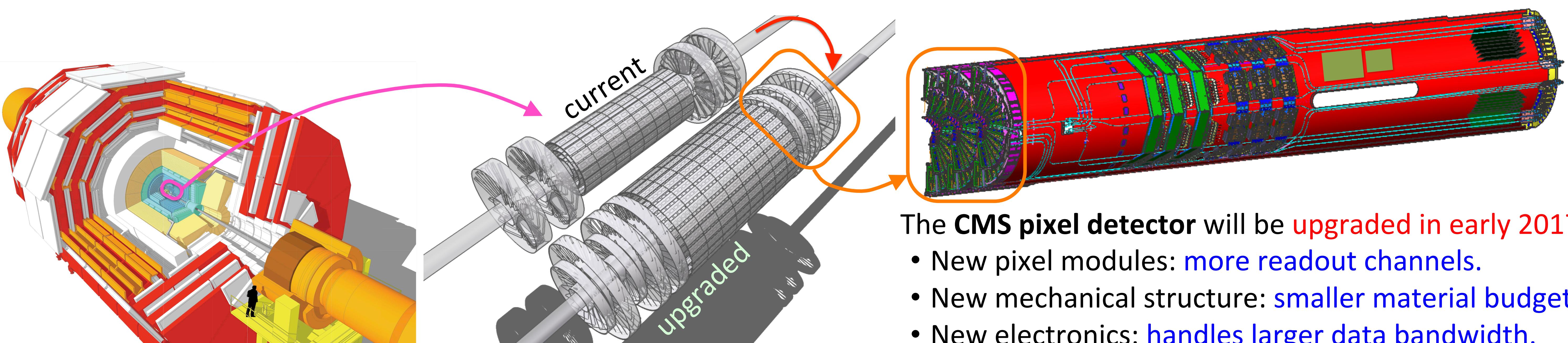


# CMS Forward Pixel Upgrade

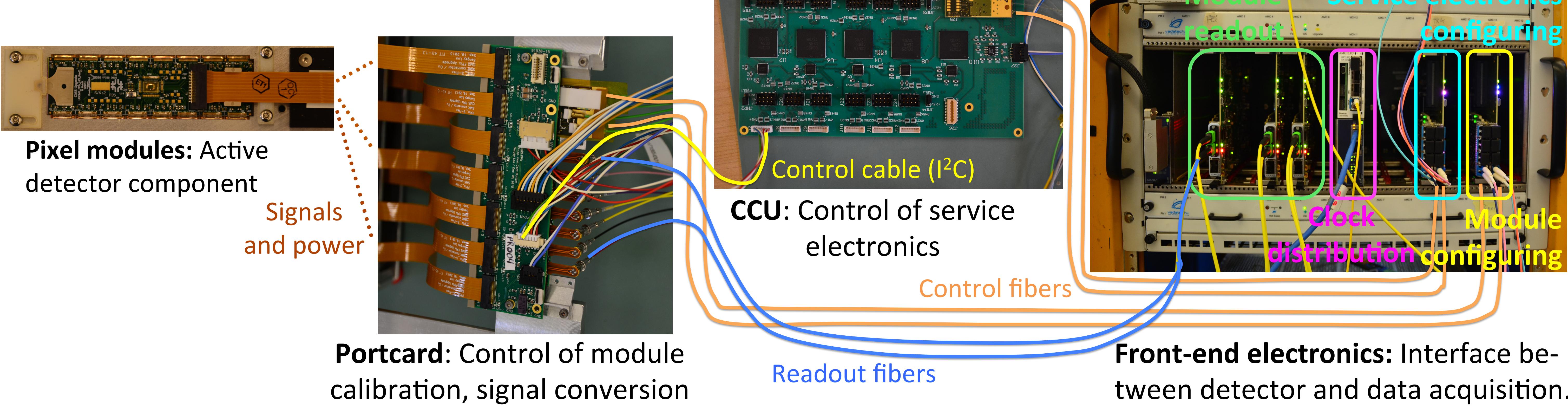
## Electronics and System Testing



Hannsjörg Weber (Fermilab)



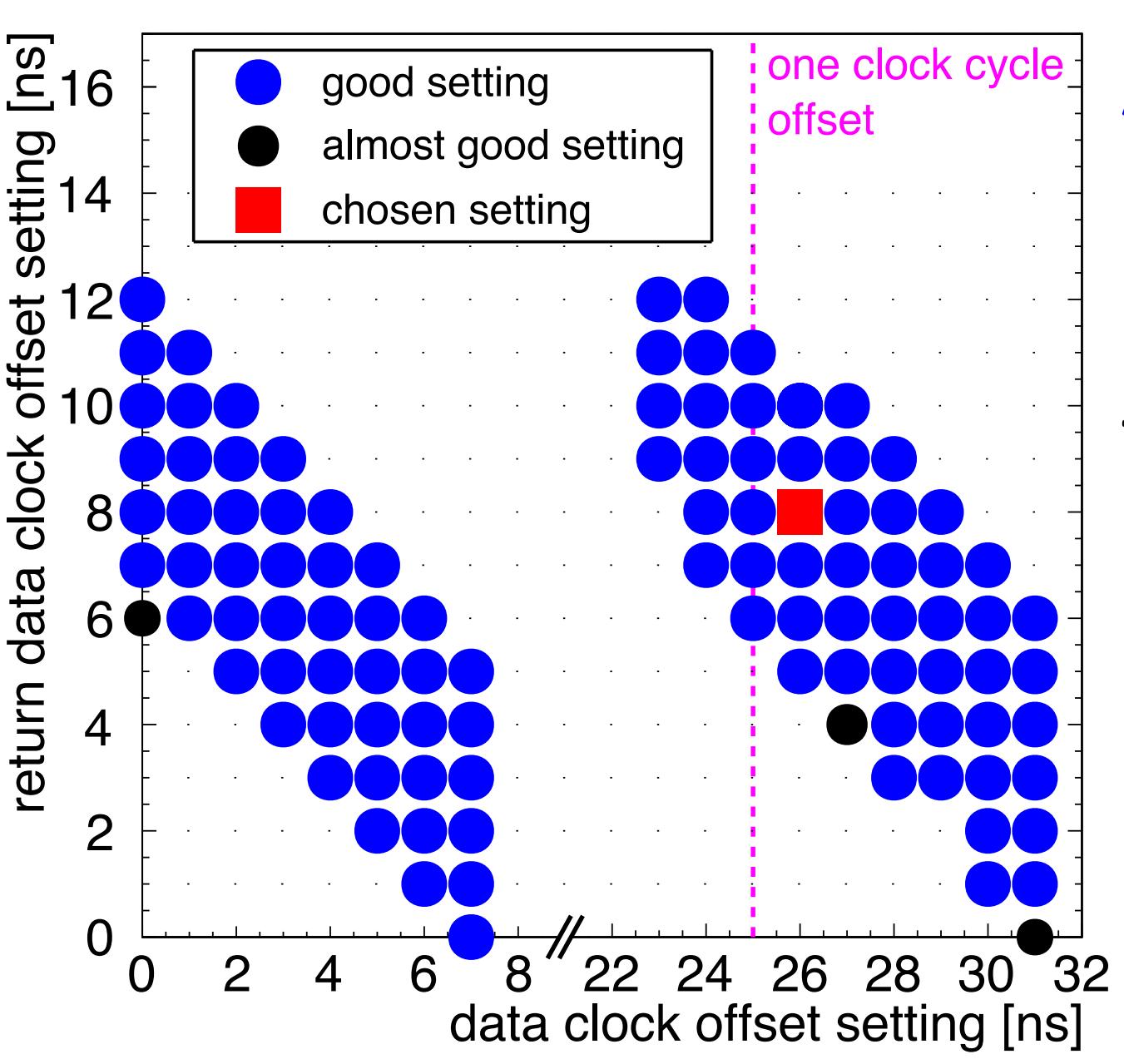
### Establishing full readout chain



This readout chain, implemented at a teststand at Fermilab, USA, resembles the readout of the final detector.

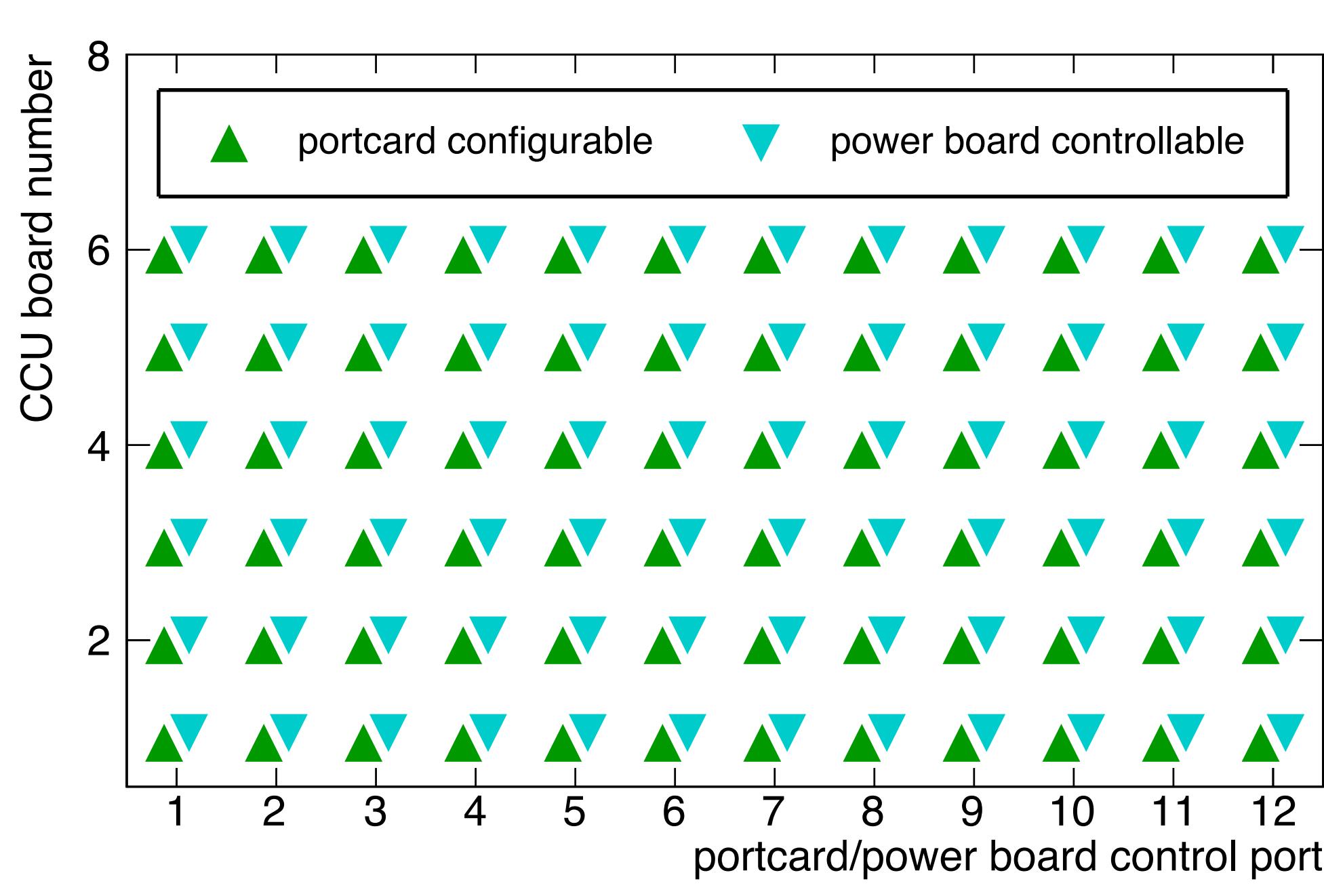
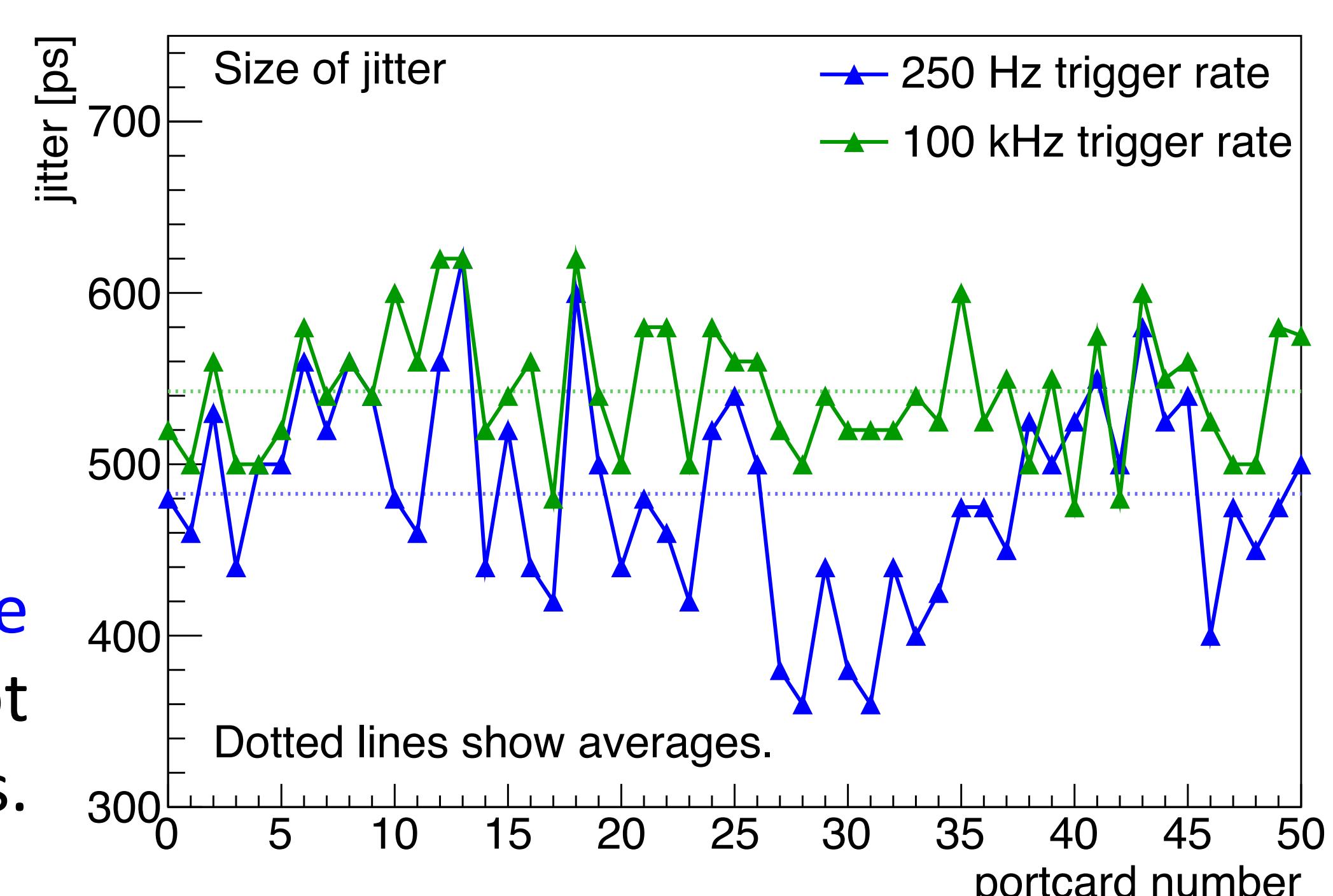
### Full System testing

Each element is tested with a full suite of tests before deemed good to go into the detector. Examples of these tests are ...

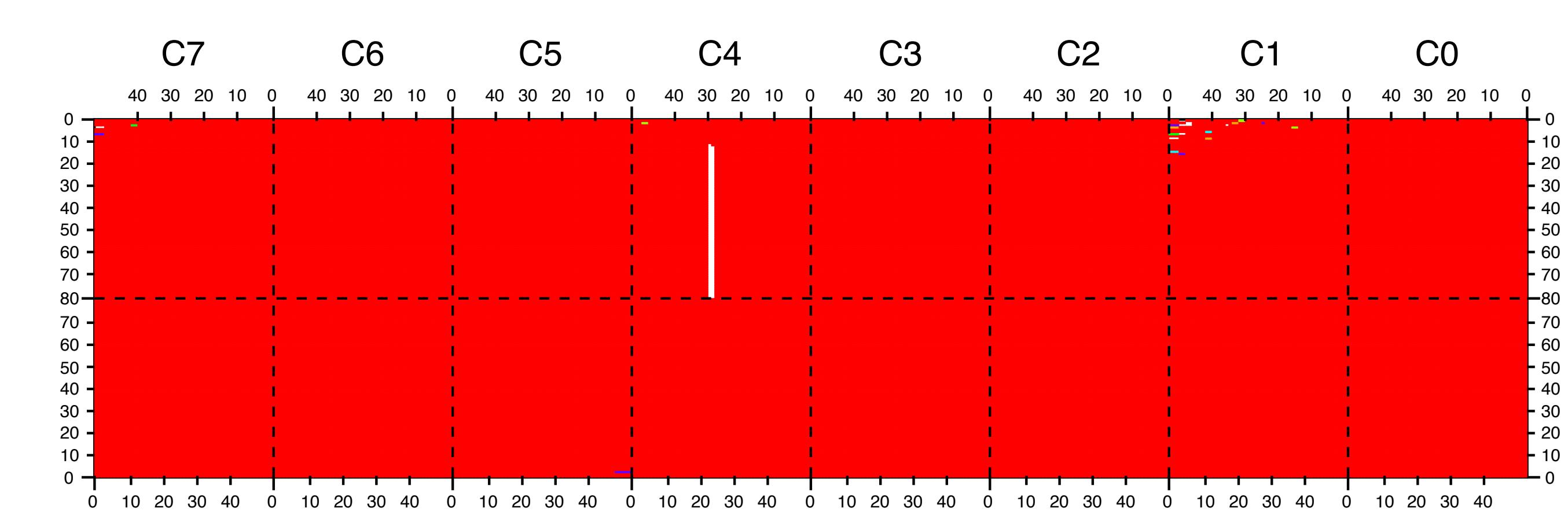


An ASIC chip on the portcard synchronizes the input with return data. Good offset settings allow the chip to do the synchronization. Thus, the user can see if calibration data were acknowledged by the modules.

A quartz crystal chip on the portcard controls the jitter of the clock distribution. Jitter should not increase significantly for high frequencies.



The CCU performs the settings of the portcards, controls the on-detector power boards, as well as some temperature readout. Thus it acts like a “brain” of ¼ of the forward detector.



→ Test data are generated at the modules and sent to the front-end electronics. If the full readout system is working correctly, the test data are read out successfully.

### Towards integration

Only successfully tested objects are installed in the detector. All CCUs and 38/50 portcards have been qualified as good. The first two half-cylinders are assembled for the installation during the technical stop of 2016/2017.