Notes from tests with E. Delagnes in Saclay on Dec. 4
S. White, Dec. 9, 2014

The purpose of these tests was to follow up on tests we did at CERN on Nov. 21. Specifically:

1) I didn't have a fiber optic splitter in my office in the earlier test so all timing was done relative to the pulse firing the Vcsel. We prefer to have data timing 2 APDs against eachother.
2) As noted earlier, there is a fine point in establishing MIP equivalence in that lower APD gain (than at DESY) was compensated with higher light signal. In the Saclay tests all data were taken with a 1795 V bias (as at DESY).
3) The plot in Eric's report from the CERN test doesn't seem to follow the expected 1/SNR dependence of the time jitter. We did a series of points with varying gain to check this.

During the course of tests we noted that the spare detectors still had problems which we first noted at U.Penn. on Nov. 17th.The detectors are being sent back to RMD and I asked Dick to prepare 2 new detectors for beginning of January. The symptoms:
432-6: This was supposed to be the selected design to match the one currently under test. This was our last purchase. The detector draws significant (>10microA) current, even at ~ 1kV.
432-5: This detector is working fine up to about 1750 v but draws current above this voltage.

We started by repeating the measurement of jitter relative to the Vcsel drive pulse and noticed that the back, older technology detector and more jitter than the front, new technology one tested on the 21st. There were 2 causes we considered and tried to test. The front detector usually had the

fiber retracted from the surface to reduce the light whereas the back detector had the fiber close to the detector and the intensity was usually adjusted in the coupling external to the box. The other possibility was that the leads connecting the detector to the amplifier could have degraded the signal.

The tests were not conclusive but we eventually got as good performance with the back detector mostly after changing the light connection.

We should really follow up on this. If there are subtle issues in the interconnects or light delivery which can noticeably degrade performance it would be best to track these down.

We didn't really work on this but we noted the presence of low rate noise signals with large amplitude as Lu has also in the past. We should try to characterize these systematically, vs. HV and other environmental effects. Dick should fill us in on what is known.

We used both the home made pulser and the commercial one (Lecroy?) that Eric had in the lab. The latter has slower (300 psec?) risetime but none of the radiated noise noted in the Nov. 21st report.

We studied the latter in more detailed and had online w. CF method about 18 picosec jitter between 2 APDs and ~11 picosec between individual APDs and the pulser signal.

Eric is releasing the data from the test for offlie analysis tomorrow.